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**MASS MATTERS: INCREASING MAMMOGRAPHY RATES TO UNDERSERVED
WOMEN**

by

INGRID N. COOPER

EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing and Health Professions

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

DOCTOR OF NURSING PRACTICE

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DEDICATION

I would like to dedicate this EBP project to my family. To my mother who selflessly dedicated her life to raising her children. Her words of encouragement and telling me you can do anything you want, has inspired me to always reach for the stars. To my late mother-in-law Kathy, who helped care for my children when I first went to nursing school. Without you I would not have attained my goal of becoming a nurse nor be where I am today. You are one of our family's angels. To my father-in-law Thomas, who has helped support me in my journey of advancing my career as well as my education by helping with the boys. To my children, Kyle, Bryce, Cole, and Bella, you have motivated me to keep pursuing my dreams and to exemplify with hard work you can be and do anything. To my husband Thomas, thank you for your patience, love, and support. Finally, to those that are battling breast cancer, may we continue to raise awareness, support early detection, and find a cure.

ACKNOWLEDGMENTS

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ABSTRACT

Breast cancer is the most frequently diagnosed cancer among women in Indiana and the United States (Indiana Cancer Organization, 2019). An estimated 268,000 new cases of invasive breast cancer were diagnosed and 41,760 women died due to breast cancer in 2019 (ACS, 2019). Substantial breast cancer-related morbidity and mortality disparities persist among the underserved. Disparities in breast cancer outcomes are due to lower mammography screening rates, lack of timely follow-up of abnormal results, and lack of timely treatment initiation among women with breast cancer (Highfield et al., 2015). The purpose of this evidence-based practice project was to address low mammography rates to the underserved population by implementation of an intervention to increase breast cancer screening at a site dedicated to assist the economically challenged by sending an informational letter and text message reminder for one's scheduled mammogram appointment. The Iowa Model of Evidence-Based Practice to Promote Quality Care was selected as a guideline to facilitate evidence into best practice to an underserved population serviced by several community health clinics in Northwest Indiana. Each participant received a mailed informational letter regarding the benefits of breast cancer screening and what a mammogram is. At the patient's free will, she scheduled an appointment for a mammogram. Based on the date the mammogram scheduled, the participant received a text message reminder before the set appointment. Each appointment scheduled was detailed within the clinic's EMR. The EMR was reviewed weekly of each appointment kept, rescheduled, cancelled, or no-show and documented within an Excel Spreadsheet. This data was categorized according to ethnic background, age, and insurance status to detail the crude rates of mammography. Data was analyzed utilizing the Chi square test of independence. Demographic information was calculated by descriptive statistics. A text message reminder was a statistically significant intervention to promote mammogram appointment adherence. Application of findings will be discussed.

CHAPTER 1

INTRODUCTION

Background

Breast cancer is one of the most common cancers in American women (American Cancer Society (ACS, 2019). An estimated 268,000 new cases of invasive breast cancer were diagnosed and 41,760 women died due to breast cancer in 2019 (2019). Breast cancer is the second leading cause of cancer death in women (2019). Breast cancer affects women of all races and ethnicities. According to the ACS (2019) the incidence rate per 100,000 for breast cancer from 2011-2015 among non-Hispanic whites are 130.1; non-Hispanic blacks 126.5; Asian/Pacific Islander 92.9; American Indian/Alaska Native 100.9; and Hispanic/Latino 93.0 per 100,000. While there is a higher incidence of breast cancer among non-Hispanic white women, non-Hispanic blacks have a higher rate of mortality among all nationalities. The ACS (2019) reports that non-Hispanic whites have a mortality rate of 20.6; non-Hispanic blacks 28.9; Asian/Pacific Islander 11.3, American Indian/Alaska Native 14.5; and Hispanic/Latino 14.3. In addition, women of a lower socioeconomic status (SES) have higher cancer death rates than those with higher SES, regardless of demographic factors such as race/ethnicity (2019). Even though breast cancer rates are similar between non-Hispanic whites and non-Hispanic blacks, the outcomes for non-Hispanic blacks are grave, as the mortality rate is higher.

Breast cancer is defined as “an uncontrolled growth of breast cells” (Breastcancer.org, 2019). Typical signs and symptoms of breast cancer include: a lump or mass in the breast, thickening of the breast, swelling, distortion, tenderness, skin irritation, redness, scaliness, and nipple abnormalities or spontaneous nipple discharge (ACS, 2019). Yet, women with early breast cancer may not display any signs or symptoms (2019). Thus, mammography screening can help identify breast cancer in the early stages. Mammography is “a low-dose x-ray procedure used to detect breast cancer at an early stage” (ACS, 2019, p. 11). When breast

cancer is discovered early, before it is able to be felt, the five-year survival rate is 99 percent according to the Indiana Cancer Organization (2019). Risk factors associated with breast cancer include: family history; age and sex; early menarche; weight gain after the age of 18; being overweight or obese; use of hormone therapy; physical inactivity; heaving smoking; alcohol consumption; and shift work, especially at night (ACS, 2019; Indiana Cancer Organization, 2019). Many of these factors are typical of those who are of a lower SES. Those who are categorized as low SES, or those who demonstrate racial and ethnic disparities, have a higher mortality rate from breast cancer when compared to non-Hispanic whites. According to the U.S. Census Bureau, in 2017, 21% of blacks and 18% of Hispanics/Latinos lived below the poverty line, compared to 9% of non-Hispanic whites and 10% of Asians (ACS, 2019). Also, 11% of blacks and 16% of Hispanics/Latinos were uninsured, compared to 6% of non-Hispanic whites and 7% of Asians. Non-Hispanic blacks mammography screening rates are 19% lower than rates for non-Hispanic whites according to Vang et al. (2018). Other disparities associated with low breast screening rates is discrimination. “Racial and ethnic minorities tend to receive lower-quality health care than non-Hispanic whites, even when insurance status, age, severity of disease, and health status are comparable” (ACS, 2019, p. 53). Another disparity to breast cancer screening is low health literacy rates, as well as personal obstacles to health care such as lack of transportation and lack of monetary funds to pay for services (2019). Finally, lack of social support (Talley et al., 2017) is a barrier to obtaining a mammogram. Costs associated with the diagnosis of breast cancer was estimated at \$19,700 million for the year of 2018 (National Cancer Institute, 2019).

Data from the Literature Supporting Need for the Project

Nationally, decreasing healthcare disparities is a major public health goal in the U.S. (Hendren et al., 2013). Substantial breast cancer-related morbidity and mortality disparities persist among the underserved. Disparities in breast cancer outcomes are due to lower mammography screening rates, lack of timely follow-up of abnormal results, and lack of timely

treatment initiation among women with breast cancer (Highfield et al., 2015). Thus, underserved populations have consistently been shown to be at higher risk for late-stage diagnosis due to these preceding factors. Therefore, it is necessary to develop a best practice to increase breast cancer screening rates before one seeks care at a late stage of breast cancer.

Breast cancer is the most frequently diagnosed cancer among women in Indiana and the United States (Indiana Cancer Organization, 2019). As such, it is imperative to implement interventions to increase mammography rates among women. The ACS recommends that those “40 to 44 years of age have the option to begin annual mammography; those 45-54 undergo annual mammography; and those 55 years of age and older may transition to biennial mammography or continue annual mammography” (ACS, 2019, p. 11). In Indiana, approximately 4,635 cases of invasive breast cancer were diagnosed in 2016 (2019). According to the 2014 Indiana Behavioral Risk Factor Surveillance System, 72.4% of women aged 50 to 74 had a mammogram in the past two years (Indiana State Cancer Registry, 2016; Indiana Cancer Organization, 2019). As early detection is necessary for optimal outcomes, during 2014 in Indiana, only 55% of breast cancer cases were diagnosed at the local stage (Indiana Cancer Organization, 2019). During this same time, 26% of breast cancer cases in Indiana were diagnosed in the regional or distant stages (2019). While the incidence rates of breast cancer are comparable between African American women and Caucasian women, the mortality rate for African American women was 46% higher in Indiana in 2016 (2019). Treating cancer in Indiana is costly. According to Indiana Cancer Organization (2019) \$2.01 billion dollars was spent on direct costs of treating Indiana residents with cancer in 2016 (2019). Since breast cancer is the most commonly diagnosed cancer in Indiana, a significant portion of these costs are associated with breast cancer.

Numerous interventions may increase mammography rates, thus detecting breast cancer at an earlier stage. One activity that could increase breast cancer screening rates is text

messaging. Text messages may be utilized to send a reminder for a scheduled appointment. In a study conducted by Kratzke and Wilson (2013) nearly half of the Hispanic and one third of the non-Hispanic women preferred to receive a text appointment reminder. Seventy four point nine percent of those who received a text reminder attended their mammography appointment versus 65% who did not receive a text reminder that attended their mammography appointment (Vidal et al., 2014). Another option to increasing mammography rates is a combination of telephone calls and letter reminders. The results from a study including 624 women demonstrated that letters and personal telephone calls were more effective at improving screening rates for breast cancer (17.8% vs. 27.5%; AOR 2.2, 95% CI 1.2-4.0) (Fortuna et al., 2013). In another study, after nine months, mammogram adherence was higher in the intervention group who received telephone calls and letters compared with the control group who did not receive telephone calls and letters (87% vs. 76% respectively, $p < 0.001$) (Phillips et al., 2010). Not only can a letter and personal call increase screening rates, patient education and patient navigation is effective as well. Patient navigation is an approach to reducing disparities in breast cancer screening (Kimbrough Marshall et al., 2015). Patient navigators usually are members of the community who are fluent in the patient's language and sensitive to her culture to help address barriers to care (2019). In a study by Kimbrough Marshall et al. (2015) a total of 949 African American women in the intervention group had higher odds of being up to date on mammography screening at the end of the follow-up period compared to African American women in the control group (OR 2.26, 95% CI 1.59-3.22). The effects of the patient education and navigation was stronger among African American women who were not up to date with mammography screening at enrollment (OR 3.63, 95% CI 2.09-6.38) (Kimbrough Marshall et al., 2015). Identification of barriers to obtaining a mammogram, such as low income, inaccurate beliefs (e.g., belief that treatment was worse than the disease, fatalistic view of disease), poor access to care, and low literacy (Talley et al., 2017), is necessary to develop a plan of care that is patient centered. Evidence supports that increasing awareness

about breast cancer has the potential to decrease late staging of a breast tumor (2017) by promotion of early detection.

