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Improving Mammography Adherence in the Primary Care Setting

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ABSTRACT

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Despite exhaustive efforts over the past several decades aimed at prevention, early detection, and improved treatment regimens, breast cancer remains the most commonly diagnosed cancer among American women and is nearly the deadliest; it is second only to lung cancer in mortality (American Cancer Society [ACS], 2019; Centers for Disease Control and Prevention, 2018a; National Cancer Institute [NCI}, 2018). Women of average risk carry a 12% or 1 in 8 chance of developing breast cancer in their lifetime. Most recent estimates reveal 270,000 new breast cancer cases and over 42,000 breast cancer related deaths will occur in 2019 (ACS, 2019). Screening mammography remains the gold standard for early detection of breast cancer; detection before signs and symptoms appear is shown to decrease mortality and improve survival related to breast cancer (NCI, 2016, 2018). Multiple barriers and disparities were discussed in the literature in relation to mammography adherence and screening rates remain suboptimal despite known benefits of this important preventive tool. This Doctor of Nursing Practice scholarly project further explored the background and influencing factors related to mammography adherence, integrated a comprehensive review of the literature, and provided an evidence-based quality improvement initiative tailored toward improving mammography adherence in the primary care setting.

This quality improvement project was designed in collaboration with a local primary care clinic and breast diagnostic center. The project aimed to identify women in the community who were past due for a screening mammogram, identify past and current efforts to improve mammogram rates within the chosen clinical setting, and develop a multimodal outreach initiative to improve women's adherence to timely mammogram screenings. A scripted, evidence-based telephone outreach initiative was developed and built upon in-person and reminder letter initiatives completed by the clinic prior to this project. Fifty women from the clinic who were of average lifetime risk, were at least 12 months past due for a screening mammogram, and had received both previous forms of outreach were included in the sample population. The post-intervention sample population consisted of 44 women; the project was successful in influencing 20% of participants to schedule a mammogram while 16% followed through in obtaining a mammogram. The results of this scholarly project are beneficial in providing the clinic and diagnostic center stakeholders with additional knowledge and methodology regarding breast cancer screening outreach in addition to reaffirming a theme revealed in the literature surrounding mammography adherence: improving mammogram rates for women who are past due for screening is best accomplished through multimodal outreach that progressively increases in intensity over time.

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CHAPTER I

INTRODUCTION

Background

Breast cancer represents a significant disease burden among American women and across our society. The most recent data from the Centers for Disease Control and Prevention (CDC; U.S. Cancer Statistics Working Group, 2018) revealed over 240,000 new cases of female breast cancer were diagnosed in 2015 and over 41,000 cases resulted in death. The American Cancer Society (ACS; 2019) estimated that by 2019 the incidence rate would increase to nearly 270,000 new cases per year with the mortality rate rising to over 42,000 deaths annually. Although great progress in breast cancer mortality rates is illustrated by a 40% decrease since 1989, breast cancer remains the most commonly diagnosed cancer and the second most deadly cancer among American women (CDC, 2018a; National Cancer Institute [NCI], 2018; U.S. Cancer Statistics Working Group, 2018). Additionally, the NCI (2011) estimated that by 2020 the annual national expenditure on breast cancer would exceed $20.5 billion, a higher cost than any other cancer.

Although breast cancer is the most commonly diagnosed cancer among all women, disparities in prevalence, mortality, and screening practices vary depending on race and ethnicity, socioeconomic status, and other characteristics. Among Hispanic women, breast cancer is the leading cause of cancer-related death; however, Hispanic women are less likely to be diagnosed with breast cancer during their lifetime than White

or Black women (ACS, 2017; CDC, 2018a). White women have the highest incidence rates of breast cancer at 128 in 100,000 women and incidence rates for Black women are nearly as high at 125 in 100,000 women (ACS, 2017). Additionally, Black women face several other disparities including a tendency toward younger age at diagnosis, the highest mortality rate among all races and ethnicities, and lower screening rates for preventive, lifesaving measures including mammograms (ACS, 2017). Women living in rural or frontier areas, of low socioeconomic status, and who are uninsured or underinsured also represent groups lacking access to appropriate screenings and subsequently are predisposed to worsened outcomes related to breast cancer (ACS, 2017; Colorado Cancer Coalition [CCC], n.d.). Clearly, disparities exist in relation to breast cancer prevalence and mortality; these characteristics influence mammography adherence among a diverse group of American women.

The state of Colorado recognizes the need to understand disparities in breast cancer prevalence, mortality, and screening practices and is actively working toward improved outcomes for Colorado women (CCC, n.d.). Mammography is considered the gold standard screening tool for early detection of breast cancer and is associated with improved breast cancer survival in women ages 50 to 69 (NCI, 2018). Colorado currently ranks 40th nationally for mammography screenings in women 40 years and older—a rate of 68% as compared to 72.4% nationally for this age group (ACS, 2018). To further place this into perspective, Colorado remains among the 10 states performing worst in the nation for mammography screening adherence (NCI, 2019).

The CCC (n.d.) developed goals to increase the biennial mammography screening rate among women 50 and older from 72.4% to 81.1% by 2020 and to increase the

current rate of 57.6% to 63.4% among women ages 40-49 by 2020. These goals were in accordance with the Healthy People 2020 (2019) goal to "increase the proportion of women who receive breast cancer screening based on the most recent guidelines" (p. 1) from 73.7% to 81.1%, representing a 10% increase. Furthermore, the CCC (n.d.) recognized disparities in mammography rates among three groups of Colorado women: those living in rural or frontier areas, those living in poverty, and those who might be uninsured or underinsured. Colorado women ages 50 and older in these categories are certainly experiencing lower mammography rates; women living in poverty have a rate of 63.9%, women living in rural or frontier counties have a rate of 63.6%, and women enrolled in Colorado's Medicaid program have a rate of 71.1% (CCC, n.d.).

Statement of the Problem

Breast cancer screening encompasses a range of recommendations and interventions including breast awareness (BA) and self-breast exams (SBE), clinical breast exams (CBE), family history intake, screening mammography and other imaging techniques. Together, these interventions serve the common goal of detecting breast cancer in its early form, before women notice signs or symptoms, and ideally before the spread of disease. Early detection is key in decreasing mortality related to breast cancer and experts agree screening mammograms remain the single most effective intervention in achieving this (ACS, 2019; CDC, 2018b; NCI, 2016).

Despite reducing the average woman's chance of dying from breast cancer by nearly 40%, about 30% of women still do not undergo recommendations regarding timely screening mammograms (Newton, 2018). The ACS (2017) reported that although screening mammography rates steadily rose each year from 29% of women 40 years and

older in 1987 to 70% of women in this age group in 2000, mammography rates have remained nearly unchanged since that time. Barriers and disparities in mammography adherence or a woman's follow through in obtaining a mammogram were discussed in the literature at length and included income level, insurance coverage, geographic location, race and ethnicity, health beliefs, education level, and health literacy.

Mammography adherence among women is complex and multifactorial. Socioeconomic disparities such as income level, insurance status, level of education, and race and ethnicity are all influential. Women with greater incomes, higher levels of education, and adequate health insurance typically have greater adherence to screening mammograms, subsequently experience earlier detection, and are less likely to die of breast cancer (Damiani et al., 2015; Hirth, Laz, Rahman, & Berenson, 2016). Although greater income level and insurance coverage tend to improve mammography adherence among White and Hispanic women, these factors do not seem to positively influence Black women's adherence to mammography screening (Corrarino, 2015; Hirth et al., 2016). Further influencing adherence to mammogram screenings among Black and Asian women is distrust of the healthcare system and perceived discrimination (Corrarino, 2015; Hong et al., 2018; Jacobs et al., 2014).

Other commonly known barriers to mammography adherence include residing in a rural setting and geographic distance to a mammogram facility. Studies revealed the closer a woman's residence was to a mammogram facility the more likely she was to receive timely screenings; conversely, women living further from these facilities were less likely to receive the recommended screenings (Jewett et al., 2018; Wang et al., 2018). Furthermore, complexities such as self-perceived quality of life, health beliefs,

and level of knowledge regarding personal cancer risk served as barriers to screening. Researchers found health beliefs including those surrounding perceived susceptibility to breast cancer, severity of breast cancer, and weighing the benefits and risks of screening served as barriers for some women (Gathirua-Mwangi et al., 2018; VanDyke & Shell, 2017).

Initiatives to improve mammography adherence were also discussed extensively in the literature; however, implementing those evidence-based practice changes might pose resource-intensive challenges for organizations faced with regionally and nationally ambitious goals. Further confounding the issue of mammography adherence are the varying and conflicting clinical practice guidelines enforcing recommendations for screening in addition to quality benchmarks set by national organizations that evaluate provider and clinic performance and influence reimbursement of services. This doctoral scholarly project sought to identify women in a primary care setting who were not receiving timely mammograms, identify and overcome barriers to screening, and ultimately improve upon adherence to screening mammograms and early detection of breast cancer.

Purpose of the Project

Over time, adherence to screening mammograms has fluctuated with a steady rise beginning in 1979 shortly after the introduction of the mammogram through the year 2000. Currently, mammograms remain at nearly the same rate as 20 years prior despite known benefits of screening and efforts to improve adherence to screening guidelines. This project aimed to identify women in the community who were not receiving timely mammograms, explore and understand past and current efforts to improve these

screenings in the primary care setting, and develop a sustainable plan to improve women's adherence to this critical preventive health measure. The research question for this project was

Q1 Among women 40 years and older who did not receive a mammogram in the past 12 months, does a telephone counseling call addressing personal barriers as compared to usual care, improve mammography adherence?

Need for the Project

Although some estimates reveal breast cancer diagnoses are decreasing for women in Colorado (CCC, n.d.), it remains true that the mammography screening rate for Colorado women ages 40 and older is 68% as compared to 72.4% nationally (ACS, 2018). Additionally, the region falls significantly below the national goal of 81.1% (ACS, 2018; Healthy People 2020, 2019). This places Colorado at 40th in the nation for mammography adherence (ACS, 2018; NCI, 2019), highlighting the critical need for initiatives aimed at early detection and lifesaving preventive measures. Furthermore, the lifetime risk of developing breast cancer for women in Colorado is one in seven; whereas on a national level, the risk is one in eight (ACS, 2018; CCC, n.d.). Devastating risks related to diagnoses of late stage breast cancer might be mitigated by increasing the number of women who comply with timely screening mammograms, most often finding breast cancer long before symptoms appear and greatly improving the chance of cure, survivability, and quality of life.

The critical need to improve mammography adherence was evidenced in regional and national goals. Healthy People 2020 (2019) compiled initiatives and objectives to improve the health of all Americans and the CCC (n.d.) represented a group of regional stakeholders with a vision of eliminating the cancer burden in Colorado (Healthy People

2020, 2019). These influential groups shared common goals for reducing the incidence and mortality of breast cancer while increasing adherence to screening mammography guidelines. Also driving national and regional goals to improve mammography adherence are quality and performance benchmarks. Health reform in recent years including the Patient Protection and Affordable Care Act has greatly influenced the importance of quality measure reporting and the transition toward value-based care rather than service-based care (Sennett, 2010). During this time when the quality of care was increasingly tied to reimbursement of services and patient satisfaction, healthcare organizations and providers faced high demands to not simply report on measures, such as screening mammogram rates, but also to continually improve upon these measures.

The continual need to improve upon mammography adherence has been evidenced in our national and regional goals, which are driven by healthcare benchmarks and an increasing demand for high quality care among providers and recipients of this care. This project sought to meet those demands through scholarly inquiry and methodology while maintaining a focus on impactful, meaningful, and sustainable results for all involved.

Population, Intervention, Comparison, Outcome, and Time Question

Interpreting and translating evidence into clinical practice is both the foundation of the Doctor of Nursing Practice (DNP) degree and the key to delivering high quality, cost-effective care. Evidence-based practice (EBP) involves informing the daily practice of clinicians with guidance from the most recent and robust literature rather than practice based in traditions or outdated policies (Melnyk & Fineout-Overholt, 2015). The DNP-prepared clinician is uniquely equipped to “bridge the gap between the discovery of new

knowledge and the scholarship of translation, application, and integration of this new knowledge in practice" (Waldrop, Caruso, Fuchs, & Hypes, 2014, p. 300). A final scholarly project is the cornerstone of the DNP degree and should exemplify rigor at the doctoral level as well as meeting criteria laid out in the American Association of Colleges of Nursing's [AACN] *Essentials of Doctoral Education in Advanced Nursing Practice* (cited in Waldrop et al., 2014).

Melnyk and Fineout-Overholt (2015) outlined the steps of EBP and stated the key to yielding the most relevant research results began with developing a clinical question in the PICOT format: *P*atient or population, *I*ntervention or *I*ssue of interest, *C*omparison intervention or group, *O*utcome, and *T*ime frame. Aspects of the PICOT format might be adjusted according to each clinical question and situation. For the purposes of this project, the time frame or *T* of the PICOT format was excluded as the timeframe of the intervention was not pertinent to the success or design of the project.

The PICO question for this scholarly project was as follows: Among women ages 40 and older who did not receive a mammogram in the past 12 months (P), does a telephone counseling call addressing personal barriers (I) compared to usual care (C) improve mammography adherence (O) in the primary care setting? The clinical question is further outlined in Table 1.

Of importance in the above listed *PICO* question was a description of the *usual care* being utilized as the comparison intervention. Although a more detailed description of the project design, setting, sample, and analysis is outlined in Chapter III: Methodology, a brief description is provided here.

Table 1

Description of Clinical Population, Intervention, Comparison, and Outcome Question

Population	Intervention	Comparison	Outcome
Women ages 40 or older who are at least 12 months past due for a screening mammogram.	Implementation of a personalized telephone counseling call to improve mammography adherence in primary care.	Usual care, reminder letter sent if women do not make appointment at annual wellness visit.	Improve mammogram screening rates, implement and evaluate intervention.

The scholarly project took place in a family practice clinic in northern Colorado as part of a larger, regional healthcare organization. The clinic and organization have recognized the importance of timely mammogram screenings in recent years and have been actively working toward improving outcomes. The clinic of interest in this doctoral project participated in a pilot project, along with their regional Breast Diagnostic Center, the previous year to address falling mammography rates. The pilot project revealed great success with improved mammography adherence.

The hallmark intervention of the pilot project involved ensuring female patients of the clinic 40 years and older made an appointment for a mammogram prior to leaving their primary care provider's (PCP) office during their annual wellness visit (AWV). However, key stakeholders in the project noted there continued to be women who did not follow through with their mammography appointments or did not wish to make a mammogram appointment prior to leaving the AWV. Upon completion of the pilot project, the clinic chose to send reminder letters to women who opted out of scheduling a

mammogram during their AWVs. Despite this second outreach attempt, there continued to be women who had not scheduled nor received a mammogram.

Another identified population of concern were women who presented for sick or acute visits but rarely or never partook in AWVs; these women were likely not being screened for breast cancer or were underutilizing screenings. A mutual decision for a population focus was determined between this doctoral candidate and family practice clinic stakeholders based upon what could be reasonably accomplished while providing meaningful, impactful, and sustainable results. Given these details, this scholarly project focused on women 40 years and older who refused to make a mammogram appointment during their AWV and had not scheduled or received a mammogram upon receiving their follow-up reminder letter. The chosen focus population and DNP project in its entirety built upon the pilot project implemented one year prior and had the full support of the healthcare organization involved—namely, the Director of the Breast Diagnostic Center and the Practice Manger of the family practice clinic.

Objectives of the Project

Since the first recommendation from AACN in 2004 advocating for a practice-focused doctorate as the terminal degree in clinical nursing, enrollment in DNP programs has drastically increased over the past 15 years (cited in Waldrop et al., 2014). Although variability exists in DNP curricula and educational and clinical standards throughout programs nationally, the clinical doctorate in nursing culminates in the completion of an evidence-based, practice-driven project. To meet the rigor expected of doctoral scholarly work and decreased variability in quality of DNP projects, the EC as PIE criteria (E = Enhances; C = Culmination; P = Partnerships; I = Implements; E = Evaluates) were

developed by Waldrop et al. (2014) and are supported by both the AACN (2019) and the National Organization of Nurse Practitioner Faculties (2007). Furthermore, following the five criteria ensures the scholarly work expected of doctoral-prepared clinicians and meets the requirements outlined in the *Essentials of Doctoral Education in Advanced Nursing Practice* (Waldrop et al., 2014). The objectives of this doctoral scholarly project met the five EC as PIE criteria as follows:

1. Enhances health outcomes, practice outcomes, or health care policy. This project sought to improve health outcomes for women in northern Colorado through early detection of breast cancer, improve survivability and quality of life, and mitigate devastating and preventable risks involved in late stage breast cancer. Screening mammograms were widely supported in the literature as the gold standard for early detection of breast cancer and considered a covered, preventable service under legislation enacted within the Patient Protection and Affordable Care Act (Health Resources Services Administration, 2018).
2. Reflect a culmination of practice inquiry. A project is produced that maintains scholarly and clinical inquiry, exhibiting the core of the DNP's contribution to health care by bridging the gap between known evidence and translating that evidence seamlessly into practice. Additionally, embrace the need to adjust the focus of the project to produce a meaningful, impactful, and sustainable practice change for the key stakeholders as the project develops.