Data from the Clinical Agency Supporting Need for the Project

The clinical site where this evidenced-based practice (EBP) project was conducted was a community health clinic network located in North West Indiana (NWI). This community health clinic network is a non-profit organization that provides quality health care regardless of the ability to pay to underinsured and uninsured, minority, and economically disadvantaged patients (retrieved from community health clinic network's website, 2019). This community health clinic network currently has six Indiana locations providing medical care. These locations are located in Portage, Lake Station, Hammond, Chesterton, and Merrillville (2019). Patients are seen on both a scheduled and walk-in basis. These facilities employ general practitioners, obstetricians, midwives, pediatricians, nurse practitioners, prenatal care coordinators, family care coordinators, patient care coordinators, and community in-reach and outreach workers (2019). Services offered on-site include: digital x-ray, ultrasound, bone density scan, mammography, laboratory services, as well as a full-service pharmacy (2019). Also, this community health clinic network offers sliding-scale fees based on income for those with no medical insurance who qualify (2019). Based on yearly household income, patients can pay from a minimum of \$25 (0% on the sliding scale) up to \$65 (100% on the sliding scale) for an office visit (2019). In addition, Healthy Indiana Plan (HIP), Medicaid, and Marketplace enrollment services are available Monday through Friday on both an appointment and a walk-in basis. Also, Spanish-speaking employees and translation services are available at all sites to provide Spanish-speaking patients with interpretation assistance (2019).

Lake County Indiana, where the Merrillville, Hammond, and Lake Station facilities are located, has a demographic make-up of 71.3% Caucasian, 24.5% African American, 0.6% American Indian/Alaska Native, 1.7% Asian, 19.4% Hispanic or Latino, and 1.9% two or more

racess (census.gov, 2019). Nine point seven percent of this population under the age of 65 do not have health insurance and 15.9% of this population live in poverty as of 2017 (2019). Porter County Indiana, where the Portage and Chesterton facilities are located, has a demographic make-up of 92.2% Caucasian, 4.2% African American, 0.4% American Indian/Alaska Native, 1.5% Asian, 10.3% Hispanic or Latino and 1.7% two or more races (2019). Nearly eight percent of this population under the age of 65 do not have health insurance and 10.4% lived in poverty as of 2017 (2019). When individuals of low SES do seek care, it is often at a stage where prevention or early detection is not possible and treatment is necessary. This community health clinic network is unique, in that it can provide onsite mammograms to this patient population. This enhances population health in this area through early detection. Therefore, increasing breast cancer screening through mammograms will help this population to detect breast cancer at an earlier stage where treatment may be more effective or provide more options for the plan of care.

The director of practice improvement (site facilitator), chief executive officer, chief medical officer, nurse practitioners (NP), and medical assistants are key stakeholders and have expressed their support of this EBP project, as they feel it is a problem within this organization that needs to be addressed. This organization emphatically promotes the use of mammography for detection of breast cancer. Challenges the providers have encountered at this community health clinic network are consistent assessment of mammography needs, adherence to the screening appointment and patient follow-up. Per communication with the site facilitator, some providers are more conscientious and consistently assess each patient that meets the parameter for breast cancer screening, while others are not dutiful (R. Mullins, personal communication, June 4th, 2019). As the initiative to eliminate health disparities in terms of low SES (ACS, 2019) is a national concern, this concern aligns with the community health clinic network health's value statement to handle economic disparities. Some components of this

value statement to improve overall community health include: caring for all people, including special populations, regardless of their cultural, financial, social, or medical condition; encouraging all patients to achieve maximum self-reliance and assisting them when they can achieve no more on their own; promoting health and preventing disease through individual, group, and community health promotion efforts; using accepted performance improvement methodology and continuously improving our quality of care; and taking a leadership role in promoting the mission of the community health center movement (community health clinic network website, 2019).

Purpose of the Evidence-Based Practice Project

The purpose of this EBP project was to increase breast cancer screening rates utilizing mammograms for those that are an underserved population. The outcomes were measured by identifying those who were due or past due for a mammogram at the community health clinic network, providing an intervention, and determining if those identified who were due for a mammogram actually obtain one after the intervention. This measurement was the rate of obtaining mammograms. Specifically, does an informational letter and text message reminder increase the rates of obtaining a mammogram in women over the age of 40 who are underinsured, uninsured, or among the underserved population?

PICOT Question

Specifically, this project will address the following PICOT question. The PICOT acronym stands for (P) patient population (I) for intervention or issue of interest, (C) for comparison intervention or group, (O) for outcome, and (T) for time frame which the population is observed (Melnyk & Fineout-Overholt, 2015). The PICOT question for this EBP project is: For women over the age of 40 who seek services at a community health clinics located in NWI (P), does a combination of an informational letter and text message reminder (I), compared to the current practice of care (C) increase rates of mammography (O) over a 12-week period (T)?

Significance of the EBP Project

Increasing mammography rates among the economically disadvantaged is necessary for a higher rate of positive patient outcomes. As previously cited, early detection of breast cancer can lead to a five-year survival rate by 99% (ACS, 2019; Indiana State Department of Health, 2019), yet those who are of low SES or a certain ethnic background such as African American or Hispanic descent, the likelihood of mortality significantly increases. This is due to lack of education regarding breast cancer health, lack of insurance, lack of access to quality care, and lack of the ability to overcome challenges that are inherent to social status. This project addressed low mammography rates to the underserved population by implementing an informational letter and text message reminder interventions to increase breast cancer screening at a site dedicated to assist the economically challenged. By implementation of best practice recommendations, the patient population this NWI health clinic network serves will benefit by early detection of breast cancer, thus allowing for options to develop quality patient-centered care.

CHAPTER 2

EBP MODEL AND REVIEW OF LITERATURE

Evidence-based Practice Model

The Iowa Model of Evidence-Based Practice (used with permission, see Appendix A) was the model chosen as a guideline for implementation of this EBP project to increase breast cancer screening rates utilizing mammography. This model incorporates several steps to ensure success of practice changes within an organization and has many strengths as well as a few disadvantages are noted. An extensive search for the highest-level of evidence was conducted with the databases Joanna Briggs Institute, Cochrane Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and ProQuest. Key terms were entered on these databases with limiters to narrow the search for relevant articles. Articles of evidence were then reviewed and appraised. The level of each final article was ascertained by the Melnyk and Fineout-Overholt Hierarchy of Evidence. The Johns Hopkins Research and Non-Research Evidence Appraisal Tool (used with permission, see Appendix B) was utilized to assign a quality grade to the thirteen articles for this EBP project. Then the evidence was synthesized to determine best practice to increase mammography rates.

Overview of EBP Model

The EBP model utilized in this project is the Iowa Model of Evidence-Based Practice to Promote Quality Care (Titler et al, 2001; Melnyk & Fineout-Overholt, 2015). The Iowa Model serves as a “guideline for nurses and other clinicians in making decisions about clinical and administrative practices that affect patient outcomes” (Melnyk & Fineout-Overholt, 2015, p. 283). The Iowa Model involves numerous problem-solving steps based on a trigger. The steps include 1) identification of a trigger, 2) clinical applications, 3) organizational priorities, 4) forming a team, 5) piloting a practice change, 6) evaluating the pilot, 7) evaluating practice changes and dissemination of results (Melnyk & Fineout-Overholt, 2015). A detailed map of

these steps for the Iowa Model may be utilized as a visual aide. Also, each step allows for feedback.

The first step in the Iowa Model is identifying “practice questions or problem triggers either through identification of a clinical problem or from new knowledge” (Melnyk & Fineout-Overholt, 2015 p. 283). Triggers are discovered by questioning current practice. There are two main types of triggers in this EBP model; problem-focused and knowledge-focused. Problem-focused triggers usually have existing evidence and pose a chance for refinement. A knowledge-focused trigger stems from disseminated scientific knowledge such as breast cancer screening guidelines developed by the ACS, U.S. Preventative Services Task Force (USPSTF), or new research that allows practitioners to challenge current practice standards (Melnyk & Fineout-Overholt, 2015). In order to discover a trigger, nurses and/or clinicians must identify a notable practice question that could be addressed utilizing the EBP process and is applicable to the clinical setting. This is the clinical application step. The next step in the Iowa Model is organizational priorities which is to rally support from the organization. According to Melnyk and Fineout-Overholt (2015) higher priority topics that impact the organization the greatest as a result of costs, volume, and risk are given priority over projects that may not align with the company’s strategic plan or goals. Therefore, it is imperative to note who the stakeholders are, if the practice question or trigger aligns with the company’s priorities, how the practice change will be implemented, resources necessary to do so, and outcomes expected during this phase of organizational priorities of the Iowa Model. The next stage of the Iowa Model involves forming a team. A team may consist of stakeholders of the EBP change such as nurses, managers, advanced practice nurses (APNs), interdisciplinary colleagues, and organizational leaders (2015). This team will be responsible for reviewing and synthesizing evidence and deciphering what evidence is high quality and applicable to improve practice or implement change. Yet, if high quality evidence does not exist to support a practice change, lower levels of evidence may be used to pilot a practice change (2015).

During the next phase of the Iowa Model, piloting the practice change is necessary to determine any issues and address them before implementation of the change permanently. This stage involves developing a practice guideline or protocol that details “the evidence-based policy, procedure, care map, algorithm, or other document outlining the practice and decision points for clinician users” (Melnyk & Fineout-Overholt, 2015, p. 286). Since the pilot is not a replication of a research study and may involve implementation of a practice change due to the review of high-quality literature, careful planning is necessary to be successful. In addition, evaluation of the processes and outcomes pre-pilot and post-pilot “determine the success of the pilot, effectiveness of the evidence-based protocol, and need for modification of either the implementation process or the practice protocol” (Melnyk & Fineout-Overholt, 2015, p. 287).

As the pilot is evaluated, a decision is made to either adopt or modify the practice change. If it is determined that adjustments are necessary, quality improvement measures such as searching for new knowledge, collaborating with researchers, or conducting research to guide practice decisions are completed to ensure quality care (Melnyk & Fineout-Overholt, 2015). However, if the pilot is seamless and has positive outcomes the practice change may be integrated into practice with continued education and monitoring (2015).

The final phase of the Iowa Model is evaluating practice changes and dissemination of results. During this phase ongoing evaluation of quality and/or performance improvement is determined to ensure continued practice change and quality care. In addition, careful review of results allows for professional learning. Melnyk and Fineout-Overholt (2015) suggest sharing project reports within and outside of the organization. This sharing supports growth of an EBP culture, enhances knowledge, and encourages EBP changes in other organizations.

Application of EBP Model to DNP Project

The Iowa Model is applicable to this EBP project for numerous reasons. The clinical problem this EBP project addressed was mammogram rates in an underserved population. Substantial breast cancer-related morbidity and mortality disparities persist among the

underserved. Discrimination contributes to cancer disparities, as racial and ethnic minorities tend to receive lower-quality health care than non-Hispanic Whites (ACS, 2019). Mortality rates for African American women in Indiana were 28 percent higher than for Caucasians (Indiana Cancer Organization, 2019). Also, African American women had significantly higher rates of diagnosis at the regional or distant stage (2019). Thus, it is imperative to develop a best practice to increase breast cancer screening rates at an early stage of breast cancer. The Iowa Model serves as a “guideline for nurses and other clinicians in making decisions about clinical and administrative practices that affect patient outcomes” (Melnyk & Fineout-Overholt, 2015, p. 283) and is useful in this EBP project to help guide and facilitate each step. The goal is to address the practice question of does a combination of an informational letter and text message reminder increase the rates of obtaining a mammogram in women over the age of 40 who are underinsured, uninsured, or among the underserved population? This question serves as a knowledge-focused trigger as well as fulfills the clinical application phase of the Iowa Model. After consulting with the director of practice improvement, increasing mammography rates is a high organizational priority at this community health clinic network, which meets the third component of the Iowa Model. Resources needed, how to implement the intervention, time necessary to complete the project were noted and discussed with the director of practice improvement. A team consisting of the director of practice improvement, Institutional Review Board (IRB) officials, physicians, APNs, Medical Assistants (MAs), and ancillary team members were identified and complete the team members component of this EBP model. An extensive search of several databases yielded high and good quality evidence that supports best practice of how to increase mammography rates. The following phases of piloting a practice change, evaluating the pilot and evaluating practice changes and dissemination of results were determined over a three-month period.

Strengths and Limitations of EBP Model for DNP Project

A strength of the Iowa Model is that it is easy to use by multidisciplinary teams. In addition, each phase of the model allows for feedback to improve processes. Another strength of the Iowa Model is it is well known and widely accepted. Over 2,500 requests have been received to use the Iowa Model (Melnyk & Fineout-Overholt, 2015). Numerous topics have been addressed utilizing this model such as verification of nasogastric tube placement (Farrington, Lang, Cullen, & Stewart, 2009; Melnyk & Fineout-Overholt, 2015), newborn hyperbilirubinemia (Nelson, Doering, Anderson, & Kelly, 2012; Melnyk & Fineout-Overholt, 2015), newborn skin-to-skin contact (Haxton, Doering, Gingras, & Kelly, 2012; Melnyk & Fineout-Overholt, 2015), and depression screening (Yackel, McKennan, & Fox-Deise, 2010; Melnyk & Fineout-Overholt, 2015). Other “issues have been addressed using the Iowa Model well ahead of regulatory standards or changes in reimbursement (e.g., pain, falls, suicide risk, and urinary catheter use)” (Melnyk & Fineout-Overholt, 2015, p. 285) which allows for innovative and critical thinking to determine a problem before it becomes an event. Also, this improves patient outcomes and promotes change in practice, as well as fosters positive interactions among teams, diversity, and a culture of expansion of knowledge through research and communication.

While many strengths of the Iowa Model exist, a couple of limitations should be acknowledged. One limitation of the model is piloting the practice change requires detailed planning of implementation and evaluation. When piloting a high-quality research-based practice change the expectation is it will be implemented with minimal difficulty as, the pilot is not a replication of the research and results (Melnyk & Fineout-Overholt, 2015), but implementation of high-quality results. This may be difficult to accomplish, as some individuals may be laggards to the practice change or oppose change. Also, the pilot for practice change may not be successful for the setting where it is implemented even though research supports the change.

The Iowa Model is a simple guideline to use when implementing a practice change that affects patient outcomes. For this EBP project the Iowa Model helped address the practice question of does a combination of an informational letter and text message reminder increase the rates of obtaining a mammogram in women over the age of 40 who are underinsured, uninsured, or among the underserved population? This question meets the first two steps of the model by identification of a trigger and clinical application. This topic is an organizational priority at the EBP project site and a team is in place that can participate in piloting this practice change of utilizing an informational letter and text message reminder to increase mammography rates, as well as evaluating the pilot, evaluating practice changes, and disseminating the results.

Literature Search

A thorough search was conducted with the databases Joanna Briggs Institute, Cochrane Library, CINAHL, and ProQuest to find the highest level of evidence to support the best practice to increase breast cancer screening rates by mammography. Inclusion and exclusion criteria were detailed to determine which articles of evidence were appropriate to use for this EBP project. Levels and quality of evidence were appraised for final consideration.

Sources Examined for Relevant Evidence

An extensive literature review was performed to attain relevant evidence regarding best practice to increase mammography rates especially to those in underserved areas. A total of four databases were searched, including Joanna Briggs Institute, Cochrane Library, CINAHL, and ProQuest. The Joanna Briggs Institute and Cochrane Library were selected as due to the ability to obtain high levels of evidence. Whereas CINAHL and ProQuest were utilized to due to the ability to yield a large amount of articles regarding mammography. A combination of keywords within each database, were utilized to yield the highest number of results. The final literature search keywords were “breast cancer screening” OR mammogra* AND adher* OR compli* AND remind* OR letter OR "follow up" OR text OR technolog* OR mobile OR e-mail.

As documented quotation marks and truncation symbols were utilized to yield relevant articles on this subject. The same terms were entered on each of the databases.

Inclusion criteria for the literature search included scholarly (peer reviewed) journals, published between 2014 to 2019 (the last five years), and English language. In addition, evidence that supported increased mammography rates, utilizing interventions such as telephone, letters, text messaging and/or education were included. Exclusion criteria included studies that included women who previously were diagnosed with breast cancer, women under the age of 40 years, and prostate cancer. Initially, articles that studied colorectal, ovarian, and cervical cancers were eliminated. However, at the age of 40 years and above, many tests for these other types of cancers are routinely screened at the time of breast cancer screening, thus some articles with these attributes were included.

The first database searched was the Joanna Briggs Institute. A search with terms “breast cancer screening” AND mammogra* AND adherence OR compliance OR reminder OR follow-up and limiter 2014-2019, yielded six results. This search was modified to “breast cancer screening” OR mammogra* AND adher* OR compli* AND remind* OR letter OR "follow up" OR text OR technolog* OR mobile OR e-mail and limiter 2014-2019, yielded twenty-four results. This was a significant improvement as the first search only provided one potential resource and the later search provided three resources, one of which was accepted for inclusion in the final literature review. Other articles were eliminated if they were not relevant to breast cancer screening, did not address mammography rates, had an age population younger than 40, or concentrated on other types of cancer such as colorectal cancer, prostate cancer, and lung cancer.

The next database searched was the Cochrane Library. The same terms from the initial search of Joanna Briggs Institute was utilized on the Cochrane Library. This yielded a large number of articles, 673. This search was modified to “breast cancer screening” OR mammogra* AND adher* OR compli* AND remind* OR letter OR "follow up" OR text OR technolog* OR

mobile OR e-mail and limiter 2014-2019 and English language, yielding 81 articles, of which four articles were utilized in the final literature review.

After searching the Cochrane Library, CINAHL was searched for relevant articles. Initially, the keywords “breast cancer screening” AND mammogra* AND adherence OR compliance OR reminder OR follow-up and limiters scholarly (peer reviewed), published between 2014 to 2019, and English language, were applied. This resulted in 115 articles, which is considered to be somewhat low for this database. Therefore, this search was modified to the terms of “breast cancer screening” AND mammogra* AND call OR letter OR text message, yielding 27 results, which is too low. Keywords were added and after consultation with the Research Services Librarian the final search terms of “breast cancer screening” OR mammogra* AND adher* OR compli* AND remind* OR letter OR "follow up" OR text OR technolog* OR mobile OR e-mail and limiters scholarly (peer reviewed), published between 2014 to 2019, and English language, resulted in 161 articles. This is an acceptable number. After the duplicates were removed, six articles were included for final review.