3. Require engagement in partnerships. The importance of interprofessional collaboration as well as input from patients and stakeholders must not be underestimated in the project development. The project moved forward with the understanding that this scholarly work must be mutually agreed upon by all involved.
4. Implement/apply/translate evidence into practice. It was not enough to gather and synthesize the relevant data on a topic of concern at the doctoral level; these data must be put into practice in a meaningful way and evaluated for effect with recommendations for continuation and maintenance. This doctoral scholarly project revealed the background and a problem statement related to mammography adherence, collected and synthesized relevant data, formulated appropriate methodology for a multimodal intervention, evaluated results of the intervention implementation, and provided a comprehensive discussion of implications.
5. Require evaluation of health care, practice, or policy outcomes. Quality measure outcomes are critical in the venture toward improving our healthcare system and outcomes for patients. These measures drove the needed improvements in mammography screening rates within the primary care setting, which have been increasingly tied to reimbursement of services. Outcome measures specific to this project examined the effect of a telephone counseling intervention on mammography screening adherence. After women received the intervention, data were collected regarding whether women scheduled or received a mammogram. Thus, outcome

measures in this project examined the effect of the intervention on both the intent to obtain screening and actual uptake of screening. Further descriptions regarding the measures involved in this project are discussed within Chapter III: Methodology in the section titled Outcome Measurements.

The criteria laid out above guided this scholarly project; successful incorporation of these objectives into the project is re-evaluated in Chapter V: Discussion.

Definition of Terms

The following list of terms was integral to the guidance and development of this scholarly project. An understanding of key defining terms within the project assisted in evaluating the integrity and validity of the processes and results of the project.

Annual wellness visit. This term was utilized throughout this project and abbreviated AWV as it was a key component in understanding the usual care experienced by women in the clinic. The AWV is a yearly preventive care visit that serves as an ideal time for providers and clinic staff to approach women about preventive screenings such as mammograms. Women were approached during their AWV and assisted in scheduling a mammogram prior to leaving their visit; if they chose not to schedule a mammogram during their AWV, they were then sent a reminder letter on behalf of the clinic.

Average lifetime risk. Represents the average woman's chance of developing breast cancer in her lifetime—a 12% risk. This did not include women identified as having a greater than average risk of developing breast cancer in their lifetime such as a personal or strong family history of breast cancer, a history of chest or

thoracic radiation, or a genetic mutation such as BRCA 1 or BRCA 2 (ACS, 2019; NCI, 2018).

Breast awareness. As opposed to self-breast examination, BA does not include a systematic or routine self-exam of the breasts. Breast awareness was described by the American College of Obstetricians and Gynecologists (2017) as "a woman's awareness of the normal appearance and feel of her breasts" and "a woman should be attuned to noticing a change or potential problems with her breasts and educated on signs and symptoms to report to her healthcare provider" (p. 7).

Breast cancer screening. Various imaging and non-imaging techniques aimed at screening for breast cancer or identification of the disease before signs of symptoms appear including imaging techniques such as mammography including screen-film and digital mammography, breast ultrasound, and breast magnetic resonance imaging (MRI). Non-imaging techniques involved in breast cancer screening included intake of family history, breast awareness, self-breast exams, and clinical breast exams.

Breast magnetic resonance imaging. This imaging technique uses no ionizing radiation and offers a sensitivity greater than that of screening mammography but is less specific than mammograms. Breast MRIs might be used for screening or diagnostic purposes. Its role in screening for breast cancer in higher than average lifetime risk women continues to grow. It is also known to be at least 35 times more expensive than mammography (NCI, 2018).

Breast self-examination. Routine or systematic self-examination of breasts for the purpose of breast cancer detection (Newton, 2018). Over the past decade, most

expert groups have revised their recommendations from historically advising women to perform monthly breast self-exams to current evidence revealing breast self-exams do not decrease breast cancer related mortality and tend to increase unnecessary imaging and biopsies.

Breast ultrasound. Rather than being utilized for screening purposes, ultrasonography is typically used as an adjunct to CBE or screening mammography when a suspicious lesion is detected (NCI, 2018; Newton, 2018). Breast ultrasound is useful in differentiating between cystic breast masses and those requiring further testing as well as guiding biopsies and therapeutic procedures. Poor specificity, about 34%, is the main reason this is not used as a screening test (Newton, 2018).

Clinical breast exam. A CBE is performed by a clinician such as a physician, nurse practitioner, or physician assistant. Most expert organizations recommend a yearly CBE; evidence suggested a CBE combined with screening mammography increased sensitivity of screening (Newton, 2018). A CBE without use of screening mammography has not proven to reduce breast cancer related mortality as has screening mammogram alone.

Clinical practice guidelines. Recommendations for breast cancer screening from several expert groups, these guidelines assist practitioners in adhering to evidence-based practice recommendations for disease prevention. As discussed by Newton (2018), prominent organizations in the United States with published breast cancer screening guidelines included the American Cancer Society, the American College of Obstetricians and Gynecologists, the American College of Physicians, the American College of Radiology, the American Medical

Association, the National Comprehensive Cancer Network (NCCN), and the U.S. Preventive Services Taskforce (USPSTF).

Diagnostic mammogram. This type of mammogram is performed once a woman is experiencing signs and symptoms of potential breast cancer including a lump, nipple discharge, thickening of breast skin, or changes in breast size or shape to aid in diagnosis potential breast disease (NCI, 2016).

Mammogram. Low dose X-ray imaging technique utilizing ionizing radiation to image breast tissue. The breast is placed firmly between two plates, which spreads out overlapping tissues and reduces the amount of radiation needed for the image (NCI, 2018). Mammograms are offered in screen-film and digital. Digital mammography might be preferred for its ease in data storage and sharing but most studies showed similar predictive value, sensitivity, and specificity between screen-film and digital mammography. Digital mammography is particularly helpful for women with dense breast tissue and women under the age of 50. Two-dimensional digital mammography is most often offered but the new three-dimensional or tomosynthesis is gaining popularity (NCI, 2018; Newton, 2018). Mammography of all forms might be utilized in two ways: diagnostic or screening.

Mammography adherence. Represents the follow-through to screening mammogram for women who have been counseled and encouraged to receive this screening service. Mammography adherence represents the rate of compliance with screening guidelines in a timely manner.

Multimodal intervention. This terminology surfaced repeatedly in the literature surrounding improvement of mammography screenings. A multimodal intervention incorporates multiple forms of outreach along a continuum for women non-adherent to mammography as opposed to a single attempt at outreach. Additionally, these multimodal interventions tend to be most successful when increasing in intensity in a step-wise fashion. Women included in the project sample experienced a multimodal intervention process, increasing in intensity over time. First, women were approached in person at their AWV and encouraged to schedule a mammogram prior to leaving the clinic. Women who did not schedule a mammogram at their AWV were sent a reminder letter encouraging them to schedule this important screening. Those included in this project received a third attempt at outreach—a telephone counseling call with prompts for addressing personal barriers.

Primary care provider. A clinician overseeing and managing care in the primary care setting, the PCP maintains responsibility for ordering timely screening mammograms. Educational preparation might vary in this role and might be represented by a physician, nurse practitioner, or physician assistant.

Primary care setting. "A patient's first point of entry into the health system and as the continuing focal point for all health care services" (American Association of Family Physicians, 2019, p. 1). As the primary care setting is often considered the medical home of the patient, it serves as a natural point for recognizing women due for screening mammograms and implementing processes for improving mammography adherence.

Screening mammogram. This type of mammogram is performed when women have no signs or symptoms of disease; the goal is to identify breast cancer in its early stages before it has spread, is easer to treat, and the chance of cure is higher.

Usual care. The current process flow within the family practice clinic of interest in this project. Medical assistants identify women due for mammogram who are presenting for annual wellness visits; the clinic assists a woman in making a mammogram appointment before leaving her AWV. Women who chose not to make an appointment prior to leaving their annual wellness visit were sent a reminder letter, again encouraging them to schedule a mammogram.

CHAPTER II

LITERATURE REVIEW

The role of the DNP scholarly project is focused on bringing evidence into practice by bridging the ever-present gap that exists between the two. Developing a high quality, comprehensive review of the literature provided an evidence base for a scholarly project proposal and guided the researcher in project development. In addition to a comprehensive literature review focusing on improving mammography adherence in the primary care setting, this section discusses the historical background related to mammography screening in the United States, provides an overview of the varying clinical practice guidelines related to this preventive service, and offers a description of the theoretical framework underpinning this project.

Historical Background of Screening Mammography

The role of mammography first entered the healthcare scene in the 1960s when radiologists began performing these exams in a similar fashion to standard X-ray imaging with general X-ray tubes and no compression (Joe, 2015). This technique resulted in images with underexposure of the breast tissue and were generally of poor quality. Over the next decade, the science of mammography significantly improved with the advent of screen-film mammography that utilized a lower radiation dose and compression of breast tissue, involved a quicker test, and ultimately produced higher quality images (Joe, 2015). Breast cancer screening with mammography became a mainstay over time as technology drastically improved and several randomized controlled trials proved its importance in

early detection and reducing mortality of breast cancer (ACS, 2018; Joe, 2015). Further adding to this trend was the introduction of digital mammography at the turn of the century. This technology further lowered radiation dosages, allowed more accuracy in imaging, and provided the ability to view images on computers rather than X-ray film.

Regulations and guidelines regarding mammography have also evolved over time as more information is gained through research and utilization. In 1992, the Mammography Quality Standards Act (cited in Joe, 2015) imposed standards nationwide to address quality issues that came to light during Congressional hearings. It became clear this screening technique needed appropriate regulation and oversight to ensure the best interest of the public. These legislative changes required all facilities performing mammography in the United States be regulated and certified by the U.S. Food and Drug Administration to "ensure the use of standardized training for personnel and a standardized mammography technique utilizing a low radiation dose" (NCI, 2018, Description and Background, para. 2). In addition to ensuring structure and consistency in reporting of findings, the American College of Radiology developed the *Breast Imaging Reporting and Data System*, or BI-RADS, and is considered the gold-standard in reporting mammographic results (Joe, 2015; NCI, 2018; Newton, 2018).

Benefits and Risks Associated with Screening Mammography

Improved chance of survival and decreased mortality related to breast cancer through early detection with screening mammograms was evidenced in the literature over time. Landmark randomized controlled trials (RCTs) beginning in the 1960s and continuing today showed the benefit of mammography as a screening tool, typically with the major outcome parameter of improving breast cancer mortality. Of note, women ages

50-69 appeared to gain the greatest benefit from decreased mortality related to screening mammograms, indicating a further need for a study of women falling outside of those age ranges (NCI, 2018). At the same time, women in their 40s represented a group whose incidence of breast cancer was increasing; thus, the importance of screening mammograms for these women could not be understated (NCCN, 2018).

As with any screening test, a risk-to-benefit analysis should be considered. It is important to consider sensitivity, specificity, and the potential for false-positives or false-negatives when performing screenings. Screening mammography has a sensitivity of 76.5% and a specificity of 87.1% for women 40 years and younger as compared to a sensitivity of 88.4% and a specificity of 93.5% for women ages 75-79 (Newton, 2018). These gaps in accuracy led to the possibility of missing cancerous lesions while also leading to further imaging, biopsies, and treatments for cancers that might otherwise not become problematic or life-threatening. Some estimates revealed between 20%-50% of lesions detected on screening mammography represented overdiagnosis, revealing room for error and contributing to unnecessary further testing and potential anxiety for affected women (NCI, 2018; Newton, 2018). Despite the imperfection of screening mammography among some women, experts agreed the benefits outweighed the risks and this tool remained the gold standard of early detection and reducing deaths related to breast cancer.

Discussion of Clinical Practice Guidelines

Screening mammography has been widely accepted as the single most important intervention in early detection of breast cancer, reducing breast cancer mortality, and mitigating the preventable and devastating consequences of late stage breast disease

(NCI, 2016, 2018; Newton, 2018). Although expert groups agreed about the critical need for screening mammograms, published clinical practice guidelines revealed many inconsistencies. Certainly, most of the guidelines shared some commonalities including the importance of regular screenings, moving away from recommending monthly self-breast examinations and toward breast health awareness, and promoting shared decision-making between each woman and her provider regarding screening. Although there were some consistencies, wide variability remained among these recommendations regarding age of initiation and appropriate frequency of screening mammography. Additionally, most of the expert groups published separate guidelines for women of greater than average lifetime risk.

The USPSTF (2019) provided recommendations often considered the gold standard in preventive care. The USPSTF recommended mammography screening every two years for women ages 50-74 of average lifetime risk and stated the decision to begin screening before the age of 50 and continue screening after the age of 74 should be made on a case by case basis mutually between each woman and her PCP (Newton, 2018). However, groups such as the American College of Radiology, American College of Obstetricians and Gynecologists, and NCCN recommended beginning annual screening mammograms at age 40 and continuing throughout a woman's life while she is in good health (CDC, 2018b; Newton, 2018). Further variations existed when considering the ACS's (2018) recommendation that stated women ages 40-44 should be given the choice to begin annual screening mammograms while women 45 years and older should receive these screenings yearly. Table 2 provides further details and comparisons regarding variations in clinical practice guidelines for breast cancer screening.

Of note, Table 2 does not include recommendations from the NCCN (2018). The NCCN's recommendations remained important to this project as they drove practice at the Breast Diagnostic Center; however, guideline use within the clinic site varied and was based upon provider preference. Although some guidelines did not recognize the importance of regular screenings for women of average risk in their 40s, the NCCN revealed strong evidence that beginning annual mammogram screenings at age 40 resulted in 39.6% of lives saved; whereas the percentage of lives saved when beginning screenings at age 50 and every two years was 23.2%.

Table 2

Overview of Breast Cancer Screening Guidelines

	U.S. Preventive Services Task Force, 2016	American Cancer Society	American College of Obstetricians and Gynecologists, 2011	International Agency for Research on Cancer, 2015	American College of Radiology, 2010	American College of Physicians	American Academy of Family Physicians, 2016
Women aged 40 to 49 with average risk	The decision to start screening mammography in women prior to age 50 years should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin biennial screening between the ages of 40 and 49 years.	Women aged 40 to 44 years should have the choice to start annual breast cancer screening with mammograms if they wish to do so. The risks of screening as well as the potential benefits should be considered. Women aged 45 to 49 years should get mammograms every year.	Screening with mammography and clinical breast exams annually	Insufficient evidence to recommend for or against screening.	Screening with mammography annually	Discuss benefits and harms with women in good health and order screening with mammography every two years if a woman requests it.	The decision to start screening mammography should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin screening

Table 2 continued

	U.S. Preventive Services Task Force, 2016	American Cancer Society	American College of Obstetricians and Gynecologists, 2011	International Agency for Research on Cancer, 2015	American College of Radiology, 2010	American College of Physicians	American Academy of Family Physicians, 2016
Women aged 50 to 74 with average risk	Biennial screening mammography is recommended.	Women aged 50 to 54 years should get mammograms every year. Women aged 55 years and older should switch to mammograms every two years or have the choice to continue yearly screening.	Screening with mammography and clinical breast exam annually.	For women aged 50 to 69 years, screening with mammography is recommended. For women aged 70 to 74 years, evidence suggests screening with mammography substantially reduces the risk of death from breast cancer but it is not currently recommended.	Screening with mammography annually.	Physicians should encourage mammography screening every two years in average-risk women.	Biennial screening with mammography.

Note. Adapted from CDC (2018b).

Stages of the Literature Review

Finding the appropriate scope and searching mechanisms for a literature review on a topic of interest can initially be a daunting, overwhelming venture. Gray, Grove, and Sutherland (2017) recommended using a systems model for literature searches involving "input, throughput, and output" (p. 126). The authors described the searches of the literature as the *input*, the critical analysis of all literature found as the *throughput*, and the final written review was designated as the *output*. Guidance from Gray et al. was utilized in this literature review process to create a well-rounded understanding of the evidence surrounding screening mammography adherence.

Searching the Literature and Developing a Plan

Prior to developing a written literature review, it was necessary to perform a thorough literature search by way of a systematic plan. Of additional importance was an understanding that it was essentially impossible to retrieve and analyze every piece of literature relevant to the topic of interest; constraints regarding time and resources should be individualized to each literature review and research initiative (Gray et al., 2017). As vast amounts of data are readily available today, it was necessary to set inclusion and exclusion criteria, utilize key words, and select appropriate databases.

Initial searches might be broad, allowing for a wide interpretation. However, subsequent searches generally become more narrowed and refined as the searcher realizes which terms and criteria resulted in the most relevant articles. In performing a search of the literature, it was helpful to keep a record or written plan of the findings. Gray et al. (2017) recommended creating a table as a record of search findings with the following components: "the name of the database, the date, search terms and search strategy, the

number and type of articles found, and an estimate of the proportion of retrieved citations that were relevant" (p. 127). A representation of this component of the literature review is found in Table 3.

Table 3

Plan and Record for Searching the Literature

Database Searched	Date of Search	Search Strategy and Limiters	Number and Type of Articles Found	Estimate of Relevant Articles
Cumulative Index to Nursing and Allied Health Literature (CINAHL)	1/24/2019 2/5/2019	Key words: Breast cancer screening, barriers, mammography, adherence, outreach Dates 2009-2019	229: RCTs, systematic reviews, meta-analyses, mixed-methods, retrospective audits	15
Cochrane Central Register of Controlled Trials	3/14/2019	Key words: Mammography, screening, adherence, outreach, barriers, facilitators Dates 2009-2019	26: RCTs	15
Google Scholar	3/16/2019	Key words: Mammography, adherence, primary care, barriers, facilitators Dates 2009-2019	1,690: RCTs, systematic reviews, meta-analyses, mixed-methods, retrospective audits	10
PubMed	3/14/2019	Key words: Improving, mammography, adherence, barriers, facilitators Dates 2009-2019	96: RCTs, systematic reviews, Meta-analyses	12

Selecting Databases and Search Strategies

A variety of databases exist today that supply vast amounts of literature in both electronic and paper forms. This literature review contained online searches of the

following databases: CINAHL, Google Scholar, PubMed, and the Cochrane Central Registry of Controlled Trials. The following clinical research question guided this search:

Q1 What influences women to adhere or not adhere to breast cancer screening guidelines and recommendations, and what are the effective interventions for improving screening mammography adherence in the primary care setting?