The final database searched was ProQuest. Search terms “breast cancer screening” OR mammogra* AND adher* OR compli* AND remind* OR letter OR "follow up" OR text OR technolog* OR mobile OR e-mail and limiters scholarly (peer reviewed), published between 2014 to 2019, and English language, resulted in 1,649 articles. This was too large of a result. Therefore, the OR between “breast cancer screening” and mammogra* was changed to AND, which narrowed down this search to 535 results. While this is a larger number than desired, after extensively working with the Research Services Librarian to narrow this number, it was determined that these were the best search terms. After removing the duplicates, two more articles were kept for the final search.

Eight hundred and one articles of evidence were yielded combined from the literature search. After reviewing the titles and abstracts, many of these articles did not meet the inclusion qualifications or were not applicable to this project. In addition, duplicate articles were

removed. Sixty-six articles potentially were supportive of this EBP project. However, after thoroughly reviewing these articles and a rapid critical appraisal, only 13 of these articles were included as evidence in the final literature review (See Table 1.1).

Table 1.1

Evidence Search Table

Database	Yielded	Duplicates	Reviewed	Accepted
JBI	24	0	3	1
Cochrane	81	0	10	4
CINAHL	161	19	31	6
ProQuest	535	121	22	2
Total	801	140	66	13

Levels of Evidence

The Melnyk and Fineout-Overholt's (2015) Hierarchy of Evidence was utilized to level the pieces of evidence from the final literature search review. This rating system has seven levels that details where each type of evidence falls in the rating system. Level I is considered the highest level of evidence and consists of evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs). Level II is evidence from a well-designed RCT. Level III details evidence from well-designed controlled trials without randomization. For example, a quasi-experimental design. Whereas Level IV consists of evidence from well-designed case-control and cohort studies. Level V is composed of evidence from systematic reviews of descriptive and qualitative studies. Yet, Level VI describes evidence from single descriptive or qualitative studies. Finally, the lowest level of evidence Level VII is evidence from the opinion of authorities and/or reports of expert committees. Thirteen pieces of evidence were identified for this EBP project which include one evidence summary (Level I), one systematic review (Level I), one meta-analysis (Level I), eight RCTs (Level II) and two non-randomized controlled trial (Level III) (See Table 1.2).

Table 1.2

Levels of Evidence

Level	Included	Design
I	3	Evidence Summary (1) Systematic Review (1) Meta-Analysis (1)
II	8	RCT (8)
III	2	Quasi-Experimental (2)

Appraisal of Relevant Evidence

The Johns Hopkins Research and Non-Research Evidence Appraisal Tool (used with permission, see Appendix B) was utilized to conduct a quality appraisal of the evidence from the final articles selected from the literature search. The Johns Hopkins Research and Non-Research Evidence Appraisal Tool provides a detailed guide to determine quality of evidence for each article deemed relevant for evidence-based practice by answering each question regarding the evidence reviewed (Dang & Dearholt, 2017). High quality (grade A) is “consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence” (Dang & Dearholt, 2017, p. 286). The next quality rating is good quality (grade B) which is “reasonably consistent results; sufficient sample size for the study design; some control, and fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence” (Dang & Dearholt, 2017, p. 286). The lowest quality rating (grade C) is low quality or major flaws which is defined as “little evidence with inconsistent results, insufficient sample size for the study design; conclusions cannot be drawn” (Dang & Dearholt, 2017, p. 286). From the thirteen articles of evidence included for this EBP project, four were deemed of high quality or grade A and nine were determined to be good quality or grade B (See Table 1.3 and Table 1.4).

Table 1.3

Quality of Evidence

Quality	Included	Design
High (1)	3	Evidence Summary (1) Systematic Review (1) Meta-Analysis (1)
Good (2)	8	RCT (8)
Good (8)	2	Quasi-Experimental (2)

Evidence Summary Table

Table 1.4

Authors	Purpose	Design	Sample	Measurement/ Outcomes	Results/Findings	Level/ Quality
Chan, E.K., Wilson, C., Tyldesley, S., Olivotto, I.A., Lai, A., Sam, J., et al. (2018).	To determine whether signed family physician reminder letters to women overdue for screening mammography prompts screening.	RCT	n=5498 total participants n=2749 letter group n=2749 control group	The proportion of overdue women that attended a screening mammogram appointment within six months of mailing the study letters, via signed reminder letter by physician and standard postcard, or a stand reminder postcard alone.	34.4% (947/2749) women in signed physician letter and postcard completed a mammogram compared with 24.0% (660/2749) women in the control group ($p < 0.001$).	Level II High Quality
Drake, B.F., Tannan, S., Anwuri, V.V., Jackson, S., Sanford, M., Tappenden, J., Goodman, M.S., & Colditz, G.A. (2015).	To identify women overdue for a mammogram and increase mammography utilization in a high need area.	Quasi Experimental	n=751 total participants	The proportion of women who obtained a mammogram after receiving navigation intervention over a two-year period.	94.5% (n=710) obtained a mammogram during the study period after receiving navigation.	Level III Good Quality

<p>Fortuna, R.J., Idris, A., Winters, P., Humiston, S.G., Scofield, S., Hendren, S., Ford, P., Li, S.X., Scih, B., & Fiscella, K. (2013).</p>	<p>To assess the impact of various components of the reminder, recall, and outreach on breast cancer screening rates.</p>	<p>RCT</p>	<p>n=624 total participants n=157 letter only group n=158 letter + autodial group n=156 letter + autodial + prompt group n=153 letter + personal call group</p>	<p>Documentation of mammography screening at 12 weeks and 26 weeks following intervention.</p>	<p>Compared to the reminder letter alone, letter and personal call was more effective at improving screening rates for breast cancer (17.8% vs. 27.5%; AOR 2.2, 95% CI 1.2-4.0). Compared to letter alone, a letter + autodial + and prompt was also more effective at improving screening rates for breast cancer (17.8% vs. 28.2%; AOR 2.1, 95% CI 1.1-3.7).</p>	<p>Level II Good Quality</p>
<p>Hendren, S., Winters, P., Humiston, S., Idris, A., Li, S.X., Ford, P., et al. (2013).</p>	<p>To assess an intervention to increase cancer screening rates.</p>	<p>RCT</p>	<p>n=366 total participants n=185 intervention group n=181 usual care group</p>	<p>Rates of screening at 11 weeks and 1 year.</p>	<p>In the intervention group, 20% of mammography screenings occurred at the early assessment. Those that received the intervention had a higher rate of mammography compared to the usual care group (29.7% vs. 16.7%, p=0.034).</p>	<p>Level II Good Quality</p>

<p>Kimbrough Marshall, J., Mbah, O.M., Ford, J.G., Phelan-Emrick, D., Ahmed, S., Bone, L., et al. (2015).</p>	<p>To evaluate the effect of patient navigation on screening mammography.</p>	<p>RCT</p>	<p>n=1905 total participants n=956 printed educational materials only group (PEM) n=949 PEM + patient navigation</p>	<p>Rates of mammography screening within two years of study.</p>	<p>Women in the intervention group had higher odds of being up to date on mammography screening at the end of the follow-up period compared to women in the control group (OR 2.26, 95% CI 1.59-3.22). The effect of the intervention was stronger among women who were not up to date with mammography screening at enrollment (OR 3.63, 95% CI 2.09-6.38).</p>	<p>Level II Good Quality</p>
<p>Lin, H., & Wu, X. (2014).</p>	<p>Systematic evaluation of RCTs of the impact of SMS or telephone reminders on increasing or decreasing of follow-up rates.</p>	<p>Meta-Analysis</p>	<p>13 RCTs reporting on 3276 patients with SMS reminders and 3402 patients without reminders 8 RCTs reporting on 2666 patient with telephone reminders and 3439 patients without telephone reminders</p>	<p>Comparison of rates of screening following intervention of SMS reminder and telephone reminder.</p>	<p>The pooled odds ratio (OR) for the improvement of follow-up adherence in the SMS group compared with the control group was 1.76 (95% CI [1.37, 2.26]; $p < 0.01$), and the pooled OR for the improvement of follow-up adherence in the telephone group compared with the control group was 2.09 (95% CI [1.85, 2.36]; $p < 0.01$).</p>	<p>Level I Good Quality</p>

<p>Luque, J.S., Logan, A., Soulen, G., Armeson, K.E., Garrett, D.M., Davilla, C.B., & Ford, M.E. (2018).</p>	<p>To assess educational interventions to increase mammography screening among Hispanic women.</p>	<p>Systematic Review</p>	<p>SR of 5 studies: 3 experimental and 2 quasi experimental interventions to increase mammography screening reporting on n=3778 total participants</p>	<p>Combined reported results from each study and calculated overall summary OR estimate for the odds of receiving a mammography during the follow-up period in the intervention groups relative to the control groups. Follow-up periods include six months (n=1), 8 months (n=1), and 12 months (n=3).</p>	<p>Adjusted OR (95% CI): Fixed effect model 1.63 (1.35-1.96) Random effects model 1.67 (1.24-2.26)</p>	<p>Level I Good Quality</p>
<p>Nasiriani, K., Motevasselian, M., Farina, F., Shiryazdi, S.M., & Khodayarian. M. (2017).</p>	<p>To assess the effect of telephone counseling and education on mammography screening.</p>	<p>RCT</p>	<p>n=90 total participants n=45 with telephone counseling and education n=45 control group</p>	<p>Mammography rates before and after the intervention over a three-month period.</p>	<p>Mammography before and after the telephone counseling and education intervention $p < 0.001$, 13.3% and 77.8% respectively.</p>	<p>Level II Good Quality</p>