Common outcome parameters included documentation of a screening mammogram or intent to receive a screening mammogram. Key search terms included breast cancer screening, mammography adherence, outreach, barriers, facilitators, and primary care. Limits placed on the search included only full-text, peer reviewed articles and a 10-year date range from 2009-2019 to maintain a current understanding of the literature. The exception to this search was the inclusion of *The Manual of Intervention Strategies to Increase Mammography Rates* produced in collaboration with the Prudential Center for Health Care Research and the CDC (Wong, 2008). This evidence-based manual was considered a landmark publication of significant importance within the chosen topic; its inclusion remained valuable and contributory even while falling outside the specified date range.

Excluded from this scholarly project and literature review were articles focusing on women of greater than average lifetime risk of developing breast cancer, breast cancer treatment regimens, male breast cancer, studies occurring outside the primary care setting, and studies including women less than 40 years of age; there was no current evidence that mammography screening in this age group had greater benefit than risk. After careful consideration and critical appraisal of the evidence, 21 relevant articles were included for review.

Synthesis of the Literature

An exhaustive search of the current literature surrounding barriers and facilitators of and effective interventions for improving mammography adherence revealed a vast array of data. The critical appraisal checklists described by Melnyk and Fineout-Overholt (2015) were utilized to ensure relevant data and a high level of rigor. The synthesis and integration of these articles included discussions of both the theoretical and empirical literature surrounding mammography adherence as suggested by Gray et al. (2017). Concluding this chapter is a summary of the literature review and chosen theoretical framework for guidance of the methodology and intervention components of this scholarly project.

Factors Influencing Adherence to Mammography Screening

A multitude of influencing factors, barriers, and facilitators were identified in the literature regarding breast cancer screening and mammography use. The studies reviewed spanned a wide range of demographics and foci including variations in age, race and ethnicity, income level, insurance status, education level, health literacy, and engagement in the health care system. Understanding the factors influencing uptake or avoidance of screening mammography assisted in developing evidence-based, tailored interventions for improving screening rates.

Education level and health literacy. Level of education was consistently confirmed as a predictor of mammography adherence in the literature. A systematic review and meta-analysis compared women with the highest level of education and women of the lowest level of education and the influence of this characteristic on breast and cervical cancer screening (Damiani et al., 2015). Higher education levels were

consistently found to improve adherence to both screening mammography and pap smears. Of note, the evidence for mammography was strongest for women ages 50-74. Further research was needed to clarify inconsistencies in research results regarding the influence of education level on screening mammography adherence among women in their 40s (Damiani et al., 2015).

Evidence indicated health literacy also played an important role in cancer screening participation. Damiani et al. (2015) described health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (p. 286). Talley, Yang, and Williams (2017) further explored the concept of health literacy and its influence on mammography adherence through use of a validated breast literacy tool with racial and ethnic minority women. Talley et al. revealed breast cancer health literacy to be a significant predictor of mammography screening but also noted the importance of motivation—a concept that might be influenced by cultural and social contexts. Level of education and health literacy are important influencers of mammography adherence and their inclusion in outreach efforts is critical to improving screening rates.

Income level and insurance status. Having adequate health insurance, whether private or public, was strongly associated with greater adherence to mammography screening guidelines and women without adequate health insurance were less likely to receive needed screenings (Edgar, Glackin, Hughes, & Rogers, 2013; Gathirua-Mwangi et al., 2018; Wang et al., 2018). Women with health insurance had less cost associated with screening mammograms and were also more likely to receive a recommendation from a provider encouraging timely screenings. Further influencing receipt of screening

mammograms was income level. Gathirua-Mwangi et al. (2018) conducted a study among insured women across low, middle, and high-income groups. Women in the middle- and high-income groups had higher adherence to screening mammography as well as reporting higher health literacy, education levels, and being in the contemplation stage as noted in the transtheoretical model (Prochaska & Velicer, 1997).

Race and ethnicity. Women of ethnic and racial minorities tended to have lower adherence to screening mammography; this one factor contributed to higher incidence of late stage disease and breast cancer-related mortality as compared to White women (Damiani et al., 2015; Hirth et al., 2016; Jacobs et al., 2014). Although White women have the highest incidence of breast cancer, Black women were disproportionately less likely to receive lifesaving early screenings and subsequently carry worse prognoses. Among Hispanic women, breast cancer is the most common cause of cancer-related death (CDC, 2018a). Furthermore, while higher income and adequate insurance coverage increased adherence to mammography screening among White and Hispanic women, these factors did not seem to improve screening rates among Black women (Hirth et al., 2016). Perceived discrimination was another contributing disparity for women of ethnic and racial minorities to consider in cancer screening initiatives. Jacobs et al. (2014) conducted a longitudinal cohort study based on data from the *Study of Women's Health Across the Nation*. Over 3,000 women reported on a validated perceived discrimination tool regarding their experiences with breast and cervical cancer screening. Women reporting the highest rates of perceived discrimination related to race or ethnicity were Black, Asian, and Hispanic women while White women reported higher rates of discrimination related to age or gender (Jacobs et al., 2014).

Psychological and practical issues. Psychological factors influencing mammography adherence identified in an integrative review from Edgar et al. (2013) included anxiety and worry, embarrassment, and perceived benefit or risk. Anxiety and worry had a variable effect; in some women, they appeared to promote mammography receipt; in others, they increased avoidance of screening. Although further research is needed to understand the role of anxiety in uptake of screening mammography, the authors noted a certain amount of worry seemed to motivate toward positive screening practices. Some women reported embarrassment as a significant factor toward avoidance of mammography screening; this appeared to be a more significant barrier for women of certain ethnic and cultural backgrounds (Edgar et al., 2013). Of additional importance was the perceived benefit of screening. Women who held beliefs regarding the benefits of screening mammography and early detection had greater adherence to screening than women who had a fatalistic view and tended to see screening as a "waste of time" (Edgar et al., 2013, p.1023). These findings were consistent with the health belief model (Rosenstock, 1974) further discussed in the Chosen Theoretical Framework section of this chapter.

Geographic location. For women living in rural settings or those without reliable transportation, distance to a mammogram screening facility was an important influencing factor to consider. Jewett et al. (2018) found women who lived within 10 kilometers of a mammography facility were up to 50% more likely to obtain a screening mammogram than women living further from facilities. Women in this rural health study who reported not obtaining a screening mammogram in the past five years did not have a facility near their homes, were more likely to be of ethnic or racial minority, and reported

low income and education levels (Jewett et al., 2018). Henry, McDonald, Sherman, Kinney, and Stroup (2014) also found that among both rural and urban women, lower income and education levels contributed to mammography nonadherence. The authors also found single women, women without a regular healthcare provider, and women without health insurance had higher rates of nonadherence (Henry et al., 2014).

Interaction with health system and provider recommendation. Women who regularly interacted in the healthcare system for wellness and preventive care were more likely to adhere to screening guidelines regardless of income or educational level (Gandhi et al., 2015; Henry et al., 2014; Wang et al., 2018). Many sources stated a recommendation made by a woman's PCP was one of the most important interventions toward improving mammography adherence (Henry et al., 2014; Newton, 2018; Wang et al., 2018). Some sources, however, noted a provider recommendation appeared to be a more influential intervention in women of lower income and education levels (Damiani et al., 2015; Gathirua-Mwangi et al., 2018). It was theorized that women of greater education and income levels might rely less on a provider recommendation as they tended to have greater access to resources and ability to gather health-related information, which contributed to their own health literacy. On the other hand, women of lesser levels of income, education, and resources might rely more heavily on a provider to recommend appropriate screening activities.

Interventions for Improving Adherence to Mammography Screening

As this doctoral scholarly project sought to implement an evidence-based, practice driven intervention to improve mammography adherence, it was crucial to understand current literature surrounding initiatives to improve this screening measure.

As noted previously, effective interventions aimed at improving screening mammogram rates were typically multimodal. Most intervention-focused articles retrieved in this literature review were consistent with a multimodal model. The successful initiatives in this search typically compared the usual care of the chosen clinical location to a wide variety of interventions including reminder letters, automated and personalized telephone calls, counseling calls, interactive group education, outreach through informative DVDs, and point-of-care provider and patient prompts.

Multimodal reminder letter and telephone interventions. Reminder letters, automated or personalized phone calls, or a combination of these two interventions were well established in the literature as efforts for increasing mammography rates. Buist et al. (2017) examined the effectiveness of two intervention strategies among women ages 40-84: a mammogram-specific reminder letter sent out four months before a woman was due for her mammogram and a personalized birthday letter signed by the woman's PCP and sent on her birthday. The birthday letters did not focus solely on mammograms but rather on all needed preventive services and included individual due dates. Furthermore, researchers studied the effect of these interventions on women who remained up to date on mammography screening and those who were overdue. Women in their 40s were less adherent regardless of the intervention or up-to-date or overdue status, highlighting a need to provide further focus to this age group. The greatest adherence to mammography screenings was among women ages 50-69 who received a mammogram-specific letter. Overall, however, the mammogram specific letters revealed statistically significant increases in mammography adherence as compared to birthday letters across most age groups and screening statuses.

An experimental study from Feldstein et al. (2009) explored the impact of a multimodal intervention consisting of an informational postcard, automated telephone reminder, and follow-up live phone calls for those women who had not scheduled a mammogram after the first two interventions. The informational postcard was sent at 20 months after a woman's previous mammogram; if at 21 months no mammogram was scheduled, an automated telephone message was sent on behalf of the woman's PCP. It is well established that a provider recommendation is key in improving mammography adherence (Feldstein et al., 2009; Newton, 2018). The automated phone call was again repeated at 22 months if no appointment was made. The final component was a live, scripted call carried out by clerks in the radiology department to assist in scheduling mammogram appointments for women who had not made an appointment after the first three interventions. A control group received usual care that consisted of sending a reminder letter to women who were overdue, which was defined as greater than 24 months since the previous mammogram. Women involved in the multimodal reminder program saw great improvements in mammography adherence; the pre-reminder group had a screening rate of 63.4%, the post-reminder group increased to 75.4%, and the one-year post-implementation rate rose to 80.6%. Comparatively for the control group, these rates were 46.4%, 48.2%, and 47%, respectively.

Luckmann et al. (2019) implemented a randomized controlled trial (RCT) with three intervention arms: reminder letter only, reminder letter plus a reminder call (RC), and two letters plus a counseling call based in motivational interviewing and tailored education (CC). The four-year study involved over 30,000 women ages 40-84 with a high baseline mammography rate of over 80%. The RC arm was most effective in

improving mammography rates; surprisingly, the CC had the least effect. The authors attributed the failure of this seemingly well-founded intervention to inability to reach enough women to evaluate effectiveness as only 23% of women in the CC arm were reached. This study provided evidence that an intervention as simple as a reminder call had potential to provide great benefits to mammography screening rates.

A multi-phase RCT from Gierisch et al. (2010) including 3,500 women ages 40-75 evaluated the effect of enhanced usual care reminders, enhanced letter reminders (ELR), and automated telephone reminders (ATR) for women who were nearing their due date for a screening mammogram. For women who became overdue, the second phase of the RCT was implemented and women received one of two telephone counseling calls: a call focused on the positive outcomes of receiving timely screening mammograms or a call focused on the negative consequences of not receiving this screening. For women receiving the first intervention phase, all had a decrease in number of nonadherent days and showed success. As there was no group that did not receive an intervention, it was not possible to compare the intervention successes to no intervention. The authors noted that because all of these were successful and the ATRs tended to be more cost-effective than ELRs, organizations deciding between interventions might choose an ATR as it was a more cost-effective option. Additionally, for women who became overdue for mammography, the telephone counseling intervention was highly successful although no difference was shown between the positive outcomes versus negative consequences scripted calls.

Several studies compared the effectiveness of multiple outreach interventions on both breast cancer (BC) screening via mammography rates and colorectal cancer

screening (CRC) via multiple outcome parameters including colonoscopy and home testing kits. Fortuna et al. (2014) carried out an RCT evaluating the effect of four intervention combinations on BC screening and CRC screening: reminder letter, letter and an automated phone call, letter, automated call, a point of service prompt, or a letter and personalized phone call. Participants were largely low-income and of ethnic minorities. Researchers found the letter plus the automated call intervention was not more effective than any of the other interventions including a letter alone. The letter plus the personalized call and the letter, automated call, and point of service prompt interventions were more effective than a letter alone.

Phillips, Hendren, Humiston, Winters, and Fiscella (2015) also carried out a large scale RCT to determine effective interventions in improving BC and CRC screening. Participants were randomized into three intervention groups: personalized mailed letters, automated telephone calls, or both. Women past due for mammography were identified as being 50-74 years of age and at least 30 months since the last mammogram. Although screening rates did not improve significantly with each singular intervention, the combined interventions showed statistically significant increases in both CRC and BC screening rates.

A large RCT performed by Hendren et al. (2014) evaluated the effect of a multimodal, cancer screening reminder system in a safety-net clinic representing patients of low socioeconomic status and ethnic minorities. Mammography patients included women ages 40-74 while CRC screening patients were ages 50-74. Women overdue for mammography were identified as those with greater than 18 months since their last mammogram. The RCT was multi-phasic and increased in intensity according to

whether the patient remained unscreened or completed her mammogram. Women were randomized into intervention and control groups (control patients received usual care). For women receiving the intervention, a personalized letter was sent and followed up by a second letter if the patient had not completed a mammogram after 12 weeks. Automated calls were sent on weeks 2, 6, 14, and 25 for women who remained unscreened. Additionally, point-of-care prompts were incorporated into the electronic health record (EHR) to assist providers in recognizing women due for screening mammograms during office visits. The intervention groups for both BC and CRC screening saw improvements in screening rates as compared to those receiving usual care --the increase was more significant for those in the CRC screening group. However, as with other studies (Feldstein et al., 2009; Fortuna et al., 2014; Phillips et al., 2015), this RCT (Hendren et al., 2014) showcased a common theme for women with low mammography adherence: progressively intensive interventions with outreach and follow up improved uptake of timely mammograms more effectively than interventions with lesser intensity or those not multi-phasic.

Multimodal interventions incorporating television or computer technology. Some articles examined the use of DVD technology and point-of-service prompts in comparison to more traditional outreach strategies for improving mammography screening rates. Champion et al. (2016) randomized women into three intervention groups: a computer-tailored telephone counseling call, an interactive home DVD, and usual care. Demographics of the sample included both White and Black women across varying income levels. Interestingly, researchers found the DVD intervention compared to usual care was most successful for women with household incomes less than $75,000.

Further research is needed to understand why the DVD intervention was not successful in women of higher income levels; women with a household income of greater than $75,000 had fewer mammograms in the DVD group as compared to the telephone or usual care groups. Research building upon this study was carried out by Gathirua-Mwangi et al. (2016) who explored the same comparison of interventions but exclusively in African-American women. A significant improvement was noted in women of the lowest income bracket; the DVD intervention improved mammography adherence by five times in women in households of less than $30,000. However, as noted in Champion et al., women in the highest income bracket did not see an increase in mammography adherence as compared to telephone counseling or usual care (Gathirua-Mwangi et al., 2016).

Both Fortuna et al. (2014) and Hendren et al. (2014) discussed the inclusion of point-of-care prompts in mammography screening initiatives. Although the healthcare industry is increasingly involved and dependent on technology, the authors noted prompts built into EHRs were not proven to be helpful as stand-alone interventions and might pose barriers in attempts to add prompts into EHRs that do not already include provider point-of-care prompts. However, successful inclusion of paper prompts into multimodal cancer screening interventions showed promise. Fortuna et al. (2014) provided a paper prompt to both clinicians and patients for female patients overdue for mammography; these were provided at both preventive and acute visits. For the intervention group receiving the prompt in addition to a letter and automated phone call, this was found to be more successful at improving mammography adherence than a reminder letter alone or a reminder letter plus an automated phone call without a point-of-care prompt.

Effect of decision aids on breast cancer screening. Decision aids (DAs) are tools aimed at assisting women in making informed choices regarding health screenings, emphasizing the concept of shared decision-making. A systematic review and meta-analysis by Martinez-Alonso et al. (2017) evaluated 607 articles but ultimately narrowed them down to four in the final review. The article revealed consistency in DAs' positive influence on informed decision-making and knowledge level; however, inconsistencies were found regarding decisional conflict and confidence. Although Eden et al. (2015) showed a significant decrease in decisional conflict and an increase in decisional confidence through use of a DA, the meta-analysis of all articles revealed a statistically significant increase in decisional conflict and a decrease in confidence regarding decisions about screening mammography (Martinez-Alonso et al., 2017). Further research is needed to understand the variation in results and how DAs might improve or potentially worsen mammography adherence in some women. Evidence from Martinez-Alonso et al. suggested DAs could worsen a woman's decision-making abilities in relation to initiating or continuing mammography screenings. Additional studies examining DAs should investigate this aspect of the tool.

The *Manual of Intervention Strategies to Increase Mammography* rates. The comprehensive publication from Wong (2008) titled *The Manual of Interventions to Increase Mammography Rates* provided a vast source of information produced in collaboration with the CDC and the Prudential Center for Health Care Research. Originally developed in 1997 with an updated version produced just over a decade ago, the manual provided evidence-based information and interventions for health plans, systems, and clinicians seeking to improve mammography rates. Wong provided this

description of the manual and its applicability to those engaging in screening improvement efforts:

1. Assess existing barriers to mammography.
2. Identify the characteristics of members, providers, and health are delivery systems for use in tailoring intervention strategies to increase their effectiveness.
3. Identify the population(s) and provider(s) to target for intervention as well as the missed and untapped opportunities to increase mammography rates.
4. Select and implement appropriate intervention strategies including those aimed at members, the health care (mammography) delivery system and providers, and the community.
5. Monitor and evaluate intervention strategies implemented and use these data to further improve mammography screening rates. (p. 1)

This manual served as an important guide when planning the telephone intervention component of this scholarly project (discussed further in Chapter III: Methodology).