<p>Phillips, C.E., Rothstein, J.D., Beaver, K., Sherman, B.J., Freund, K.M., & Battaglia, T.A. (2010).</p>	<p>To evaluate the effect of telephone calls and reminder letters on adherence rates to biennial screening mammography.</p>	<p>RCT</p>	<p>n=3895 total participants n=1817 telephone call/reminder letter group n=2078 control group</p>	<p>Assess mammography rates between the control and intervention group after a nine-month time frame.</p>	<p>After nine months, mammogram adherence was higher in the intervention group compared with the control group (87% vs. 76% respectively, $p < 0.001$).</p>	<p>Level II Good Quality</p>
<p>Phillips, L., Hendren, S., Humiston, S., Winters, P., & Fiscella, K. (2015).</p>	<p>To assess low-cost interventions to improve cancer screening among primary care patients.</p>	<p>RCT</p>	<p>n=271 total participants n=90 letter intervention n=88 automated call intervention n=93 combined intervention</p>	<p>Mammography rates among the various interventions within a 36-week time frame.</p>	<p>The screening rates for breast cancer were 20%, 24%, and 39% for the letter, automated call, and combined (letter and automated call) groups, respectively. The combined intervention group had a statistically higher screening rate ($p < 0.05$) compared with either of the single intervention groups (automated call only or letter only). The reported P values for letter group ($P=0.030$) and automated call group ($P=0.0053$).</p>	<p>Level II Good Quality</p>

<p>Sanghavi Goel, M.S., & O’Conor, R. (2016).</p>	<p>Assess the impact of a 5 min video on screening mammogram referrals and completion.</p>	<p>RCT</p>	<p>n=97 total participants n=49 intervention group n=48 control group</p>	<p>Mammography completion during the 12-month period.</p>	<p>Overall rates of mammography completion were significantly higher among the intervention group than the control group, 33% vs. 13%, p=0.02</p>	<p>Level II Good Quality</p>
<p>Slade, S., Dip Manip Ther, G., & Musc Ther, M. (2018).</p>	<p>Assess the best available evidence promoting participation in breast cancer screening community programs.</p>	<p>Evidence Summary</p>	<p>An expert opinion, a Cochrane systematic review of 14 community based RCTs, survey of 911 women (qualitative study), SR of 19 qualitative and quantitative research projects, SR and meta-analysis of 25 studies including 23 RCTs involving 20,173 participants,</p>	<p>Determine best practice to increase breast cancer screening.</p>	<p>Evidence supports use of invitational appointments, physician appointments, phone calls, and removal of financial barriers as the most effective strategies to encourage participation in breast cancer screening programs. Race and ethnicity are important determinants in breast screening programs.</p>	<p>Level I High Quality</p>

			expert discussion article, SR which synthesized evidence from all prospective controlled studies on effectiveness of Community Health Workers' programs to improve screening mammography rates, an observational study population of 1,081 participants, and a cohort study with 327 women.			
Vidal, Garcia, Benito, Mila, Binefa, & Moreno	To analyze the effect of a cell text message reminder service on participation in	Quasi Experimental	n=12,786 total participants n=9,067 reminder letter	Mammography rates after intervention at the end of a four-month period.	Text message group-OR=1.56 (95% CI: 1.43-1.70) Women without previous screening/postal mail	Level III Good Quality

	a mammogram screening.		n=3,719 text message participants		limited- OR=2.85 (95% CI: 2.31-3.53) Women without previous screening/postal mail access- OR=1.66 (95% CI: 1.36-2.02)	
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Level I evidence.

A Level I is considered the highest level of evidence and consists of evidence from a systematic review or meta-analysis of all relevant RCTs. A meta-analysis conducted by Lin and Wu (2014) reviewed literature published between 1995 and 2014 to determine the impact of short message service (SMS) or telephone reminders to improve follow up rates of screening and/or medical appointments. Four databases were searched in this review, including Medline, Excerpta Medica Database (EMBASE), PubMed and the Cochrane Library. Thirteen RCTs were identified reporting on 3,276 patients with and 3,402 patients without SMS reminders and 8 RCTs reporting on 2,666 patients with and 3,439 patients without telephone reminders. Inclusion criteria described the impact of SMS or telephone reminders on increasing or decreasing follow-up rates, while the control group did not receive a reminder. Also, to avoid duplicate data, the newest and most relevant article was selected when multiple studies were conducted by the same authors (Lin & Wu, 2014). While this meta-analysis does not address increasing mammography rates specifically, it was selected for final review because the principle of improving health promotion by utilizing the interventions of SMS or telephone reminders is applicable to this EBP project.

The interventions utilized in this meta-analysis include SMS reminders, telephone reminders, and a combination of telephone and SMS reminders to determine adherence rates to screening appointments, follow-up appointments, or screen rate (Lin & Wu, 2014). Several tools determined the outcome measures within this meta-analysis. The primary outcome was the “follow-up rate (also known as the attendance rate, retesting rate, nonattendance rate, or screen rate) defined as the proportion of patients attending their appointment at the originally scheduled time” (Lin & Wu, 2014, p. 2). The odds ratio (OR) in the intervention group was calculated and compared to the OR in the control group as the primary effect measure. The ORs for the SMS group compared with the control group ranged from 0.74 to 6.92, and the pooled OR was 1.76 (95% Confidence Interval (CI) [1.37, 2.26]; $p < 0.01$) (Lin & Wu, 2014).

The ORs for the telephone group compared with the control group ranged from 1.69 to 4.25, and the pooled OR was 2.09 (95% CI [1.85, 2.36]; $p < 0.01$) (2014).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. In addition, a thorough literature review was conducted, however some of the data dates back to 1995 which makes this piece of evidence twenty-four years old. This study had a sufficient sample size for the study design, some control, and conclusions regarding how well the interventions work to address the clinical question. Limitations noted to this study include a risk of bias such as allocation concealment, blinding, the evaluation of incomplete outcome data, and lack of selective reporting (Lin & Wu, 2014). Other limitations include missing ages of the participants and habits of the patients that use mobile phones (2014). Despite these limitations, evidence does support the use of SMS and telephone reminders to improve follow-up appointments, screening appointments, and screen rates.

Level I evidence.

A systematic review conducted by Luque et al. (2019) reviewed literature published between 2003 and 2017 to determine how educational interventions may increase screening mammography rates among Hispanic women. Three databases were searched in this review, including Scopus, PubMed and Elton B. Stephens Co (EBSCO) Host. Twelve articles were eligible for review of which five studies were included for the final systematic review. Three of the studies were experimental and two were quasi experimental. Three RCTs were identified reporting on 678 patients with educational intervention and two quasi-experimental studies reporting on 1,386 patients with educational intervention. Inclusion criteria included studies that are RCT, case-control trial, quasi-experimental study, or prospective study with historical controls (2019). Also, control groups could not receive any type of other intervention (2019). Another attribute to be included in this review are studies with the goal of increasing

mammography screening in the U.S. Hispanic populations, and at least 50% or more of the study population must have been Hispanic (2019). The included studies also have been peer-reviewed (2019). Exclusion criteria for this systematic review included: studies that were literature reviews or case studies, studies that did not include a comparison group, studies that did not measure mammography screening outcome, studies that did not include greater than 50% Hispanic participants sample or did not report outcomes for Hispanic participants separately, and studies conducted outside of the U.S. (2019). While this systematic review focused on the Hispanic women population and results may not be generalizable to the general population, for this EBP project it is significant, as where this project is conducted serves a high portion of Hispanic women.

The intervention utilized in this systematic review was education. Three of the five studies used one-on-one education, two studies used group education, and one study combined individual and group education (Luque et al., 2019). Several tools determined the outcome measures within this systematic review. The primary outcome was to increase mammography rates among Hispanic women. The OR in the intervention group was calculated to estimate intervention effectiveness based on similar follow-up time periods (2019). This meta-analysis reports on the combined effectiveness of mammography screening educational interventions using outcome data from a total of 2,343 participants (2019). The combined OR (95% CI) for the random effects model was 1.67 (1.24-2.26) and for the fixed effect model 1.63 (1.35-1.96).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. In addition, a thorough literature review was conducted, however some of the data dates back to 2003 which is out of the date range for the literature search. This study had a sufficient sample size for the study designs, some control, and conclusions regarding how well the interventions work to address the clinical question. The majority of the studies included

in this systematic review were unbiased, as they were experimental studies, which makes the results reliable. Limitations noted to this review is only published literature in bibliographic databases were utilized. Other types of literature, such as doctoral dissertations, government reports, or gray literature were not included (Luque et al., 2019). Another limitation is the number of studies included for the review is small. Therefore, the effectiveness of different interventions components in the promotora-led intervention could not be measured. Finally, because this systematic review focused on the Hispanic population, results are not generalizable to the general population.

Level I evidence.

An evidence summary on breast cancer screening was conducted by Slade, Ther, and Ther (2018). The authors reviewed literature published between 2000 and 2015 to determine the best intervention to increase breast cancer screening rates by mammography. The evidence included in this summary is from: an expert opinion article on recent trends in screening and diagnosis for breast cancer; a Cochrane systematic review of 14 community based RCTs; a systematic review of 190 studies including 130 RCTs; a systematic review of 19 qualitative and quantitative research projects with sample sizes from 1-1,280, aged from 14-86 years old in the U.S., UK, and Sweden; a systematic review and meta-analysis of 25 studies including 23 RCTs involving 20,173 participants, and two comparative studies involving 961 and 71,357 participants; an expert discussion article on issues around informed choice for women considering breast screening effectiveness of Community Health Workers' programs to improve screening mammography rates; an observational study population of 1,081 participants; a pilot intervention study involving 22 participants; and a cohort study with 327 women (Slade et al., 2018).

The interventions utilized in this evidence summary varied among the studies included. Interventions conducted include letter invitations; mailed educational material; combination letter and phone invitations; phone call; combination of training and direct reminder; and home visits

(Slade et al., 2018). Barriers identified to obtaining a mammogram are fear of the intervention and lack of knowledge regarding breast cancer screening (2018). It is imperative to note, that race and ethnicity are significant factors in determining understanding of screening and adherence to screening among white, black and Hispanic women (2018). This may be a result of discrimination, as racial and ethnic minorities tend to receive lower-quality health care than non-Hispanic whites even when insurance status, age, severity of disease, and health status are comparable (ACS, 2019).

This piece of evidence was deemed of high quality. The evidence summary reported on five Level I articles, as well as provided expert opinions, an observational study, a pilot intervention, and cohort study, all of which were either received a Grade A or Grade B. However, some of the data dates back to 2000 which is out of the date range for the literature search. This study had a sufficient sample sizes for the study designs, some control, and conclusions regarding how well the interventions work to address the clinical question. Limitations noted to this summary is it does not state which databases were searched, the tools used to measure the effectiveness of the studies, or inclusion and exclusion criteria.

Level II evidence.

A Level II is evidence from a well-designed RCT. A randomized double-blind control trial by Chan et al. (2017) tested whether a standard reminder postcard, physician signed postcard, or a combination of standard reminder and physician signed postcard increased mammography rates in those who were overdue. Study participants included women aged 51-73 who were recruited from the practices of family physicians across British Columbia (BC) that had women overdue for screening mammography in their practices by 6-24 months. Inclusion criteria to participate in this study included previously enrolled in the Screening Mammography Program of BC (SMP), eligible for ongoing screening, aged 51-73, 6-24 months overdue for return screening mammography, residing in BC, and having completed the section of the SMP registration questionnaire stating they are willing to participate in studies relating to cancer

research (2017). A total of 5,498 participants were enrolled in the study of which 2,749 were randomly assigned to the control group and 2,749 were assigned to the intervention, or letter group. Women were randomized to receive either the postcard alone (control group), or the postcard plus the signed letter together (letter group) (2017). After six months from the mailing, the SMP database was reviewed to determine which participants had scheduled a mammogram appointment.

Outcomes were determined utilizing adjusted relative risk and 95% confidence limits. The adjusted relative risk ratio was 1.41 (95% CI: 1.30-1.54) (Chan et al., 2017). Women who received the signed reminder letter from their family physician were 1.41 times as likely (or 41% more likely) to have a mammogram than women who did not receive the letter (2017). Return participants were more likely to return for screening than initial screenees (RR 1.85; 95% CI: 1.60-2.15), and women a few months overdue were more likely to return than women who were many months overdue (RR 1.57; 95% CI: 1.43-1.73) (2017).

This piece of evidence was deemed of high quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. In addition, this study had a sufficient sample size. A two-sided statistical testing with $\alpha=0.05$, the estimated number of overdue women to achieve power=0.8 determined 574 in each group or 1,148 participants total (Chan et al., 2017) were needed. Each group had 2,749. Control of the groups was achieved by this being a double-blinded study, as the physicians were blinded to the random assignment of the overdue women in their practices and the women were not aware that they were participating in a study, thus blinded to which group they were assigned to (2017). Limitations noted to this study are it did not determine if another health professional signature would influence mammography rates. Also, this study did not determine whether reminder letters with electronic signatures or text message reminders would be as effective as the handwritten letters (2017).

Level II evidence.

A randomized control trial by Fortuna et al. (2013) explored whether a reminder letter; letter and automated telephone message; letter, automated telephone message, and point of service prompt; or letter and personal telephone call increased mammography rates. Study participants included women aged 40-74 who were past due for breast cancer screening. Inclusion criteria included being a registered patient at the study clinic; being an active patient at the practice (having at least one visit to the practice in the last 2 years); being female age 40-74 for breast cancer screening; and being past due for breast cancer screening (over 18 months from last mammogram) (2013). A total of 624 participants were enrolled in the study of which 157 were randomly assigned to the letter only group, 158 to the letter and autodial group, 156 to letter, autodial, and prompt group, and 153 to the letter and personal call group (2013). At 12 weeks and 26 weeks following the intervention period, staff blinded to group assignment reviewed the electronic medical record (EMR) of all randomized subjects to assess if cancer screening was completed (2013).

Outcomes were determined utilizing screening rates, crude odds ratio (95% CI) and adjusted odds ratio (AOR) (95% CI). The screening rate for the letter only group was 17.4%, crude odds ratio 1.0, and AOR 1.0 (Fortuna et al., 2013). For the letter and autodial group, the screening rates were 22.8%, crude odds ratio 1.4 (0.8-2.4), and AOR 1.3 (0.7-2.4). Next, the letter, autodial, and prompt group, the screening rates were 28.2%, crude odds ratio 1.8 (1.1-3.1), and AOR 2.1 (1.1-3.7). Finally, the letter and personal call group screening rate is 27.5%, crude odds ratio 1.7 (1.0-3.0), and AOR is 2.2 (1.2-4.0) (2013). However, this study did not show any significant treatment group by covariate interactions in an exploratory analysis, as the p value is for breast cancer screening is $p < 0.48$ (2013).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with

the written content. In addition, this study had a sufficient sample size, as well as the study was conducted in a large internal medicine safety-net practice located in an urban underserved area, which is similar to the population of this EBP project. Yet, this may be seen as a limitation due to the inability to generalize results to the general population. Other limitations were the baseline screening rates were low, and it may be possible that other settings with higher baseline rates may not experience the same improvement as seen in this study (Fortuna et al., 2013). In addition, the telephone numbers noted in the EMR may not be up to date. Also, some patients may have received a mammogram, but documentation in the EMR does not reflect this. Costs to send letter reminders or utilize staff to make personal telephone call reminders were not accounted for in this study.

Level II evidence.

A randomized control trial by Hendren et al. (2013) explored whether a letter, letter and automated phone call, or prompt increased mammography rates among low-income patients. Study participants included women aged 40-74 who were past due for a mammogram. Inclusion criteria included being female age 40-74 for mammography screening and overdue for mammography screening if more than 18 months from the last mammogram; past due for the follow-up interval specified at the prior mammogram; and of average risk for breast cancer (2013). A total of 366 participants were enrolled in the study of which 185 were randomly assigned to the intervention group (letter, automated phone call, and point-of-care prompts) and 181 to the usual care group (2013). A year following the intervention period mammography rates were calculated (2013).

Outcomes were determined utilizing screening rates, OR (95% CI), and Chi-square test. The screening rate for the intervention group was 20% at 11 weeks and 29.7% vs 16.7% in the control group ($p=0.034$) at one year (Hendren et al., 2013). The AOR for mammography screening was not significant for the secondary analysis [1.96 (95% CI 0.97-4.39)]. African American subjects had a pronounced increase in screening rates in the intervention groups, as

well as Medicare insurance recipients (2013). The intervention was associated with an increase in screening rates to almost 30%. Yet, the improvement did not reach statistical significance after adjustment [(OR 1.96 (95% CI 0.87-4.39)] (2013).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. In addition, this study had a sufficient sample size, as well as the study was of low-income women which is similar to the population of this EBP project. This trial was designed to use a low-cost intervention with low-literacy materials, and minimum of provider time to implement it (Hendren et al., 2013) which is applicable to this EBP project due to the population served and facility where it is conducted is similar to this study. Limitations were the inability to generalize results to the general population. Also, baseline screening rates were low, which reflect a care setting serving patients of low socioeconomic status, who thus may be at greater risk for omission of cancer screening (2013). Another limitation is the “non-statistically significant result of the breast cancer intervention on multivariable analysis may reflect limited power, since the odds ratio approached two” (Hendren et al., 2013, p. 48). A final limitation of this study is aspects of the intervention that were successful, barriers to implementation, and aspects of the multimodal intervention were not discussed in detail (2013).

Level II evidence.

A randomized control trial by Kimbrough Marshall et al. (2015) evaluated the effect of printed educational materials or printed educational materials and patient navigation services on mammography rates among African American women who receive Medicare benefits. Study participants included women aged 65 and above, lived in Baltimore, MD, and received Medicare. Inclusion criteria included being female age 65 and above, African American, enrolled in fee-for-service Medicare Parts A and B, and a Baltimore City resident (2015).

Exclusion criteria included enrollment in a Medicare managed care plan, a diagnosis of cancer

within the past 5 years or a diagnosis of cancer not in remission, the inability to provide informed consent, and current residence in a chronic care facility (2015). A total of 1,905 participants were enrolled in the study of which 956 were randomly assigned to the control group and 949 were assigned to the intervention group who received printed educational materials and patient navigation services (2015). Two years following the intervention period mammography rates were calculated (2015).