Summary of the Literature Review

A wealth of data existed regarding facilitators and barriers of mammography adherence as well as effective strategies and interventions for improving screening rates. Evidence repeatedly suggested women of lower socioeconomic status, lower education levels, and inadequate health insurance experienced suboptimal screening rates. Additionally, women living in rural areas or those with significant distances to a mammogram facility tended to have lower adherence to screening guidelines. Women of

ethnic and racial minorities faced disparities in access to timely and appropriate mammogram screenings; subsequently, they suffered higher rates of devastating late stage breast cancers and related mortality.

Focusing on a patient's level of health literacy and health beliefs are important criteria to include in any initiative aimed at improving breast cancer screening rates. Additionally, clinicians must not assume all women understand the importance of early detection of breast cancer nor that they are aware of guidelines and recommendations. Healthcare providers are in a powerful position to influence women toward timely screenings and emphasize life-saving measures through education and shared decision-making.

Although variation was noted in existing mammography screening outreach initiatives, the most successful initiatives were based on a multimodal model. Examples included reminder letters or postcards, mammogram-specific or comprehensive preventive annual letters, automated and personalized phone calls, telephone counseling with motivational interviewing, interactive DVDs, point-of-care prompts, and decision aids. Results of the literature review displayed variability in whether reminder letters or phone calls were more effective. However, most studies showed a personalized approach rather than a generic or automated approach tended to be more successful. Including the patient's PCP and incorporating his/her recommendation into either calls or letters appeared to increase adherence. Another theme from the literature revealed a step-wise approach that increased in intensity for non-adherent women was imperative to a sustainable screening outreach program. It was not enough to reach out to women on a

single occasion; successful multimodal interventions incorporated a variety of methods of outreach and follow up for improving screening rates.

Studies regarding mammography adherence tended to focus on a specific demographic and varied widely in age range of participants. For instance, studies utilizing DVD technology mainly focused on Black women; yet, the large RCTs utilizing multimodal interventions with letters, automated calls, and personal calls were representative of both White and Black women as sample populations. Lacking representation in the literature regarding mammography screening adherence were Hispanic and Asian women. Additionally, further research is needed in understanding mammography adherence patterns and effective interventions among women in their 40s as the literature tended to focus on women ages 50-74. As noted previously, although guidelines among expert groups had variability in recommendations regarding age and frequency of mammography screenings, there was a growing consensus that breast cancer incidence was increasing among women in their 40s and regular screenings in this age groups reduced breast cancer mortality (NCCN, 2018; Newton, 2018).

Relevant Frameworks

Theoretical frameworks assist researchers in gaining greater connection of findings across an entire body of knowledge and aid clinicians in application of evidence-based practice. Inclusion of a framework within research is not always apparent or may not be present at all. Gray et al. (2017) stated quantitative and outcomes research always uses theoretical frameworks, qualitative research might use a framework but was more likely to use philosophical perspectives or phenomenon, and mixed methods studies

rarely used theoretical or conceptual frameworks to guide research. If a framework was not explicitly stated, it might be inferred from the main ideas or hypotheses.

A multitude of theoretical frameworks and models were identified throughout the studies in this literature review: the health belief model (Rosenstock, 1974), transtheoretical model (Prochaska & Velicer, 1997), precaution adoption process model, theory of planned behavior, model of goal-directed behavior, elaboration likelihood model, Anderson's model of healthcare services utilization, and the information-behavioral skills model. A brief overview of these models and their use throughout the literature is provided in addition to a chosen theoretical framework for guidance in this doctoral scholarly project.

Several authors utilized the health belief model (HBM; Rosenstock, 1974) in guidance of their research efforts in improving mammography screening adherence (Champion et al., 2016; Gathirua-Mwangi et al., 2016; Hendren et al., 2014). The HBM is centered on the constructs of perceived susceptibility, perceived severity, health motivation, perceived benefits, and perceived barriers (Connor & Norman, 2015). This framework stated individuals would act upon health promoting behaviors, such as mammography screening, based on the amount of risk or threat they perceived and the level of perceived benefit from screening. The transtheoretical model (Prochaska & Velicer, 1997) or TTM was another commonly cited framework in the literature surrounding mammography adherence (Champion et al., 2016; Gathirua-Mwangi et al., 2016, 2018). The TTM works well with the HBM but shifts its focus to stages of change and identifies them as precontemplation, contemplation, preparation, action, and maintenance. Articles in the literature review utilized the stages of the TTM to identify

women's readiness to engage in mammography screening—typically identified as the contemplation and preparation stages (Champion et al., 2016; Gathirua-Mwangi et al., 2018). Both the TTM and HBM incorporated the concept of self-efficacy—the reflection of one's belief and confidence in one's ability to carry out and sustain a desired health behavior change.

Gierisch et al. (2010) theorized maintenance of health screening behaviors, such as mammography, was based in "deliberative reasoning processes and past experiences" (p. 336). The authors utilized the concepts of HBM (Rosenstock, 1974) outlined above in addition to the theory of planned behavior, model of goal-directed behavior, and the elaboration likelihood model. As with the HBM, the theory of planned behavior (Ajzen, 1991) also focused on motivators of health behavior change like perceived benefit, susceptibility, and self-efficacy. Moving beyond the motivators of change, the model of goal-directed behavior (Perugini & Bagozzi, 2001) focused on strategies that transitioned ideas and motivations into action. The final framework utilized by Gierisch et al. was the elaboration likelihood model (Petty & Cacioppo, 1986) as the authors sought to understand the role of information processing in establishing a maintenance routine for mammography adherence among women.

The precaution adoption process model (Weinstein, 1988) was utilized by Luckmann et al. (2019) in one arm of their multimodal RCT for guidance in a counseling call intervention. This model related to the TTM in that it utilized the following stages of change: unaware, decided against, undecided, planning, and scheduled. The precaution adoption process model is useful in assessing women's intent to obtain a screening

mammogram and might help in tailoring interventions toward health beliefs and readiness to change.

Henry et al. (2014) used Andersen's (1995) model of health care services utilization in their study of understanding mammography uptake in the context of geographic distance from a mammography facility. The framework stated that "realized access refers to the utilization of health care services and potential access refers to the predisposing and enabling factors that facilitate use of services" (Henry et al., 2014, p. 666). In the context of adherence to mammography screening guidelines, the framework theorized that increasing the availability of resources would increase the likelihood of uptake of services. The final framework identified in the literature review was utilized by Talley et al. (2017—the information-motivation-behavioral (IMB) skills model of health behavior (Fisher & Fisher, 1992). Based in social-cognitive theory and the theory of reasoned action, IMB assists researchers in understanding and predicting changes in health behavior. Talley et al. (2017) theorized the IMB might be utilized in improving mammography adherence by "determining the extent to which a person is informed about breast health, is motivated to adhere to established screening guidelines, and have the necessary behavior skills to adhere to screening guidelines over time" (p.1363).

Chosen Theoretical Framework: The Health Belief Model

The HBM (Rosenstock, 1974) was developed by public health professionals and social scientists in the 1960s in response to a lack of uptake of free or low cost and easily accessible screening programs (Connor & Norman, 2015). The lack of uptake among desired participants of publicly or widely financed health programs was first discovered decades ago but continues to be evidenced in studies today (Connor & Norman, 2015;

Rosenstock, 1974). A complex intermingling of socioeconomic status and health beliefs influence an individual's decision to partake in health-promoting or -defeating behaviors. Health beliefs are considered modifiable factors that shape and influence behavior and are formed through primary socialization. Key beliefs that shape health-related behavior include the "likelihood of experiencing a health problem, the severity of the consequences of that problem, and the perceived benefits of a preventive behavior" (Connor & Norman, 2015, p. 30). Research surrounding the HBM continuously confirmed health beliefs are correlated with health-related behavior and thus might be utilized to understand differences in uptake and effective interventions for those who did and did not participate in desired health-promoting behaviors.

The HBM (Rosenstock, 1974) is further broken down into two health beliefs: the perception of threat and behavioral evaluation. Perception of threat includes an individual's perceived susceptibility to a health problem and the potential consequences and severity of that illness. The behavioral evaluation component consists of the value of benefit and efficacy an individual places upon a recommended health behavior as well as concerns regarding cost or other barriers of engaging in the recommendation (Connor & Norman, 2015). Furthermore, when appropriate health beliefs are present, cues to action and an individual's level of general health motivation are also considered influential components of activating health behavior within the HBM. Cues to action are triggers of varying types that prompt change in those displaying readiness, examples include reminder programs and educational campaigns.

Concerns regarding the uptake of screening mammograms while cost and other barriers have steadily been removed showcased the alignment of the goal of this scholarly

project with the HBM (Rosenstock, 1974). Components of the HBM include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and motivation. The HBM was utilized in this project to further understand health beliefs and barriers for women in the chosen clinical setting who remained non-adherent to mammography screening and assisted in designing a tailored, evidence-based telephone intervention for promoting this important health behavior. Figure 1 displays a visual depiction of the main aspects of the HBM.

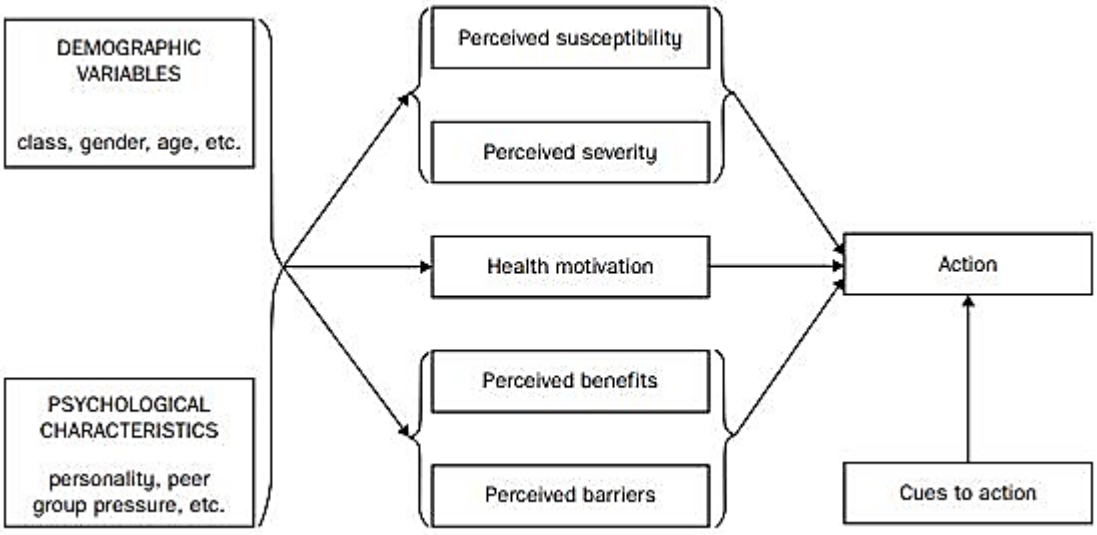

Figure 1. The health belief model (adapted from Connor & Norman, 2015).

CHAPTER III

METHODOLOGY

Design

The design of DNP scholarly projects might take various forms while upholding clinical and scholarly inquiry. Moran, Burson, and Conrad (2017) noted DNP projects might be experimental or non-experimental in nature and examples of designs included quality improvement projects, pilot projects, healthcare delivery innovations, healthcare policy analyses, and program development and evaluations. This doctoral scholarly project most closely aligned with a quality improvement design. The Health Resources and Services Administration (cited in Moran et al., 2017) defined quality improvement, or QI, as "a systematic and continuous process that leads to measurable improvement in health care services and the health status of targeted groups" (p. 134).

This project sought to improve outcomes among women in northern Colorado through early detection of breast cancer via screening mammography. As outcome measurement is a key component of the quality improvement process, the outcome measures for this project included determining the number of non-adherent women who scheduled or obtained a mammogram after receiving a telephone counseling intervention. Once specific data were collected regarding quality measures driving improvements within the chosen clinical site, they were incorporated into the outcome measures of this project. Analysis of pre- and post-intervention mammography rates was instrumental in

displaying whether the telephone intervention was a change that truly resulted in improvement.

Chosen Conceptual Framework: The Model for Improvement

While a theoretical framework, such as the HBM (Rosenstock, 1974), helps guide and inform a DNP project, a conceptual framework serves as a map "used to connect all the important aspects of the project" (Moran et al., 2017, p. 258). While the HBM was used as the theoretical foundation for guiding the development of the telephone intervention in this project, further structure was needed in mapping out the project steps and processes.

A conceptual model utilized in the quality improvement realm of healthcare is the model for improvement and was utilized as a framework for this DNP project. The model for improvement was developed by the Associates in Process Improvement (2019) and utilized by the Institute for Healthcare Improvement in their QI initiatives (IHI, 2019). The model for improvement was based around three fundamental questions that assist an organization in "setting aims, establishing measures, and selecting changes" (Moran et al., 2017, p. 138). Once changes were selected, they were tested using PDSA cycles--*plan, do, study, act*. Plan represented planning for a change, do represented implementing the plan, study represented analysis of the results, and act represented taking action based on the results. Key to the model for improvement was the cyclical nature of the PDSA and embracing the inevitability of failures while learning from said failures as the QI process evolved. The cycle was repeated and refined until an optimal result was achieved; often these began on small scales and upon successful completion were implemented on a larger scale throughout an organization.

As stated above, the model for improvement was based upon three fundamental questions and followed by cycles of the PDSA process. The following three questions were answered in relation to this doctoral scholarly project.

1. What are we trying to accomplish? This first question answered the aim of this project--to improve mammography adherence among a group of women who historically had been non-adherent with breast cancer screening recommendations and guidelines. Through early detection of breast cancer while women are symptom free, screening mammograms are the gold standard in reducing deaths related to breast cancer and mitigating devastating consequences of late stage disease. Outcome measurements driving this project included a post-telephone intervention analysis that determined the proportion of mammograms scheduled or received by women who were previously overdue for screening despite repeated outreach attempts. Specific parameters regarding improvement goals were mutually decided upon between the author and the Director of the Breast Diagnostic Center. In conversations with this stakeholder, the goal for improvement in mammogram rates for this project aimed for a 50% increase among the sample participants.

   As information was gained in the data collection phase, information was added to this section to ensure the aims were time-specific and measurable as encouraged in the model for improvement (IHI, 2019). Key information needed from the practice manager, another key stakeholder, included the current rates of mammography adherence within the clinic and

the quality improvement measures driving practice within this setting. These details helped guide time-specific and measurable goals as the sample population was drawn from the clinic and continuity of outreach efforts and goals was crucial to ongoing success.

2. How will we know that a change is an improvement? This second question referred to outcome measurements. The model for improvement (Associates in Process Improvement, 2019) reminded those seeking change that "all improvement requires change, but not all changes are an improvement" (IHI, 2019, p. 1). For outcome measurement to reveal improvement, it must bring new knowledge into daily practice. As the aim of this project was to utilize a telephone intervention in a population of women who were overdue for mammography screening despite multiple outreach attempts, improvement was measured in success of the telephone intervention prompting women to schedule and/or receive a mammogram by the end of the study period. As telephone outreach was not currently incorporated as part of the bundle of outreach initiatives utilized by the clinic and Breast Diagnostic Center, successful outcomes of this project could prompt utilization of this study design for further improvement in mammography rates among overdue women throughout their regional health system.

Another method for ensuring the change was truly an improvement was utilization of a run chart. Run charts are often used in the quality improvement realm and depict a visual display of data over time, allowing

for assessment of effectiveness of changes and giving direction for future improvements (IHI, 2019). Run charts are further discussed in the Data Analysis Procedures section of this chapter.

3. What change can we make that will result in improvement? The final question in the model for improvement (Associates in Process Improvement, 2019) focused further on changes that would result in improvement. As noted above, the aim of this project was to improve mammography adherence among a group of women who historically had been non-adherent to breast cancer screening guidelines and recommendations. Outreach provided to these women prior to beginning this project included encouragement and assistance with scheduling a mammogram during their AWV and followed up with a reminder letter sent to women who did not schedule a mammogram during their AWV and encouraging them to do so.

   The intervention for improvement in this project involved a telephone call placed to these women with prompts for personal barrier counseling and ability to schedule a mammogram appointment prior to ending the telephone call. This call incorporated concepts from the HBM (Rosenstock, 1974) and the *Manual of Intervention Strategies to Increase Mammography Rates* (Wong, 2008). Success of the intervention and its impact on improvement was evaluated through determining the proportion of women who scheduled or obtained a mammogram after receiving the telephone intervention.

Upon setting an aim, determining changes intended to result in improvement, and establishing appropriate and meaningful outcome measurements, the PDSA cycle was the next phase in the model for improvement (Associates in Process Improvement, 2019; see Figure 2). This process might be thought of as testing the change; it involved planning for the change, trying the new intervention, observing the results, and formulating an action plan based on the results. The influence of the PDSA cycle components is further discussed in the Project Plan section of this chapter.

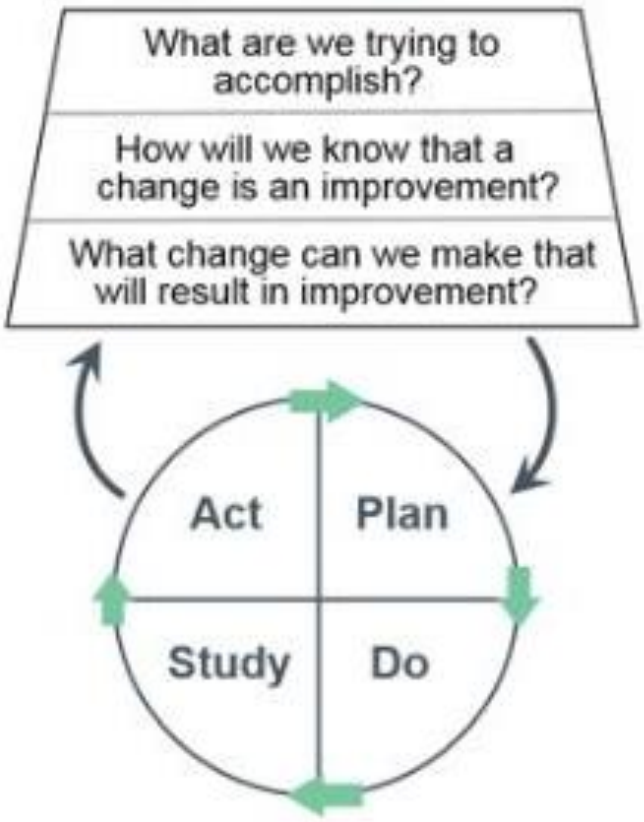

Figure 2. Model for improvement (adapted from IHI, 2019).