Outcomes were determined utilizing screening rates, OR (95% CI), and Chi-square test. The screening rate for mammography for those receiving patient navigation intervention versus the control group is 93.3% and 87.5% respectively; ($p < 0.001$) (Kimbrough Marshall et al., 2015). For those who were not compliant with breast cancer screening at baseline, the incidence of mammography screening at the end of the study was 73.4% in the intervention group, compared to 45.6% in the control group ($p < 0.001$) (2015). In the multivariable analysis, women in the intervention group had odds of having a mammogram than the control group (OR 2.26, 95% CI 1.59-3.22) (2015). A significant interaction between the intervention and baseline mammogram status ($p=0.025$ for the intervention term) existed (2015). Among the women who were not up to date at baseline, the intervention was associated with an increase in the screening rate at the end of the study (OR 3.63, 95% CI 2.10-6.26) (2015). Also, for the women who were up to date at baseline, the intervention remained significantly associated with mammography (OR 1.59, 95% CI 1.00-2.52) (2015). However, the interaction between the intervention and health literacy or participant age were not statistically significant (2015).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. In addition, this study had a sufficient sample size, as well as the study was tailored for African American women who utilize Medicare. This is notable as it is similar to the population of this EBP project. Limitations of the study include the inability to generalize results

to the general population as the sample was of African American women of low socioeconomic status. In addition, a large proportion of women were lost to follow-up. This may be a result of the study lasting two years. Another limitation is the use of “weighted logistic regression with the inverse probability method to address the differential loss by group status and account for observable differences in baseline characteristics between participants who completed the study and those who were lost to follow-up” (Kimbrough Marshall et al., 2015, p. 74). As a result of this approach, unobservable difference may not be accounted for due to the attrition rate. Also, participants self-reported obtaining a mammography. This number may be inflated as the participant may want to please the researcher. Finally, the costs associated with the intervention was approximately \$3,000 per person enrolled in the Baltimore site (2015).

Level II evidence.

A randomized control trial by Nasiriani et al. (2017) studied the effect of telephone counseling and education versus standard care to increase mammography rates, as well as determine family caregiver patients’ knowledge of risk factors for breast cancer and screening process. Inclusion criteria included being female age 40 and above, having a family history of breast cancer, access to a telephone, not being deaf or having a hard time hearing and/or speaking, having the ability to speak Farsi as this study was done in Iran, and having not history of breast cancer (2017). Exclusion criteria included women who failed to respond to the call more than three times and women who were unwilling to continue in the study (2017). A total of 90 participants were enrolled in the study of which 45 were randomly assigned to the control group and 949 were assigned to the intervention group who received printed educational materials and patient navigation services (2017). Three months following the intervention period mammography rates were calculated (2017).

Outcomes were determined utilizing screening rates. In addition, the content validity was confirmed by experts and the internal reliability was approved by calculating Cronbach’s alpha of 0.84 (Nasiriani et al. 2017). Data was analyzed using statistical package for social

science (SPSS) 18, as well as descriptive and inferential statistics were calculated (2017). The Chi square test, and Fischer exact test were used for comparison with different groups for univariate analysis in categorical variables (2017). The McNemar test was used to analyze pretest-posttest study data and the independent t test was used to compare the means of the two groups (2017). The level of significance was set at $p < 0.05$. Results showed that mammography was performed by participants before the telephone counseling by 13.3% and after telephone counseling by 77.8% (2017). The McNemar test showed a significant difference of ($p < 0.001$) of 20.0% before the study, and 24.4% after the study in the control group. The McNemar test showed no statistically significant difference ($p=0.791$) and the exact Fischer test showed not statistically significant difference between the two groups in number of mammograms before the study (0.573) (2017). However, after the study significant differences were found ($p < 0.001$) (2017).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. The results of the study were significant and thus likely will produce the same results. However, this study took place in Iran. While this patient population is vastly different from the population of where this EBP project took place, the principles of not understanding what mammography is and perceived risk for breast cancer is similar among Iranian women and those who seek service at this community health clinic network. Many women who seek services at community health care network are of low SES and according to ACS (2019) social inequalities, including communication barriers and provider/patient assumptions, can affect interactions between patients and physicians and contribute to miscommunication and/or delivery of substandard care. Other limitations of the study include the inability to generalize results to the general population as the sample was of Iranian descent. Also, the sample size was not sufficient as it only included a total of 90 participants.

Finally, some of the participants were younger than 40 years of age, which based on current practice guidelines established by the ACS, the recommended age to begin mammogram screening is 45-50.

Level II evidence.

A randomized control trial by Phillips et al. (2010) evaluated the effect of telephone calls and reminder letters from patient navigators to increase mammography rates. Inclusion criteria included being female age 51 to 70, had an assigned primary care provider, and had a documented visit with that provider in the previous two years (Phillips et al., 2010). Exclusion criteria included a documented bilateral mastectomy. A total of 3,895 participants were enrolled in the study of which 1,817 were randomly assigned to the intervention group of patient navigators and 2,078 were assigned to the control group (2010). Nine months following the intervention period mammography rates were calculated (2010).

Outcomes were determined utilizing screening rates. In addition, descriptive statistics on socio-demographics were documented on all eligible subjects in the intervention and control groups (Phillips et al. 2010). Statistical differences were identified utilizing the Chi square test or t-test (2010). Unadjusted rates of adherence to biennial screening mammography were compared for the intervention and control groups at baseline and post intervention (2010). An adjusted logistic regression was performed for each time period (2010). The Generalized estimation equation (GEE) was used to account for regressions modeled adherence to biennial screening mammography (bivariate), and to control for influence (clustering effect) of each provider between the outcome and intervention group (2010). All tests were two-tailed and a statistical significance level was set at $p=0.05$ (2010). Results showed at baseline, adherence rates were the same for the intervention and control groups, 78% respectively (2010). However, at the end of the study, 87% of the participants in the intervention group demonstrated biennial mammography adherence compared to 76% in the control group. The odds of adherence in the intervention group was 2.5% (95% CI, 1.9-3.2) compared to the control group (2010). For the

women whose last mammogram was more than 24 months before the intervention, navigation adherence was 50% compared with 17% in the control group (2010). However, those who had their last mammogram more than 18 months, but less than 24 months prior to the intervention, had an adherence rate of 74% compared to 37% in the control group (2010), which is statistically significant.

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. The sample size was significant. The demographics of the study are mostly African American and Hispanic which is representative of the demographics of this EBP project. However, this is not representative of the entire population, thus results are not generalizable to the general population. Another limitation of the study include costs of the program were not calculated.

Level II evidence.

A randomized control trial by Phillips et al. (2015) determined the effect of personalize letters, automated telephone calls, and both personalized letters and automated telephone calls on breast cancer screening rates. Inclusion criteria included being a registered patient at the study clinic; being an active patient at the practice having at least 1 visit to the practice in the past 2 years; being 50 to 74 years old; and being past due for mammography based on medical record documentation; female age 51 to 70; had an assigned primary care provider; and had a documented visit with that provider in the previous 2 years (Phillips et al., 2015). Exclusion criteria included patients at high risk for cancer by physician experts opinion or the uninsured (2015). A total of 271 participants were enrolled in the study of which 90 were randomly assigned to the letter intervention group, 88 to the automated telephone group, and 93 were assigned to the combined group (2015). Thirty-six weeks following the intervention period mammography rates were calculated (2015).

Outcomes were determined using the Pearson χ^2 test between the 3 randomized groups (Phillips et al., 2015). The unadjusted (crude) and adjusted rates were calculated. Baseline characteristics of patient in each of the intervention groups was determined by the χ^2 test for binary variables and t tests for continuous variables (2015). Statistical significance was set as $p < 0.05$ (2015). The crude screening rates for breast cancer were 19%, 22%, and 37% for the letter, automated call, and combined groups, respectively (2015). The adjusted screening rates for breast cancer were 20%, 24%, and 39% for the letter, automated call, and combined groups, respectively (2015). The combined intervention group had a statistically higher screening rate ($p < 0.05$). A statistical difference was not noted between each of the single intervention groups. Racial background and insurance status did not show any statistical significance as well (2015). The reported p value for the letter group was ($p=0.030$) and ($p=0.0053$) for the automated call (2015).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. Costs associated with study were reported. The cost of mammography mailings was \$2.36 per patient mailing; \$0.09 per completed call; \$3.28 per patient for the combination of letter and automated call (Phillips et al., 2015). Therefore, these interventions are cost effective. Limitations of this study include the sample size was not large enough. The demographics of the study were mostly Caucasian with health insurance. This is not representative of the entire population or the site where this EBP project occurs. Thus, results are not generalizable to the general population. Other limitations of the study include the cost of identifying insured patients who were overdue for screening was not calculated (2015).

Level II evidence.

A randomized control trial by Sanghavi Goel and O'Connor (2015) evaluated the effect of an educational video regarding mammograms to increase screening rates. Inclusion criteria

included women being 40 years and older; those who did not have a current screening referral; had not completed a mammogram within two years; and had a primary care appointment in the scheduled in the two-week time frame of this study (Sanghavi Goel & O'Connor, 2015). A total of 97 participants were enrolled in the study of which 49 were randomly assigned to the video intervention group and 48 to the control group (2015). Twelve months following the intervention period mammography rates were calculated (2015).