Setting

This project utilized screening participants from a family practice clinic in Greeley, Colorado. The clinic is part of a larger, regional, nonprofit healthcare organization located throughout the state of Colorado. The clinic team included a practice manager, physicians, nurse practitioners, medical assistants, and front desk staff. The clinical site did not have screening mammography capabilities within their setting; screening mammogram appointments were scheduled for patients of the clinic at any of the regional Breast Diagnostic Centers within the health system. The closest diagnostic center was also located in Greeley but patients had the option of scheduling their mammograms at locations in Fort Collins and Loveland, Colorado. The Breast Diagnostic Center in Fort Collins served as the main location for data collection and implementation of the telephone intervention involved in this project. This location was chosen in accordance with the preference of the Director of the Breast Diagnostic Center and available space and resources for project development and implementation. Team members at the Breast Diagnostic Center involved in aspects of this project included the Director, administrative assistant to the Director, and the schedulers. Of critical importance in the planning of this project, the schedulers at the diagnostic center had specialized training in scheduling mammograms and were the only team members capable of this important step. In coordination with the request of the Director of the Breast Diagnostic Center, calls involved in this project were routed to the administrative assistants rather than the entire team of schedulers. For the purposes of this project, it was felt that containing the calls within a more controlled setting was best for the workflow within the facility. Efforts to incorporate telephone outreach beyond the

timeframe of this project should include the scheduling team into the workflow to ensure patient satisfaction and efficiency of outreach.

Greeley is a community in northern Colorado located in Weld County. The population of Weld County is approximately 304,000 people (U.S. Census Bureau, 2018b) and Greeley accounts for one-third of this population at about 105,000 people (U.S. Census Bureau, 2018a). Although much of Weld County remained true to its agricultural beginnings with many rural areas and farmland, Greeley has become increasingly urbanized. The median household income is $52,887 while 17.5% of residents live in poverty. About 83% of adult residents reported graduating from high school and 25% held a bachelor's degree. Women represented 50.8% of the population, displaying an equal gender distribution. Ethnic and racial demographics revealed 55% of Greeley residents are White, 39% are Hispanic or Latino, 2% are Black or African American, 1% are American Indian or Alaskan Native, and 1% are Asian (U.S. Census Bureau, 2018a).

Sample

Participants included in the population sample for this project were female patients of the clinic ages 40 and older who were past due for their screening mammogram. As the clinic and Breast Diagnostic Center promoted annual screening, women were considered overdue after 12 months had passed since their previous mammogram. Additional inclusion criteria included a current order for a mammogram from the PCP or standing orders for mammography. Efforts were made to include non-English-speaking participants in this project through use of the healthcare organization's certified interpreter services technology, CyraCom ®. This detail was dependent on

obtaining data during the chart review regarding preferred spoken language of each participant prior to contacting them via telephone and is further discussed in Chapter IV: Data Analysis and Results.

Furthermore, women specifically included in the sample were those who had experienced the usual care interventions implemented by the clinic to improve mammogram rates. As previously noted, usual care interventions were two-fold: women first experienced breast cancer screening outreach during their AWV and were encouraged and assisted in scheduling a mammogram appointment prior to leaving their PCPs office; if the woman failed to make a mammogram appointment prior to leaving her AWV, she was then sent a reminder letter encouraging her to call the Breast Diagnostic Center and schedule a screening mammogram. The sample participants of this project received a third outreach initiative aimed at improving mammogram screening adherence through use of a telephone intervention with the opportunity to schedule a mammogram and discuss any personal barriers toward mammography.

The sample size agreed upon among this author, the stakeholders of the involved healthcare organization, and approval from both the educational institution and the healthcare organization involved was 50 participants. The list of potential participants provided by the clinic manager and lead medical assistant included 461 women 40 years and older who were past due for screening and had received some form of outreach. The QI team within the healthcare organization was unable to produce a list of women who had specifically received outreach during their AWV and via a reminder letter. The author performed chart reviews and excluded potential participants without clear documentation in the EHR noting both forms of outreach. Once 50 participants who met

the inclusion criteria were identified, chart review and sample development processes ceased.

Project Mission and Vision

The Community Health Tool Box (2018) developed by the University of Kansas assists communities in improving the health of their members through strategic planning. This toolbox highlights the need for organizations and health research initiatives to have clear vision and mission statements during the planning process. Vision statements assist the researcher in conveying his/her vision or dream of how his/her study would impact its participants and the greater community; the vision statement for this study was the eradication of breast cancer regionally and globally. A mission statement helps place the vision statement into practical terms by describing the *what* and *why* of what the research project would accomplish. This study's mission statement was eliminating the burden of breast cancer and improving lives in our community through widespread access to yearly mammogram screenings and consistent, caring, compassionate outreach efforts.

Project Plan

The project plan was guided by the PDSA cycle recommended within the model for improvement (IHI, 2019). In this phase, the project plan revolved around the *plan* and *do* steps of the PDSA cycle; the *study* and *act* phases are described in Chapter IV: Data Analysis and Results and Chapter V: Discussion. A retrospective chart review was begun upon successful defense of the project proposal and Institutional Review Board (IRB) approval from both the educational institution and the healthcare organization involved (see Appendix A). The practice manager of the clinic provided this author with a list of women who had received the two outreach interventions defined as usual care

including outreach during an AWV and a follow up reminder letter for women who did not schedule an appointment prior to leaving their visit. The women on this list served as the sample population, assuming they were 40 years and older, remained overdue for their mammogram at the time the project began, and had a current or standing order for screening mammography. Based on discussions with the Director of the Breast Diagnostic Center and the practice manager of the clinic, the number of women qualifying for this sample population was estimated to be 50. The author ensured each participant remained overdue for screening at the time data collection began by confirming no presence of mammogram results in their EHR and ensured the presence of a current or standing order.

The chart review collected demographic information regarding these women and the following characteristics: medical record number, age, health comorbidities, time since last mammogram, race and ethnicity, preferred spoken language, health insurance status and type, place of residence, and potentially descriptors regarding income and employment. Utilization of a spreadsheet to collect demographic information during the chart review ensured organization and accuracy throughout the project. Additional spreadsheets were utilized to track data regarding the progress of the telephone intervention and the post-intervention results.

Additionally, each woman's PCP was noted in the data collection process. As displayed throughout the literature review, a provider recommendation is an effective tool for improving mammography uptake. Incorporation of each PCP with the appropriate patient was utilized in the telephone intervention upon agreement among all the providers of the clinic. Providers at the clinical site were informed by mailed letter of this project

and their patients were contacted regarding screening mammograms. The author's and research advisor's contact information were provided in the letter; providers at the clinic were encouraged to contact the author or research advisor with questions or concerns regarding the telephone intervention.

The telephone intervention described throughout this paper was the hallmark of this project. The intervention was based upon a comprehensive literature review, current and past attempts to improve mammogram screenings at the chosen clinical site, and with guidance from the theoretical framework—the health belief model (Rosenstock, 1974). Additionally, the *Manual of Intervention Strategies to Increase Mammography Rates* (Wong, 2008) served as a critical resource in understanding successful telephone interventions and designing of a script. Once a spreadsheet was established from the chart review of the participant's EHRs, the author began implementing the telephone intervention within the Breast Diagnostic Center. It was necessary to conduct the calls within the Breast Diagnostic Center, rather than the clinic, as the intention was to transfer the women via telephone to the mammogram schedulers upon participant agreement during the telephone intervention. Of note, access to the EHR was possible at both the clinic and the diagnostic center.

Per the request of the Director of the Breast Diagnostic Center and for the purposes of this project, women wishing to schedule a mammogram during the telephone intervention were transferred to the administrative assistant of the Director. The Director felt at the time she did not have the appropriate resources and staff capabilities to receive calls related to this project throughout the entire scheduling team; additionally, she felt confident the administrative assistant would be valuable in project implementation as she

had a background as a mammogram scheduler within the facility. The organization and Director of the Breast Diagnostic Center recognized that plans for continuity and maintenance of the telephone intervention beyond the constraints of this project would require expanding the ability of the calls to be fielded by the mammogram scheduling department.

Three attempts were made to reach women for the telephone intervention. A brief voicemail message was left for women who were not reached, encouraging them to schedule a mammogram and providing the contact information of the administrative assistant to the Director of the Breast Diagnostic Center as requested by the Director. If women were reached but chose not to continue with the telephone intervention at that time, they were given the choice of not participating further or rescheduling a date and time of their preference to continue with the telephone intervention. For women revealing hesitancy, prompting for discussion of personal barriers guided the telephone intervention. Details regarding the telephone script and prompts for barriers discussion are provided in the Instrumentation section of this chapter.

The three attempts or phases of the telephone intervention occurred over a four-week time period—one week allotted for each phase of the telephone intervention and a final week for assessment of outcome measurements. Each weekly phase was evaluated the following week through data collection regarding proportion of mammograms scheduled and obtained. Once all women had been reached or attempted to be reached three times, a final chart review was completed one month after the initial telephone intervention phase began. The final chart review again assessed the number of women who scheduled or received a mammogram after receiving the telephone intervention.

This post-intervention analysis ensured the stated outcome measurements were tracked and revealed whether the chosen changes resulted in improvement.

Instrumentation

The main tool utilized in this project was an evidence-based telephone script with prompting for barriers counseling (see Appendix B). The script was based upon recommendations outlined in *The Manual of Intervention Strategies to Increase Mammography Rates* (Wong, 2008). Key strategies incorporated into the telephone intervention and script included proactively reaching out to women overdue for their mammogram, progressively increasing intensity of outreach efforts, incorporating women's PCPs into the telephone call, being prepared prior to engaging women over the telephone with a systematic script, incorporating personalization and a caring attitude, allowing for counseling of stated barriers and perceptions, and offering to schedule a mammogram prior to ending the call (Wong, 2008).

The script was also guided by the HBM (Rosenstock, 1974). For women revealing hesitancy to schedule a mammogram, the HBM was incorporated into the barriers prompting script through assessing perceived susceptibility, severity, benefits, and barriers. Women revealed perceived susceptibility when responding "I feel fine," "I have no symptoms," "I don't need to--I examine my own breasts" or "I don't need to—my provider examines my breasts," "I have no family history," "I don't need to because of my age," "I won't get breast cancer," or "there is no breast cancer in my family." Perceived barriers were revealed when women responded "I am too busy—I don't have time," "I can't afford it—t costs too much," "I am not sure if my insurance company covers it," "I am afraid of the amount of radiation," "I am afraid of the discomfort or

pain," "I don't know what a mammogram is," "I am afraid to find out results," or "I am embarrassed." Combined perceived severity and susceptibility might be revealed by women who did not believe breast cancer to be life-threatening, did not believe they needed a mammogram if their provider had not recommended one, or they did not recall their provider recommending this screening.

The telephone script was designed to take three pathways depending on each woman's response: yes response, no response, and hesitancy response. If a woman agree to schedule a mammogram during the call, she was transferred to the administrative assistant at the Breast Diagnostic Center for scheduling and provided with positive reinforcement for willingness to engage in screening. If a woman did not want to schedule a mammogram, she was asked if she had concerns regarding mammography. If she was open to discussion, the script took the barriers-prompting pathway. If she did not want to discuss concerns at that time but was open to continuing the conversation at another time, a date and time was agreed upon to re-attempt the telephone intervention. If she did not wish to continue with the telephone intervention, she was thanked for her time and encouraged to schedule a mammogram in the future. Participants not wishing to further discuss scheduling a mammogram or personal barriers surrounding mammography were excluded from the remainder of the project. Finally, if a woman revealed hesitancy or vagueness when asked if she would like to schedule a mammogram, the script entered the barriers-prompting pathway. A short, scripted counseling intervention was completed based upon specific barriers revealed during the telephone call.

For women who were not reached or women who chose to re-schedule their phone call, three attempts at telephone outreach were made. Upon reaching a participant's voicemail, a brief scripted message was left including the importance of scheduling a mammogram, the PCP's recommendation, and the telephone number of the administrative assistant at the Breast Diagnostic Center whom she could call for scheduling a mammogram. Of note, the scripts in this project were designed to be carried out by a variety of healthcare professionals of varying levels of skill and education. It was theorized that if this intervention could be carried out by various team members of different skill and knowledge levels throughout the clinic setting, sustainability of the intervention was more likely to be achieved. Appendices B, C, and D contain the telephone script, voicemail message script, and barriers discussion script, respectively.

Analysis

Sociodemographic information was collected through a chart review of participants' EHRs within the family practice clinic site. Quantitative data for inclusion in the chart review included medical record number, age, race/ethnicity, date of last mammogram in months, PCP name, contact information, major health comorbidities, preferred spoken language, insurance status and type, place of residence, and potential descriptors regarding income and employment status. As the telephone intervention was implemented, data were tracked over time until all participants were reached or three attempts had been made to contact participants. Important data tracked during the telephone intervention phase of the project included whether a woman was transferred to the scheduling department at the Breast Diagnostic Center, whether a woman rescheduled the call, number of attempts to reach women, number of voicemail messages left, length

of call times, inaccurate or disconnected telephone numbers, and if a participant chose to end further involvement in the telephone intervention. Qualitative data retrieved from the telephone intervention included recording specific barriers revealed during use of the barrier prompting script. Upon completion of the telephone intervention, a final chart review was completed to assess two outcome measurements: whether a mammogram was scheduled among women who received the telephone intervention and if a mammogram was completed among women who received the telephone intervention.

Data Analysis Procedures

Analysis of data collected during the chart review and throughout the telephone intervention represented an important phase of the DNP project—transformation of data into meaningful information for use in the clinical realm. Data analysis within this project was examined through use of Microsoft Excel® for Office 365® with add-in software for QI macros. Run charts are one of the most important graphical displays in QI initiatives as they depict change over time and "provide a picture of how a process is performing" (Health Resources Services Administration, 2011, p. 11). Run charts were utilized in the data analysis portion of this project to assess the effect of the telephone intervention on outcome measures throughout the study period. Histograms and frequency distributions were utilized to assess for normal distribution of the variables retrieved from the chart review including age, race/ethnicity, date of last mammogram in months, major health comorbidities, preferred spoken language, insurance status and type, place of residence, and potentially descriptors regarding income and employment status. Descriptive statistics were utilized to display the variables via bar graphs, line graphs, and pie charts as appropriate.

Outcome Measures

Clear outcome measures are critical to the QI process as they provide guidance to the process and assist teams in identifying changes resulting in improvements. Post-intervention analyses took place three times throughout the project, occurring one week after each of the weekly telephone intervention phases with the final chart review occurring one month after the telephone intervention series begins. Post-intervention analysis determined the impact of the telephone calls on the following two outcome measures:

1. Proportion of women who scheduled a mammogram after the telephone intervention.
2. Proportion of women who obtained a mammogram after the telephone intervention.

The first outcome measure was assessed by viewing the patient schedule list within the Breast Diagnostic Center and the second measure was assessed by reviewing participant charts within the EHR for evidence of mammography results. As discussed with the Director of the Breast Diagnostic Center, a goal of a 50% increase in mammogram screening rates among participants guided outcomes involved in this project.

Calculating the proportions outlined in the outcome measurements consisted of an appropriate identification of a numerator and denominator. In the clinical setting, the denominator represented all patients eligible for the intervention while the numerator represented the patients who received the intervention. Outcome 1 was calculated as follows: the number of women who scheduled a mammogram after the telephone

intervention (numerator) divided by the total number of women in the sample who received the telephone intervention (denominator). Outcome 2 was calculated as follows: the number of women who obtained a mammogram after the telephone intervention (numerator) divided by the total number of women in the sample who received the telephone intervention (denominator).

Project Timeline

Writing, researching, and networking involved in this doctoral scholarly project began in December 2018. The author worked closely with the DNP committee chair throughout all aspects of the project with valuable guidance and input from three additional committee members. The author began outreach to the Director of the Breast Diagnostic Center in February 2019 with subsequent monthly in-person or phone conversations among the author, Director of the Breast Diagnostic Center, and the practice manager of the chosen clinical site. The proposal writing phase took place from January 2019 through April 2019 with a scheduled proposal defense on May 2, 2019. Submission for IRB approval from the educational institution and the healthcare organization followed the defense and was finalized by late June 2019. Upon authorization from the healthcare organization, this author began the chart review for sociodemographic data collection in early July 2019. The telephone intervention took place over a three-week period throughout July 2019 and the final chart review occurred in late July 2019. The author utilized August 2019 for writing Chapter IV: Data Analysis and Results and Chapter V: Discussion was finished by the end of September 2019. The final project defense took place in October 2019. In total, the estimated duration of the project was 10 months.

Ethical Considerations

Critical to the process of research with human participants was the consideration of ethical implications. The concept of *ethical knowledge* is described as an important attribute for health providers both in the clinical and research realms and is "based on the obligation to service and respect for human life" as well as requiring "evaluation of what is good, valuable, and desirable as it relates to the maintenance or restoration of health" (Moran et al., 2017, p. 104). Furthermore, NIH (2016) developed seven principles that assist clinicians in performing research ethically.

1. Social and clinical value. Health research should not be completed simply for the purpose of knowing but rather should contribute to scientific understandings of health or methods for preventing and improving health concerns. Each research study should answer a specific question. The research question for this project was

   Q1 Among women 40 years and older who did not receive a mammogram in the past 12 months, does a telephone counseling call addressing personal barriers as compared to usual care, improve mammography adherence?

   As breast cancer represents a significant disease burden for our communities, nation, and healthcare system, translation of evidence into practice to improve mammogram screening rates contributes to social and clinical value through early detection of breast cancer and prevention of late stage disease.

2. Scientific validity. The realm of scientific validity includes ensuring the project is designed to gather results that answer the study question and the author describes clear and reliable methodology. This project is described

as a quality improvement project designed to improve uptake of screening mammograms among a group of women who are overdue for screening. The project was based on literature recommendations to progressively increase intensity of outreach interventions; a telephone counseling call with prompts for barriers discussion was chosen as women had already received outreach during their AWV and by reminder letters. Impact of the study design and intervention were analyzed by post-intervention rates of women who either scheduled or obtained a mammogram. Further descriptions of methodology and data analysis are reviewed in this chapter in the section titled Analysis.

3. Fair subject selection. Recruitment of study participants should be based on the scientific goals of the study. As the goal of this study was to improve mammogram screenings among women who were non-adherent with guidelines and recommendations, women overdue for screening were chosen as participants. Women 40 and older who had not had a mammogram in at least 12 months were included in the sample population to give more women the opportunity to benefit from screening despite the understanding inconsistencies existed in the guidelines regarding age of initiation and frequency of mammography screenings. The author also attempted to include non-English-speaking women in the project through use of a telephone interpreter service provided within the healthcare organization.

4. Favorable risk-benefit ratio. Although the author did not foresee risks associated with participation in this project, the potential for mammography to not detect a small percentage of cancers as well as causing additional unnecessary testing and imaging for lesions that are not cancerous was discussed in the informed consent document (see Appendix E). However, all expert guidelines shared the common recommendation that regular screening mammograms were the gold standard in early detection of breast cancer and the benefits outweighed the risks. Experts also agreed the risk of not obtaining timely screening mammograms increased the chance of late stage breast cancer diagnoses and subsequent poor prognoses and death, further illustrating the benefit-risk relationship of screening mammography.
5. Independent review. The need for independent review by a panel of objective experts was critical to the protection of rights of study participants as well as examining any potential risks incurred from the study. Upon successful defense of this doctoral scholarly project to the author's committee members, the proposal was submitted to the IRBs of both the educational institution of the author and the clinical organization involved in the project. No contacting of participants, data collection, or any aspects of project implementation occurred until successful approvals from both IRBs were obtained (see Appendix A).
6. Informed consent. It was widely agreed upon that potential research participants should have the ability to decide whether to participate in a study or not or whether to continue participating once they had begun.

Participants were informed their involvement was voluntary and coercion of subjects was not permissible. The informed consent process involved accurately informing potential participants of the "purpose, methods, risks, benefits, and alternatives to the research, understand this information and how it relates to their own clinical situation or interests, and make a voluntary decision about whether to participate" (NIH, 2016, Informed Consent, para. 1). The informed consent for participants in this doctoral scholarly project is provided in Appendix E.

As the nature of a signed consent form is impractical for a telephone intervention, this author was advised by both IRBs to utilize a verbal consent process and request pertinent waivers during the IRB review processes. As discussed in coordination with the Director of the IRB of the healthcare organization involved in this project, the first telephone outreach call to potential participants served as the opportunity to provide a scripted verbal consent. Participants' responses during the consent process were documented by this author. Participants had the option of writing down the contact information of this author and research advisor's contact information or gave the author their email address if they wished to have access to this information for questions and concerns. Participants choosing not to participate or give consent over the telephone were excluded from further involvement in the project. Participants calling to schedule a mammogram after receiving a voicemail message from this author fell under the category

of implied consent; it was not necessary to read a scripted verbal consent in these cases.

7. Respect for potential and enrolled subjects. This realm of ethical guidance in research involves respecting privacy and protecting private information of participants, respecting participants decisions to not participate or stop participating at any point, informing them of the risks and benefits, and ensuring they learn the results of the study. Data management processes in this project aimed at protecting participants private health information (PHI) included various forms of access and protection of both identifiable and de-identified data. This author was the only individual with access to devices containing participant information. Participants' demographic information was de-identified through assignment of an identification number; the de-identified data were stored on a password protected USB drive stored in a locked drawer. The master list containing identifiable PHI including contact information was stored on a computer within the Breast Diagnostic Center. that required a login and password, was encrypted, and was regularly monitored by the Information Technology (IT) Department within the organization. Upon completion of the telephone intervention series and post-intervention analyses, information stored on the computer followed a secure-erasing process carried out in coordination with the organization's IT department to ensure the PHI could not be re-accessed or reconstructed. The de-identified data stored on the password protected USB drive were destroyed using the built-in self-erase function of the storage device.

CHAPTER IV

DATA ANALYSIS AND RESULTS

This quality improvement project sought to improve adherence to mammogram screenings through an evidence-based telephone outreach intervention. Stagnation of mammography rates regionally and nationally were driving factors in the project need and design; this was further influenced by the involved healthcare organization's desire to further improve upon their screening rates and quality metric outcomes. The telephone intervention was mutually agreed upon among this author, the Director of the regional Breast Diagnostic Center, and the Practice Manager of the Family Practice Clinic. The comprehensive literature review displayed in Chapter II revealed the evidence base for this project and the telephone outreach intervention built upon outreach efforts currently being conducted within the family practice clinic while progressively increasing the intensity of those outreach efforts.

Upon gaining expedited approval from both the university and the involved healthcare organization's IRBs (see Appendix A), this author began the data collection and implementation phases of the project. Informative letters were sent to providers of the family practice clinic (see Appendix F), which described the project objectives and design as well as provided contact information for the author, research advisor, and contact person for the university IRB for directing questions or concerns from providers. Additionally, an informative, interactive meeting led by the author was held for staff at the BDC to provide an overview of the project and offer an opportunity to answer

questions or concerns. This presentation took place during a mandatory staff meeting and, subsequently, attendance was high. Staff members present included the Director of the BDC, administrative assistant to the Director, front desk staff, scheduling staff, mammography technologists, and nurses. The informative meeting was well received and many staff members stated their enthusiasm with the project while expressing gratefulness for an opportunity to ask questions and relay concerns to the author

Retrospective chart reviews were conducted within the BDC for 50 women meeting the sample population criteria. Participants received telephone outreach up to three times in a three-week period. Per the request of the Director of the BDC, the outgoing phone number was blocked when calling participants to decrease the possibility of excess incoming calls to the scheduling department. As noted in the project plan, all participants opting to schedule a mammogram during this project were directed solely to the administrative assistant rather than the entire scheduling department of the BDC as requested by the Director. Participants with disconnected numbers, those unable to receive blocked incoming calls, those opting out, and those who agreed to transfer to the scheduler were not called back during subsequent study period weeks.

The fourth week of the project was designed for outcome measurement in the original project plan. This consisted of returning to the diagnostic center and performing a final chart review to determine the proportion of women who scheduled a mammogram and those who received a mammogram after the telephone outreach intervention. However, the diagnostic center was experiencing significant scheduling delays, resulting in most participants scheduling their mammograms further out than one week. To ensure accuracy of data results, this author extended the final chart review process to eight

weeks after the project began based upon dates of scheduled mammograms for participants.

Analysis of Population, Intervention, Comparison, and Outcome Question and Description of Outcome Measures

Producing reliable research results began with a clinical question in the PICO format: Among women ages 40 and older who did not receive a mammogram in the past 12 months, does a telephone counseling call addressing personal barriers compared to usual care improve mammography adherence in the primary care setting? The established metrics for evaluating effectiveness of the telephone outreach intervention were twofold:

1. Proportion of women who scheduled a mammogram after the telephone intervention.
2. Proportion of women who obtained a mammogram after the telephone intervention.

The post-intervention analysis of mammography proportion was conducted eight weeks following the project implementation. Proportion of mammography scheduling and uptake in the post-intervention period were compared to the pre-intervention mammography proportion. By default, the pre-intervention mammography proportion was zero as all participants had to be overdue for mammography to be eligible for inclusion.

Description of Sample

Participants eligible for inclusion in this quality improvement project were women ages 40 and older who were at least 12 months past due for a screening

mammogram and those who had received the two forms of outreach currently conducted within their family practice clinic: encouragement and assistance during their AWV in scheduling a mammogram and a reminder letter for those opting out of scheduling during their AWV.

A list of women provided by the family practice clinic Practice Manager was sent electronically in a secure format to the author. The list consisted of 461 female patients of the family practice clinic who were overdue for screening mammography, were 40 years and older, and had received some form of outreach conducted within the clinic. The quality improvement team within the organization was unable to produce a list of women who had received both forms of outreach described in the project design. To ensure the sample population included only participants who had received outreach during their AWV and by a follow up letter, the author performed individual chart reviews to ensure presence of documentation of both forms of outreach. Participants without clear documentation noting both forms of mammography outreach were excluded.

A large discrepancy existed between the number of overdue women on the list provided by the clinic (461) and the approved number of participants for this project (50). In coordination and agreement with the author's research advisor and the Director of the Breast Diagnostic Center, the list was reviewed in alphabetical order, participants were included or excluded based on sample criteria, and the development of a sample population was discontinued upon reaching 50 eligible participants. Of additional importance, extending the sample size beyond 50 participants required IRB amendments as 50 was the approved sample size within the expedited reviews. As agreed upon with

the Director of the BDC regarding a reasonable and appropriate scope of time and resources for this project, the sample size remained at 50 with the understanding that future outreach initiatives might include a greater number of eligible participants.

Pre-Intervention Data

Data collected prior to the project implementation and analysis phases included the following sociodemographic descriptors: age, race and ethnicity, date of last mammogram, preferred spoken language, insurance status and type, and employment status. Although the proposal included collecting income data during the data collection phase, this information was not available within the EHR and subsequently was not included in the sociodemographic data for this project. The sample size after collecting eligible participants from the master list and performing chart reviews was 50. Table 4 outlines the distribution of variables within the pre-intervention sample population.

Table 4

Sociodemographic Characteristics of Pre-Intervention Sample Population

Variables	*N*	%
Race		
Caucasian	47	94
African American	1	2
Asian	1	2
Unknown	1	2
Ethnicity		
Hispanic	7	14
Non-Hispanic	43	86
Age		
40-49 years	10	20
50-59 years	21	42
60 years and older	19	38
Insurance Status		
Private	37	74
Uninsured	1	2
Medicare	8	16
Medicaid	4	8
Marital Status		
Married	29	58
Single	7	14
Divorced	6	12
Legally Separated	1	2
Widowed	5	10
Unknown	2	4
Employment Status		
Employed	24	48
Unemployed	7	14
Retired	7	14
Unknown	12	24
Date of Last Mammogram		
1-2 years	1	2
3-5 years	21	42
5-10 years	5	10
Unknown or Never	23	46

The pre-intervention sample population (*n* = 50*)* was overwhelmingly Caucasian at 94% in the demographic of race while ethnicity was 14% Hispanic and 86% non-Hispanic. Interestingly, the Greeley, Colorado population in its entirety is more representative of the Hispanic community with 39% identifying as Hispanic and 55% Caucasian or non-Hispanic (U.S. Census Bureau, 2018a). Two percent of participants were African American (*n* = 1), 2% were Asian (*n* = 1), and 2% were unknown (*n* = 1). The average age of pre-intervention participants was 57.52 years. Participants were categorized into three age groups, 40-49 years (*n* = 10), 50-59 years (*n* = 21), and 60 years and older (*n* = 19). Most pre-intervention participants were employed at 48%, 24% were unknown, and a combined total of 28% were unemployed or retired. Many pre-intervention participants (*n* = 29) were married at 58% while the remainder were categorized as single, divorced, legally separated, widowed, or unknown based on documentation in the EHR. Most participants were privately insured at 74%, one participant was uninsured, 16% had Medicare, and 8% had Medicaid. Lastly, information regarding the length of time from the last mammogram was collected. Most pre-intervention participants (*n* = 23) either never had a mammogram or the last mammogram was not recorded in the chart. This demographic was grouped into four categories: 2% had a mammogram in the last one to two years, 42% in the last three to five years, 10% in the last 5-10 years, and 46% never had a mammogram or the last date of the mammogram was unknown.

Post-Intervention Data Analysis

The post-intervention sample population (*n* = 44) decreased by six participants from the pre-intervention sample size (*N* = 50). Participants excluded from the post-

intervention sample population included those with the following characteristics: disconnected telephone number, wrong telephone number recorded in the EHR, and inability to receive blocked or restricted telephone calls. Post-intervention sample participants did not vary significantly in sociodemographic variables from the pre-intervention sample. The post-intervention group remained mostly Caucasian at 94% and ethnicity also remained unchanged with 14% Hispanic and 86% Non-Hispanic. There was one Spanish-speaking participant in both the pre-intervention and post-intervention sample populations and the remainder of participants were English speaking. Comparable to the pre-intervention group, most women in the post-intervention group were employed (n = 22), married (n = 26), and privately insured (n = 33). No change was noted in the age distribution among participants in the pre- and post-intervention groups as most participants were in the 50-59 age range. Notably, the pre-intervention group had one participant recorded as being one to two years past due for a mammogram whereas the post-intervention group consisted of women at least three years past due for screening. Most participants in both groups were categorized as having no history of a past mammogram or no recorded past mammogram. Table 5 provides the sociodemographic characteristics of the post-intervention sample.

Table 5

Sociodemographic Characteristics of Post-Intervention Sample Population

Variables	*N*	%
Race		
Caucasian	41	94
African American	1	2
Asian	1	2
Unknown	1	2
Ethnicity		
Hispanic	6	14
Non-Hispanic	38	86
Preferred Language		
English	43	98
Spanish	1	2
Age		
40-49 years	10	20
50-59 years	21	42
60 years and older	19	38
Insurance Status		
Private	33	75
Uninsured	1	2
Medicare	6	1
Medicaid	4	9
Marital Status		
Married	26	59
Single	6	14
Divorced	5	11
Legally Separated	1	2
Widowed	4	9
Unknown	2	5
Employment Status		
Employed	22	50
Unemployed	8	18
Retired	5	11
Unknown	2	5
Date of Last Mammogram		
1-2 years	0	0
3-5 years	18	41
5-10 years	5	11
Unknown or Never	21	48

Analysis of Outcome Measures

The aim of this DNP scholarly project was to improve adherence to screening mammograms for overdue women through effective outreach. The proportion of mammography scheduling and uptake were the outcome measures for evaluating effectiveness of the telephone intervention described throughout this project. The final chart review for evaluating the established metrics took place eight weeks after the initiation of the project. Although the project proposal plan noted the final review taking place four weeks post project implementation, delays in scheduling influenced the extension of the final review date in order to ensure capture of all participants' mammography uptake. The following describe the chosen outcome measures for this project:

1. Proportion of women who scheduled a mammogram after the telephone intervention.
2. Proportion of women who obtained a mammogram after the telephone intervention.

Outcome one described the proportion of women who agreed to schedule a mammogram during the telephone intervention. Although this metric did not describe the uptake of mammography as the second outcome did, it implied a woman's intent to receive a mammogram. Additionally, it was helpful for the healthcare organization involved in this project to understand the likeliness of women to follow through with obtaining a mammogram after scheduling one during a telephone outreach initiative.

Both outcome measures were calculated by appropriately identifying a numerator and denominator. Outcome one was calculated as follows: the number of women who

scheduled a mammogram after the telephone intervention (n = 9) divided by the total number of women who received the telephone intervention (n = 44). The proportion of women who scheduled a mammogram was 20%.

Outcome two described the proportion of mammography uptake after receiving the telephone intervention. This metric was verified by documentation of mammogram results within participants' charts. Calculation of the second outcome measure was as follows: the number of women who obtained a mammogram after the telephone intervention (n = 7) divided by the total number of women who received the telephone intervention (n = 44). The proportion of women who obtained a mammogram was 16%. Notably, the goal stated by the Director of the BDC for mammography uptake for this project was 50%. The personal goal set by the author was to achieve an increase in mammography proportion of 20%. Although 20% of candidates scheduled a mammogram, the proportion rate of mammography uptake fell slightly below the author's goal of 16%.

Discussion of Personal Barriers to Mammography

A unique aspect of this project was the opportunity for participants to discuss personal barriers influencing their uptake or avoidance of mammography screening. Data collected regarding personal barriers reflected important qualitative results with the potential to provide a greater understanding of mammography uptake for women in northern Colorado. The telephone outreach intervention allowed the author to use an evidence-based script guided by the *Manual of Intervention Strategies to Increase Mammography Rates* (Wong, 2008) in discussing personal barriers with participants.

The telephone script created for this project addressed the following barriers with prompts for discussion: lack of time for a mammogram, provider did not recommend a mammogram, feeling fine or not having symptoms, performing self-breast examinations or receiving a clinical breast examination, no family history of breast cancer, personal belief of being unlikely to develop breast cancer, age related reasons, fear of radiation, discomfort or pain, lack of understanding of mammography, confusion regarding the guidelines, afraid of concerning findings from mammography, positive family history and afraid to find concerning results, embarrassed about the process of obtaining a mammogram, quality and accuracy of mammograms, and cost or insurance coverage related concerns. Of those barriers listed within the telephone script represented in Appendix D, only the following three were discussed during telephone calls as prompted by participants: lack of preventive care coverage while in between insurance plans, concern for pain or discomfort, and financial concerns.

Participants also discussed concerns and barriers not listed within the telephone script in Appendix D including long work hours and the inability to receive a mammogram during business hours, no longer living in Colorado and intentions to receive a mammogram in their new place of residence, currently being in a grief period due to the recent death of a spouse and preferring to delay mammography at that time, preferring to schedule online through the patient portal of the healthcare organization, and having a work program providing mammograms at a reduced cost or of no cost to the patient. Between both the scripted barriers and unscripted barriers, a total of eight concerns were discussed with participants. Discussion of personal barriers arose during 11 (25%) phone calls.

Key Facilitators and Barriers to Project Implementation

Although a thoroughly planned proposal certainly contributed to a more successful DNP project implementation, foreseen and unforeseen barriers arose and contributed to challenges. Of equal importance, facilitators of project success arose and allowed for assistance in overcoming challenges or strategizing alternative plans. Facilitators and barriers are discussed objectively without interpretation in the following paragraphs. Further discussion and interpretation regarding the influence of facilitators and barriers is provided in the final chapter of this project.

Key Facilitators

Critically important to the successful implementation of this project was the buy-in and support of the Breast Diagnostic Center Director and staff of the involved healthcare organization. The Director was instrumental in assisting the author in developing the project direction and plan, strategizing the workflow of the telephone outreach process, and involvement of necessary staff for carrying out the telephone calls and scheduling. The project was dependent on the involvement of the administrative assistant to the Director of the BDC as all patients who opted to schedule a mammogram after the telephone outreach were transferred to the administrative assistant for scheduling.

Other members of the healthcare organization who positively contributed to forward movement of the DNP project included the Manager of Clinical Education and Professional Development as she facilitated EHR access for the author to perform chart reviews and form a sample population, the IRB within the healthcare organization as this team assisted the author in navigating the IRB process and offered suggestions

throughout the process, and the Lead Medical Assistant within the family practice clinic as this individual worked diligently to provide a list of potential participants in forming the sample population.

Barriers

Several barriers were anticipated prior to project implementation while several arose throughout the implementation process. A requirement of the Director of the BDC was to block or restrict outgoing calls to avoid excess incoming calls to the scheduling department. The Director voiced concerns about the ability of the scheduling staff to handle an influx of calls within an already busy department. Another concern voiced by the director was the tendency of patients to call the main number at the BDC without listening to a voicemail that gave a specific number to return the call. Regardless of which phone was utilized within the BDC, all outgoing calls appeared as the main number of the BDC and the Director sought to avoid increased confusion among the patients and staff due to the telephone outreach. The author worked with the IT department within the organization to seek a solution for blocking the outgoing number. However, the IT department was unable to find a solution that would not block all outgoing calls from the BDC rather than the single telephone utilized by the author. The solution to overcoming this barrier included using a cellular telephone to block the outgoing calls. The cellular telephone also included a function that allowed the author to transfer participants to the administrative assistant for scheduling a mammogram.

Blocking the outgoing telephone number also served as a barrier for participant recruitment as four participants did not allow restricted calls. These participants were excluded from the post-intervention sample and for this reason did not receive the

telephone intervention. Additionally, 36% of participants in the post-intervention sample population received a voicemail encouraging them to schedule a mammogram each week for three weeks. These participants did not receive the opportunity to discuss personal barriers regarding mammography and had the additional barrier of calling a telephone number after listening to a voicemail message rather than having the opportunity to schedule a mammogram during the telephone call. Furthermore, none of the participants receiving voicemails called back to schedule a mammogram whereas 53% of participants who answered the call did schedule a mammogram. Of the 44 participants in the post-intervention sample, 17 answered the call over the three-week period, nine opted in to scheduling, six opted out, and two requested a call back but did not schedule upon calling back at their desired date and time.

Another barrier presented when attempting to call a Spanish-speaking participant—the only non-English-speaking participant in the sample. The telephone interpreter service provided by the healthcare organization was utilized to conduct the telephone outreach intervention with this participant. The author read the informed consent and telephone script to the interpreter prior to conducting the call. The Spanish-speaking participant ended the phone call while the interpreter was reading the informed consent to her; thus, she was unable to schedule or obtain a mammogram as a result of the telephone outreach. Additionally, the informed consent presented as a barrier for women of English and non-English-speaking preference. Women agreeing to schedule a mammogram typically agreed at the beginning of the call prior to hearing the informed consent script. In adherence with IRB requirements, the author read the informed

consent described in Appendix E. This requirement increased the length of call times and hindered the direct transfer of participants to the scheduler.

Lastly, obtaining the list of potential participants from the family practice clinic manager proved difficult and took several attempts over a period of one month. As noted in the project proposal, it was predicted potential delays in needs from the family practice clinic might occur during project implementation as the clinic was in a transition of leadership. However, during the project proposal phase, the author, Director of the BDC, and outgoing manager of the clinic agreed this individual would provide the author with the list of potential participants upon receiving IRB approval despite the transition of roles within the clinic. The outgoing manager ultimately was not able to assist in providing a list of participants and requested this be directed to the new manager of the clinic. The author reached out to the incoming manager of the clinic and the lead medical assistant for assistance in obtaining this list. Involvement of these two individuals provided improved clarity in communication and prompt delivery of the participant list to the author. Upon obtaining the list of participants, it was discovered the QI department within the organization was unable to distinguish whether the overdue women had received both forms of outreach but that each had experienced some form of outreach. This required an additional step in the chart review process to ensure each participant had received both forms of outreach. Those without clear documentation in the EHR of receiving outreach both during their AWV and via a reminder letter were excluded from the list of participants.

CHAPTER V

DISCUSSION

This chapter includes a summary of project findings, conclusions related to the findings, and recommendations for future research. Finally, a description is provided regarding the fulfillment of this author's scholarly project in meeting the AACN's (2006) *Essentials of Doctoral Education in Advanced Nursing Practice* and the evaluation, culmination, partnerships, implements, and evaluates (EC as PIE; Waldrop et al., 2014) criteria for maintaining scholarly and clinical rigor in DNP projects.

Summary of Findings

This DNP scholarly project followed a quality improvement design that sought to improve adherence to timely screening mammograms for Colorado women. The purpose of the project included identifying women who were past due for screening, developing an outreach intervention building upon current efforts within the chosen healthcare organization, offering the opportunity to discuss personal barriers toward mammography, and providing ease of scheduling for this important screening. The need for the project was evidenced by stagnation in regional and national mammography rates and goals for improvement; Colorado remains 40th nationally in mammogram rates at 68% for women ages 40 and older while the national goal was set at achieving 81.1% or higher (ACS, 2018; Healthy People 2020, 2019).

Women ages 40 and older who were at least 12 months past due for a screening mammogram, had received both forms of outreach provided by the clinic, and those

fitting the inclusion criteria were included in the sample. The pre-intervention sample (*N* = 50) was an organization-driven sample size agreed upon between the author and Director of the BDC. After excluding participants with disconnected or incorrect phone numbers, those unable to receive blocked or restricted calls, and those without clear documentation of receiving both forms of prior outreach, the post-intervention sample size was 44. Most of the sample participants were Caucasian, non-Hispanic, English speaking, privately insured, employed, and married. The average age of participants was 56.91 years. Additionally, most women either never had a mammogram or no history of a mammogram was recorded in the EHR.

Over a three-week period, women were contacted by telephone up to three times utilizing a scripted outreach intervention guided by the health belief model (Rosenstock, 1974), the model for improvement (IHI, 2019), and the *Manual of Intervention Strategies to Increase Mammogram Rates* (Wong, 2008). The outgoing telephone number from the BDC was blocked per the request of the Director. The Director felt blocking the call for the purposes and scope of this pilot project would reduce the chance of women calling the main BDC telephone number and creating confusion among both patients and staff. Women who scheduled a mammogram during the call were not called back during subsequent weeks and those with voicemail messaging activated were left a scripted message encouraging them to schedule a mammogram appointment.

Notably, 36% of women received a voicemail during each of the three intervention weeks of the project; these women did not receive the opportunity to discuss personal barriers regarding mammography or experience ease of scheduling during the call. Of the women who answered the outreach call, 53% agreed to schedule a

mammogram while none of the women receiving voicemails called back to schedule an appointment. Although the Director of the BDC set a goal of a 50% mammography proportion rate for those in the post-intervention sample, the outcome measures did not reach this goal; 20% of women in the post-intervention sample scheduled a mammogram and 16% received a mammogram. However, the author's personal goal for the project included increasing mammography proportion by 20%; the project succeeded in scheduling 20% of participants but fell short of the mammography proportion at 16%.

Conclusions

Although the post-intervention analysis did not reveal a 50% increase or greater as proposed as a project goal by the Director of the BDC, the telephone outreach did succeed in influencing 20% of the sample participants to schedule a mammogram while 16% followed through in obtaining a mammogram. It was difficult to assess the full potential of success for the telephone outreach as 36% of women were not reached directly but received voicemails. Although most women who answered the call agreed to schedule, none of the participants receiving voicemails called back to schedule a mammogram. All participants were past due for screening while having multiple outreach attempts in the past. Additionally, all participants were at least three years past due for screening and most had no history of a mammogram or an unknown amount of time since their last screening. Considering these variables, this telephone outreach intervention successfully influenced a group of women who were past due for screening or never had a mammogram to decrease their risk of breast cancer related mortality through adherence to mammography screening guidelines.

Influence of Frameworks

This project was guided by the HBM theoretical framework (Rosenstock, 1974) and the model of improvement conceptual framework (IHI, 2019). The HBM was most influential to this project in the realm of personal barriers discussion during the telephone outreach calls. It was helpful for the author to understand concepts of perceived severity, susceptibility, benefits, and barriers in discussing personal reasons guiding participants toward or away from mammography. Another concept within the HBM model was health motivation. Those participants with stated barriers but active health motivation agreed to schedule a mammogram while those with stated barriers and not in an active state of health motivation chose not to schedule a mammogram.

The proposal of the project was also guided by the model of improvement and the PDSA cycle (IHI, 2019). The *plan* phase took place during the project proposal while the author and key stakeholders developed the project plan. The *do* phase involved implementing the project and working alongside stakeholders to carry out the intervention. Chapter IV: Data Analysis and Results presented the *study* phase in which results were presented. Finally, this chapter presents the *act* phase of the PDSA cycle, allowing for interpretation of results and formulating a plan for further research and action.

Recommendations for Future Research

A variety of outreach techniques and approaches were discussed in the literature regarding improving mammography adherence. Results of the literature review within this project and the outcomes of the project revealed a consistent message: breast cancer

screening outreach must be multimodal, tailored to meet the needs and preferences of a varied group of women, and increase in intensity over time for optimal effectiveness.

The involved healthcare organization was committed to continuing breast cancer screening outreach and researching methods for improvement. It was recommended by this author to expand both the size and scope of this project in future initiatives. To provide sustainability over time and reach a greater number of overdue women, it was suggested that telephone outreach initiatives be fielded to the scheduling department rather than solely to the administrative assistant. To accommodate a potential influx in calls, it might be necessary to develop a plan between the Director and scheduling department regarding the organization's goals toward improving mammography rates and a reasonable workflow that considered resource availability of the schedulers. It would also be necessary to determine which individuals within the organization were best equipped to carry out the telephone outreach. These individuals must have allotted time built into their schedules for performing the outreach and might require training regarding the telephone script and discussion of personal barriers with patients.

Blocking outgoing calls served as a clear barrier for some women; those not allowing restricted calls were excluded from the sample and did not receive the opportunity to participate. It was also possible some of the participants (36%) receiving voicemails during all three intervention weeks chose not to answer the blocked call. It was recommended in future telephone outreach initiatives that outgoing calls not be blocked with the goal of increasing the number of participants answering the call. As most participants who answered the call did schedule a mammogram and none of the participants receiving voicemails called back to schedule, telephone outreach was clearly

most effective by talking to women directly versus leaving an informative voicemail message. The healthcare organization involved in this project might also consider reaching out beyond three attempts or utilizing telephone outreach as an ongoing, continuous process for overdue women in their primary care clinics.

It was also recommended that further research and outreach initiatives provide greater focus for non-Caucasian, non-English speaking, and uninsured or underinsured women in our communities. The sample population for this project revealed an overwhelmingly Caucasian, English speaking, insured group of participants that might not be representative of our region's diverse population and outreach needs. Although breast cancer incidence is greatest among White women, it is also true that minority women and those who are uninsured or underinsured are predisposed to worsened breast cancer-related outcomes. Women identifying as Asian, Hispanic, or Native American were underrepresented in breast cancer related literature; thus, it is recommended future research efforts ensure these groups represent a greater focus. As women living in rural or frontier areas also face barriers in receiving timely mammogram screenings, it might also benefit the organization to expand outreach research efforts to rural settings as the location utilized in this project was increasingly urbanized.

Lastly, a large discrepancy existed between the post-intervention sample size (44) and the number of overdue women on the list of potential participants (461). This project revealed a 20% increase in the proportion of women willing to schedule a mammogram and a 16% increase in uptake of mammography among overdue women. It is recommended a telephone outreach initiative be performed on a larger scale including all overdue women in the family practice clinic. Expanding the size of the sample population

and the scope of available resources for future telephone outreach would increase the impact of a 16%-20% improvement in mammography adherence.

Dissemination of Findings to Project Stakeholders

It was critically important to disseminate the findings of the DNP scholarly [roject to the stakeholders involved. The chief stakeholder involved in this project at the organization level was the Director of the BDC. This individual was instrumental in bringing the design and implementation of this project to fruition; her input and guidance regarding the outcomes of the project and future recommendations were of great value. At the convenience and preference of the Director, a meeting will be scheduled with the author to discuss the project findings and ongoing plans regarding breast cancer screening outreach for the healthcare organization. If the Director requests expanded dissemination of findings to other individuals or groups within or outside of the healthcare organization, this request will be organized and accommodated by the author.

Essentials of Doctoral Education in Advanced Nursing Practice

For the past 15 years beginning in 2004, national organizations have called for a terminal degree in advanced nursing practice to transition from the traditional master's degree pathway to a clinical doctorate: the DNP (AACN, 2006; Auerbach et al., 2015). Both nursing centered organizations such as the AACN (2006) and non-nursing organizations including the Institute of Medicine (2010) and the National Academy of Sciences (2005) recognized the increasing complexity of the healthcare system and the people it served. This growing complexity required the highest level of education and preparation for clinicians. Thus, the AACN developed the *Essentials of Doctoral Education for Advanced Nursing Practice* to ensure DNP programs met a set of national

standards that upheld the clinical and scholarly rigors expected of doctoral prepared clinicians. These essentials represented eight foundational outcome competencies expected of all DNP graduates regardless of clinical focus or specialty.

Criteria for Doctor of Nursing Practice Scholarly Projects

The EC as PIE criteria from Waldrop et al. (2014) were developed to ensure each DNP candidate and his/her scholarly project fulfilled the *Essentials of Doctoral Education for Advanced Nursing Practice* (AACN, 2006). When all five of the following criteria were met, a scholarly project displayed the rigor and excellence expected of doctoral work as well as a candidate worthy of carrying the title of Doctor of Nursing Practice.

1. Enhances health outcomes, practice outcomes, or health care policy. This DNP scholarly project enhanced both health and practice outcomes related to mammography screenings for a group of women in Colorado. All participants were overdue for screening, placing them at greater risk for discovery of late-stage breast cancer and worsened outcomes. Many women in the sample population had never received a mammogram. This project influenced these women to make a positive health behavior change and subsequently reduced their breast cancer related mortality risk.

   In the practice realm, this project contributed to outreach initiatives incorporated into breast cancer screening programs within the chosen healthcare organization. Telephone outreach with discussion of personal barriers and the ability to schedule a mammogram during the call were not previously utilized within this setting. This allowed the organization to

utilize a wider array of outreach techniques in their ongoing efforts to increase mammogram rates.

2. Reflect a culmination of practice inquiry. The DNP student must be able to identify and interpret available evidence while seamlessly translating this evidence into practice. This author inquired within the health organization regarding current outcome measurements and difficulties related to various improvement areas. The organization had longstanding and varied approaches toward improving mammograms with intermittent successes but experienced non-sustaining improvement. This concept was repeatedly shown in the literature and evidenced by stagnation and lack of improvement in mammogram screening rates regionally and nationally. The author showed practice inquiry by understanding the needs and growth areas of the organization; performing a comprehensive review of the literature to understand barriers to mammography and methods for improvement; implementing an evidence-based, practice-driven project; and reflecting on the outcomes through thoughtful evaluation and recommendations for future research.
3. Require engagement in partnerships. Of critical importance to the success of a DNP scholarly project is the development of partnerships with key stakeholders. Key partnerships developed throughout this project included the Director of the BDC, the administrative assistant to the Director, the incoming manager and medical assistant within the family practice clinic, and staff within the BDC. The interest and buy-in of the healthcare

organization was critical to the planning and development of the project. Additionally, it was necessary at times to adjust the plan based upon the needs of the organization including directing all calls to the administrative assistant rather than the entire scheduling department and blocking outgoing calls to avoid confusion and an influx of calls. This process highlighted the importance of understanding all perspectives among those involved and the need to maintain flexibility while carrying out a clinical improvement project.

4. Implement/apply/translate evidence into practice. At the doctoral level, a clinician must be able to find and interpret available evidence but also apply this evidence appropriately in the clinical setting. This author worked alongside members of the organization to identify an area of concern, performed a comprehensive literature review, critically compared the literature with the organization's strategic plan and past efforts, and designed and implemented an evidence-based, practice-driven project.
5. Require evaluation of health care, practice, or policy outcomes. As a clinician practicing at the doctoral level, this author chose to focus on the practice outcome of improving mammograms through adherence to national guidelines and recommendations. The outcome measures were two-fold: what is the proportion of women who scheduled and obtained a mammogram after receiving a telephone outreach intervention offering the opportunity to discuss personal barriers toward mammography. This project did not meet the Director of the BDC's goal of 50% but it nearly met this

author's personal goal of 20% mammography uptake. However, the following must not be discounted: most women who chose to schedule a mammogram during this project never received a mammogram before despite multiple previous outreach attempts; 20% of women scheduled a mammogram during the call while 16% followed through; and seven women who were previously at an increased risk of finding breast cancer in its late and devastating stages decreased this risk while simultaneously making a positive health behavior change.

Summary

Screening mammography remains the gold standard in detecting breast cancer in its early stages when it is most treatable. Timely screening mammograms reduce mortality related to breast cancer—the second leading cause of cancer-related death among all American women (ACS, 2019). Despite evidence supporting mammograms and increased coverage of this important preventive service (HRSA, 2018), mammogram rates regionally and nationally remain suboptimal. This DNP scholarly project sought to improve mammogram rates through the development and implementation of a telephone outreach initiative incorporating discussion of personal barriers toward mammography and the option to schedule a mammogram during the call. As a result, 20% of women scheduled a mammogram while 16% followed through in obtaining a mammogram; these results are important as most women in the sample had never received a mammogram and successfully adopted a new, positive health behavior.

Despite this success, it is important to view quality improvement initiatives in breast cancer screening as an ongoing, dynamic process requiring continuous evaluation

and evidence-based, practice-driven outreach initiatives. It is recommended that healthcare organizations continue to research and implement multimodal outreach services that increase in intensity overtime for women remaining overdue while providing approaches appealing to women of varied racial and ethnic backgrounds, insurance and financial status, geographical location, and other influencing factors.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVALS

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	June 14, 2019
TO:	McKenzee Kemper, BSN, DNP Candidate
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[1434120-1] Improving Mammography Adherence in the Primary Care Setting
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	June 14, 2019
EXPIRATION DATE:	
REVIEW TYPE:	Expedited Review

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of .

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Nicole Morse at 970-351-1910 or nicole.morse@unco.edu. Please include your project title and reference number in all correspondence with this committee.

Hello Ms. Kemper and Dr. Einhellig,

Thank you for your detailed and thorough proposal submission. For future reference, please include the contact information for Nicole Morse for participants if they have concerns or questions. Thank you. We recommend approval of this project.

Drs. Clucky and Montemayor

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

uchealth

STATEMENT OF COMPLIANCE
UCHEALTH IRB
{ASSURANCE FWA00023003}

IRB MEETING DATE **June 12, 2019**
TO: **McKenzee Kemper BSN, RN, DNP Candidate**
SPONSOR PROTOCOL NUMBER: IRB NUMBER AND PROTOCOL TITLE: **19-6072: Improving Mammography Adherence in the Primary Care Setting**
APPLICATION INITIAL APPROVAL DATE: **May 28, 2019**

The Protocol sent to the Institutional Review Board (IRB) was reviewed and approved. Your signature below indicates your compliance of the following provisions. Please sign and return one copy to the UCHealth IRB office within a month. The other copy is for your records. All protocol procedures will be followed as submitted.

1. No further changes in the protocol by either the sponsor or the investigator will be allowed without a formal review of such changes by the IRB. You, as the investigator, are required to report these changes to the IRB within 90 days of receipt.
2. Any related, unexpected and serious adverse reactions by any subject participating in the study are required to be reported. The death of any patient related to the study requires notification of the IRB at the earliest possible time, but not to exceed 72 hours following receipt of notification.
3. Any unanticipated problems and serious or continuing noncompliance needs to be submitted to the IRB as they discovered.
4. Comply with all federal (including HIPAA), State, and institutional regulations governing the research.
5. Notify the IRB when the study is terminated or completed. A closure notification needs to be submitted via IRBManager electronic database
6. Maintain records of research for a minimum of three (3) years beyond the termination of the study or, if longer, as specified by the funding agency/sponsor of the protocol.
7. Please send all future correspondence to Kim Buening, IRB Coordinator, UCHealth, 3702 Automation Way, Suite 200, Fort Collins, CO 80525 or email to UCHealthIRB@uchealth.org.

Failure to comply with any of the above requirements may result in Closure of the Study by the UCHealth IRB. I hereby assure compliance to the above and understand that I am responsible to report any misconduct to the UCHealth IRB.

[redacted] 6/4/2019

Principal Investigator Signature or Designee — Date
(Sign and return this copy to the UCHealth IRB office)

[redacted] May 28, 2019

Michael Metzler, MD — Date
Chairperson, Institutional Review Board

[redacted] May 28, 2019

Kim Buening, CIP — Date
IRB Coordinator

uchealth

Breast Diagnostic Center

2127 E. Harmony Road
Suite 100
Fort Collins, CO 80528

O 970.207.4702
F 970.207.4755
amanda.wood@uchealth.org

May 1st, 2019

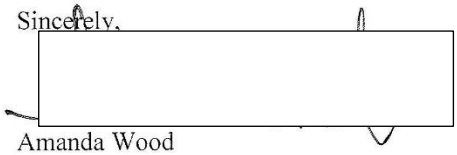
University of Colorado Health
Institutional Review Board
3702 Automation Way, Suite 200
Fort Collins, CO 80525

Dear IRB Committee:

It is my understanding that McKenzee Kemper, DNP Candidate at the University of Northern Colorado, will be conducting a DNP Scholarly Project aimed at increasing mammogram rates for women who are overdue for screening. This quality improvement project will take place within the UCHealth Breast Diagnostic Center in Fort Collins, CO. Mrs. Kemper has informed me about the study design, sample population, needs within the breast center for project implementation, and desired outcomes of the project.

I support this clinical and scholarly effort and will provide any necessary assistance needed for successful implementation of this project. If you have any questions, please reach out to me at 970-207-4702 or amanda.wood@uchealth.org

Sincerely,



Amanda Wood
Director of Breast Services
UCHealth Northern Region
2127 E. Harmony Road, Building B
Fort Collins, CO 80528
970-207-4702

APPENDIX B

SCRIPT FOR TELEPHONE INTERVENTION WITH PROMPT FOR BARRIERS COUNSELING

Introduction

"Hello _____, my name is McKenzee and I am calling from the UC Health Breast Diagnostic Center on behalf of Dr. _____ office. I am conducting a research project aimed at improving early detection of breast cancer for Colorado women. Do you have a few moments to speak about scheduling a mammogram appointment?"

***If agrees to proceed, read VERBAL INFORMED CONSENT SCRIPT HERE.**

If YES: "I see based on our records it has been _____ since your last mammogram. Your provider recommends receiving a mammogram every year as this is proven to be a lifesaving screening and can detect breast cancer up to 2 years sooner than a self or clinical breast exam. May I transfer you to the breast imaging center to schedule a mammogram now?

- **If YES:** "Great! I will transfer you over to the schedulers at the breast imaging center. Thank you for talking with me and have a nice evening!"
- **If NO:** "Some women feel a mammogram is not needed because they feel fine or do not have breast cancer in their families. Others feel too busy or are concerned about cost or other fears. Do you have any concerns like these?"
    - **If YES:** see ***Barrier Prompt Script with Responses***
    - **If NO** and no longer wants to talk: "Thank you for taking the time to talk with me this evening. I encourage you to think about our conversation this evening and call the breast imaging center soon to schedule a screening mammogram. Have a nice evening!"

If NO: "Would you like me to call back at another time?"

- **If YES:** Arrange for another date and time to call back and record this in spreadsheet. Thank her for her time.
- **If NO** and no longer wants to talk: "Thank you for taking the time to talk with me. I encourage you to think about our conversation this evening and call the breast imaging center soon to schedule a screening mammogram. Have a nice evening!"

If VAGUE/HESITANT: "Some women feel a mammogram is not needed because they feel fine or do not have breast cancer in their families. Others feel too busy or are concerned about cost or other fears. Do you have any concerns like these?

- If reports barriers, see ***Barrier Prompt Script with Responses.***
  - **Respond to questions/concerns→**"If you are feeling ready to make a mammogram appointment, I can take care of this for you now. May I transfer you to the breast imaging center to schedule your appointment?"
  - **If YES:** "Great! I will transfer you over to the schedulers at the breast imaging center. Thank you for talking with me and have a nice evening!"
  - **If NO and** no longer wants to talk: "Thank you for taking the time to talk with me this evening. I encourage you to think about our conversation this evening and call the breast imaging center soon to schedule a screening mammogram. Have a nice evening!"

- **If NO** but wants to continue to think about it: Thank her for her time, ask to schedule another date and time to discuss scheduling a mammogram.

APPENDIX C

VOICEMAIL SCRIPT

“Hello (participant’s name), my name is McKenzee Kemper and I am a graduate student in the School of Nursing at the University of Northern Colorado. I am conducting a research project along with your UCHealth Family Practice Clinic and regional Breast Diagnostic Center reaimed at improving early detection of breast cancer for Colorado women. I’d like to encourage you to schedule your mammogram soon as it has been _____ (months, years) since your last screening. Experts and your provider agree that regular mammogram screenings are the best way to catch breast cancer early and save lives. Please call Jaime at the Breast Diagnostic Center at **970-207-4732** to schedule your mammogram. As part of my research efforts I will make three attempts to reach out to you about this important screening, although your participation is entirely voluntary, and you may choose not to participate at any time. Thank you, _____ (participant’s name) and have a great day!”

APPENDIX D

BARRIER PROMPT SCRIPT WITH RESPONSES

BARRIER	RESPONSE
Don't have time/too busy	I realize your time is valuable. A mammogram only takes about 10 minutes and we have several breast imaging center locations in Northern Colorado. I'd be happy to transfer you to our scheduling department now.
Provider did not recommend mammogram	All the providers at the UC Health Family Practice Clinic in Greeley agree that regular mammograms are the best tool we have for finding breast cancer early. Your provider is aware we are making calls encouraging women to schedule their mammogram. If you receive your screening at one of our breast imaging centers, your provider will receive the results.
I feel fine/No symptoms	I am glad you are feeling well and have no current concerns about your breast health. Did you know that in the early stages of breast cancer most women do not have signs or symptoms? This is why mammograms are so important, they are the best tool we have for finding breast cancer early, before you notice it and when we have the best chance of successful treatment.
I check my breasts/Provider checks my breasts	I am glad you are familiar with breast health, the most recent guidelines promote breast awareness over monthly self-checks. Breast awareness is simply being in tune to the normal feel and look of your breasts, so you are able to alert your provider if you notice changes. Although breast awareness is an important practice, it is not as effective at finding breast cancer as a mammogram. A mammogram can find early breast cancer up to 2 years before a self-check or a clinic breast exam from your provider.
No family history	Did you know 3 out of 4 breast cancers are diagnosed in women with no significant family history of breast cancer? Although it is true having breast cancer in your family increases your risk,

	most women who are diagnosed with breast cancer do not have another family member who has had breast cancer.
I won't get breast cancer	Women of average lifetime risk have a 12% chance of developing breast cancer in their life, that is 1 in 8 women. For women with a history of breast cancer or some other cancers in their family, the risk is even higher. As breast cancer is most treatable before any signs or symptoms develop, a screening mammogram is the most important tool for catching cancer early.
Don't need to- age	The chance of developing breast cancer increases with age, the best way to catch breast cancer early is with a mammogram screening.
Fear of radiation/x-rays	I understand your concerns about radiation exposure from x-rays. The amount of radiation in a mammogram is a very low dose. It is considered safe and recommended as often as yearly for women 40 years and older. The radiation we receive simply from living in Colorado for three weeks is greater than the radiation exposure from a screening mammogram.
Discomfort/pain	I can understand your concerns about discomfort or pain. Most women do not describe mammograms as painful, but rather mild discomfort. We also use a special foam pad to decrease discomfort, most women find this very helpful. If you still have menstrual periods, consider scheduling your mammogram right after your period when your breasts are less likely to be tender. If you are taking hormonal supplements, you may notice times of the month your breasts are more tender. Consider scheduling your mammogram during a time you are not already experiencing tenderness.

	You may also discuss taking OTC pain medication like ibuprofen or Tylenol before your mammogram with your PCP prior to your appointment.
Don't know what a mammogram is	A mammogram is a low-dose x-ray of the breast. The purpose of a mammogram is to find breast cancer early, before you have signs or symptoms and while it is most easily treated. The technologist will take a few pictures of each breast, these pictures help the radiologist observe for anything concerning in your breast tissue. During the exam, your breast will be pressed between two plates. Some women find this mildly uncomfortable, but the procedure takes 10 minutes or less and this technique allows for the best picture possible.
Confusion about guidelines	It is understandable that women face some confusion with breast cancer screening guidelines. Although there is variation in when women should start mammogram screenings and how often, all expert groups and your provider agree that regular mammogram screenings are the best way to catch breast cancer early.
Afraid of finding something wrong or don't want to know	I agree it can be scary to think about the possibility of breast cancer but putting a mammogram off increases the chance of finding breast cancer in its later stages when it is less treatable. Most abnormal mammograms turn out not to be breast cancer, but rather cysts or other non-concerning breast changes. If there is a problem going on now but you have no symptoms, the best way for us to find out is through a mammogram.
Family history- afraid	I can understand your concerns, considering you have family members who have experiences breast cancer. As a family history of breast cancer can increase your chances of developing the disease, it is very important for your to receive screenings while you are symptom free. Early detection of breast cancer, before women realize there is a

	problem, is best found through mammography and can save lives. Additionally, understanding your breast health can help increase further knowledge and understanding among other women in your family.
Embarrassed to have mammogram	This is a common concern among women planning for a mammogram and it is a concern we acknowledge at the breast center. All the mammogram technicians are women. You will only need to take your clothes off down to your waist. The technician will provide you with a gown, she will be able to keep you covered most of the time.
Quality/accuracy of mammograms	Quality and accuracy of mammograms is very important to us too. All of our equipment is certified by the FDA. Our technicians are highly skilled and trained as well as our radiologists; the doctors who will read your mammogram and send results to your PCP.
Cost/Insurance coverage	Although it is true there used to be variation in coverage of mammograms, through the Affordable Care Act insurances companies are typically required to cover preventive services like mammograms at 100% with no cost to you. I would encourage you to check in with your insurance carrier regarding your policy coverage.

APPENDIX E

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

University of Northern Colorado

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
Patient Version

Project Title: Improving Mammography Adherence in the Primary Care Setting
Author: McKenzee Kemper, BSN; University of Northern Colorado, Doctor of Nursing Practice Candidate
E-mail: kemp8173bears.unco.edu
Research Advisor: Dr. Katrina Einhellig, PhD., University of Northern Colorado, School of Nursing
E-mail: katrina.einhellig@unco.edu Phone: 970-351-2269

Hello (participant's name), my name is McKenzee Kemper. I am a graduate student at the University of Northern Colorado in the School of Nursing. I am undertaking research that will be used in my doctoral research project. This research project has the support of UCHealth, your Primary Care Provider, and your regional Breast Diagnostic Center.

I am studying how we can improve mammogram screening rates among women in Northern Colorado, understanding that our rates have been below target for many years and mammograms continue to be the best method we have for finding breast cancer early and improving the chance of survival for women.

If you choose to proceed with our conversation today, it will involve the opportunity to schedule a mammogram and discuss any barriers, questions, or concerns you have about mammograms.

This conversation will take about 10 minutes of your time. At all times I will strive to maintain confidentiality of your private information. Data collected for this project will be de-identified and kept on a password protected USB device. Your de-identified information will not be shared with other researchers. The master list of contact information will be kept on an encrypted, password protected computer within the UCHealth Breast Diagnostic Center.

Your participation is voluntary and at any time you may decide not to participate. I do not anticipate any risks of participating in this project, your provider and experts agree that for most women the benefits of regular mammogram screenings greatly outweigh any potential risks.

If you have additional questions or concerns about the study, please feel free to contact myself, my research advisor Dr. Katrina Einhellig, or our university research office at any time. If you would like a list of contact information, I can give you those now if you have a pen and paper or I can email this list if you'd prefer.

Do you have any questions currently about the research project? Do you agree to participate?

If so, let's begin.

APPENDIX F

LETTER OF INTENT FOR PROVIDERS

University of Northern Colorado
LETTER OF INTENT FOR PROVIDERS

Project Title: Improving Mammography Adherence in the Primary Care Setting
Author: McKenzee Kemper, BSN; University of Northern Colorado, Doctor of Nursing Practice Candidate
E-mail: kemp8173bears.unco.edu
Research Advisor: Dr. Katrina Einhellig, PhD., University of Northern Colorado, School of Nursing
E-mail: katrina.einhellig@unco.edu Phone: 970-351-2269

Hello Provider Team at the UC Health Greeley Family Practice Clinic:

My name is McKenzee Kemper, I am a doctoral student at the University of Northern Colorado. I have also been a nurse in the intensive care setting within UC Health the past four years. As I work toward completing my doctoral education, the highlight of this journey culminates with a scholarly project translating evidence into practice. I am writing to inform you of a project I will be implementing within the regional breast diagnostic center and utilizing a sample population from within your clinic setting.

Throughout the month of June 2019, women ages 40 and older in your family practice clinic who are at least 12 months past due for a mammogram screening will be contacted via telephone as part of a doctoral research project. The project will specifically target those women overdue who have already been reached out to during their annual wellness visit and via a follow up reminder letter. The telephone intervention involved in this project will further encourage these women to schedule a mammogram, offer to counsel them on specific barriers to mammography during the call, and transfer them to the schedulers at the breast diagnostic center if they are agreeable. Of course, if women choose not to participate in the call or schedule/obtain a mammogram they maintain the right to do so or stop participating at any time.

Current literature surrounding mammography adherence advises reaching out to women on multiple attempts and through varied interventions, progressively increasing the intensity of said interventions. It is the hope of myself and leadership within your clinic and the breast diagnostic center that this project will reveal ways we may continue to provide outreach for mammogram screenings, ultimately leading to more lives saved through early detection.

I encourage you to call or email myself or my research advisor, Dr. Katrina Einhellig, with any questions or concerns you may have regarding this project. Thank you for your time and support as we work collectively toward improving outcomes for women in our community!