Outcomes were assessed by two telephone interviews to determine breast cancer knowledge and patient activation at baseline and after their primary care appointment (Sanghavi Goel & O'Connor, 2015). A 10-item measure was utilized to measure breast cancer knowledge. Patient activation was measured "as a continuous score using the 13-item Patient Activation Measure (PAM), which is an instrument that measures an individual's knowledge, skills, and confidence needed in managing one's own health and healthcare" (Sanghavi Goel & O'Connor, 2015, p. 409). Also, self-report of a mammogram was transcribed at the posttest. Women who received the intervention were 2.5 times more likely to receive a mammogram referral during their appointment than those in the control group (36.7% versus 14.6%, $p=0.01$) (2015). In the multivariable analysis, viewing the video significantly increased the receipt of a mammogram referral (OR=4.56, 95% CI 1.3-15.6, $p=0.015$) (2015). Also, language (Spanish) was associated with higher odds of receiving a mammogram referral (OR=4.85, 95% CI 1.7-13.8, $p=0.003$) (2015). Rates of mammography completion were higher among the intervention group compared to the control group, 33% versus 13%, $p=0.02$. Those who viewed the video were associated with a higher propensity for mammography completion (OR=5.21, 95% CI 1.6-17.1, $p=0.007$) (2015). Also, those who spoke Spanish had higher odds of mammogram completion (OR=16.7, 95% CI 2.1-131.6, $p=0.007$) (2015). In the unadjusted analysis by type of appointment, no significant differences in mammogram completion rates between the intervention and control groups were noted (24.4% versus 11.4%, $p=.16$); annual exam (75% versus 25%, $p=.22$) (2015). However, those who received mammogram referrals in the

intervention and control group, had a higher mammogram completion rate of 88% (89% intervention group, 86% control group) (2015).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. The population of this study was mostly Spanish speaking at a federally qualified health center (FQHC). This is similar to the demographics of the population where this EBP project occurs. However, this does not represent the entire population and results are not generalizable. Other limitations of this study include the sample size is small. Also, this study site has existing well run system for ensuring high quality preventative health care and navigators that follow these patients, which may result in a higher rate of mammography completion.

Level III evidence.

A Level III details evidence from well-designed controlled trials without randomization. A non-randomized trial published by Drake et al. (2015) evaluated the effect of patient navigation to increase screening rates. Inclusion criteria included living in the North St. Louis county location of study clinic; being 40 years and older; and overdue for a mammogram (Drake et al., 2015). A total of 792 participants were enrolled in the study (2015). Patient navigation consisted of searching for women who eligible for and due/overdue for a mammogram. For those who met these parameters, the navigators provided face-to-face, telephone, and mail-based support to refer women to screening, diagnostic, and treatment services, as well as assist women through the initial and follow-up visit process for mammogram related care (2015). Also, the navigators assessed barriers from this population as to obtaining a mammogram. Participants were contacted up to three times to initiate navigation. Two years following the intervention period mammography rates were calculated (2015). Some of the barriers identified in this study included: my doctor required a clinical breast exam prior to receiving a

mammogram; mammogram was completed at another facility; language or culture; cannot afford mammogram; and other (2015).

Descriptive statistics were used to analyze baseline characteristics between women who received a mammogram and those who did not. The proportion of mammography utilization for North St. Louis county over the study period was compared to mammography utilization for all PHC locations (Drake et al., 2015). Barriers to obtaining a mammogram were reported. X squared and *p* values were reported to assess statistical significance (2015). Also, the Chi squared values was utilized to determine participant mammograms or not (2015). If the count of participants fell below six a Fisher Exact Test was used instead of the difference proportion test because the proportion test performs poorly with low counts (2015). Statistical Analysis System 9.2 (SAS) was used for analysis as well (2015). Eighty-nine-point three percent of the participants were African American, 99% were non-Hispanic; 37.1% were unemployed; and 57% were uninsured. There was no significant difference between the demographic variables who received a mammogram after navigation and those who did not receive a mammogram (2015). A slightly higher percentage of women who were navigated received a mammogram compared to those did receive a navigation (58.2% versus 55.0%, respectively) (2015). Of the 792 participants, 751 were eligible for navigation (94.8%) (2015). From this group, 710 women received a mammogram during the study (94.5%) (2015). However, 55 of these women received a repeat mammogram during the 2-year time frame. After 1 year of implementing mammography and navigation services 17.7% of all the women received a mammogram and year 2 27.6% (2015).

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. Also, the sample size was adequate. The population of this study were mostly African American. This is similar to the demographics of the population where this EBP

project occurs. This project filled a gap in geographic access to care (2015) and allowed those who do not typically have access to these services an opportunity to receive preventative services. However, the population in this study does not represent the entire population and results are not generalizable. Other limitations of this study include no control group. Also, no data exists on repeat visits with or without navigation (2015). Finally, refinement and improvement of the navigation program should be conducted with the overall network of providers (2015).

Level III evidence.

A non-randomized trial published by Vidal et al. (2014) evaluated the effect of cell text message reminder to increase screening rates. Inclusion criteria included: women age 50-69 years of age and who had been scheduled for a mammogram appointment in June or July 2011 (Vidal et al., 2014). A total of 12,786 women with a scheduled appointment were selected to participate in the study of which 3,719 (29.1%) provided their cell phone numbers and received a text message reminder three days before their appointment were enrolled in the study (2014). Those who did not provide a cell phone number were assigned to the control group and received an invitation letter, which comprised of 9,067 participants. An outsourcing company was hired and responsible for sending the text message reminders. Four months following the intervention period mammography rates were calculated (2015).

Outcomes were measured by age-adjusted OR and 95% CI were estimated (Vidal et al., 2014). In addition, logistic regression models were utilized to analyze if the text reminder was associated with participation in the screening program (2014). To control for cofounders (behavior, accessibility, and age), a stratified and multivariate analysis was conducted. Costs were determined in this study. However, this study was conducted in Spain and the costs associated are in their native currency and not applicable to the currency where this project takes place. As a result of the text message reminder, 74.9% of the women who received the text message reminder and 65.0% of the women who only received the invitation letter attended

their appointments (OR=1.63, 95% CI: 1.49-1.78) (2014). The text message reminder had a larger effect on the group without previous screening and among women who lived in hard to reach areas (OR=2.85; 95% CI 2.31-3.53) (2014). However, the proportion of rescheduled appointments in the group who received a text message was 8.3% and among women invited by letter only was 7.0% (OR=1.20, 95% CI 1.04-1.38) (2014). Seventy-four-point two percent of the women who received a text message reminder and 80.7% of the letter only group attended their rescheduled appointment (OR=0.69, 95% CI 0.49-0.96) (2014). Overall, text message reminders increased participation in breast cancer screening compared to those who received reminder letters.

This piece of evidence was deemed of good quality. The purpose of the study, outcomes, and measurements were clearly delineated. The instruments used to measure the effectiveness of the interventions were reliable, and the tables displayed were consistent with the written content. Also, the sample size was adequate. This study was successful and cost efficient. However, the population in this study does not represent the entire population and results are not generalizable as the population of this study were from Catalonia, Spain. However, there are few studies conducted on text message reminders, and the outcomes of this study may be beneficial to the population of the EBP project site. Other limitations of this study include the study design, as it is quasi-experimental. Also, the inability to exchange the costs associated in the study to U.S. currency is a limitation. Finally, it may be possible that women with cell phone access are more technological savvy, educated, and have access to online resources regarding breast cancer screening (2014).

Construction of Evidence-based Practice

Synthesis of Critically Appraised Literature

After a critical appraisal of the literature to increase mammography rates, a few interventions yielded similar results and recommendations leading to what may be best practice. The final articles selected were of high and good quality, as well as the majority of evidence

being either a level I or level II according to Melnyk and Fineout-Overholt's Hierarchy of Evidence. From these articles common themes were extracted regarding which interventions enhanced breast cancer screening rates, such as text message reminders, education, and a combination of telephone and letter reminders.

Population. Several articles were consistent in the sample of women aged 40 and above as their population for screening for breast cancer utilizing mammograms. This is the target population for of EBP site, in addition to the population who should be screened according to the ACS guidelines. However, according to USPSTF guidelines women aged 50 and above should begin breast cancer screening. Studies that followed this guideline set the parameters for their inclusion population of women aged 50 and above. All of the articles had the same requirements for inclusion of being overdue for mammography by 18 months to 2 years. Many of the studies excluded women who were diagnosed with breast cancer, had a history of breast cancer, or were at risk for cancer. However, several studies did not specify exclusion criteria.

Interventions. Numerous interventions were tested to increase breast cancer screening rates that were successful that included text message reminders, education, and a combination of a phone call and reminder letter. The telephone call reminder alone proved to be the least effective method among the studies that utilized this intervention. Yet, the studies that combined two methods to increase mammography rates, such as a telephone call and letter reminder, were the most effective intervention (Fortuna et al., 2013; Kimbrough Marshall et al., 2015; Nasiriani et al., 2017; Phillips et al., 2010; and Phillips et al., 2015). Evidence from the literature supported addressing barriers to obtaining a mammography among African American and Hispanic/Latino populations, as well as those who are uninsured or economically disadvantaged, to increase the rate of mammography through patient navigators (Drake et al., 2015; Kimbrough Marshall et al., 2015; Phillips et al., 2010).

While the evidence details a few effective ways to increase breast cancer screening, evidence varied as to the optimal time frame to follow up after the interventions to determine mammography rates. One study calculated mammography rates upon completion of the intervention at 3 months (Nasiriani et al., 2017), another at 4 months (Vidal et al., 2014), and one at 6 months (Chan et al., 2018). Two studies determined breast cancer screening rates at 9 months (Phillips et al., 2010; Phillips et al., 2015). One study documented mammography rates at 12 weeks and 26 weeks (Fortuna et al., 2013), while another study completed rates at 11 weeks and 12 months (Hendren et al., 2013). Yet, two studies calculated the breast cancer screening rate at 12 months (Sanghavi Goel et al., 2016). Finally, a couple of studies documented mammography rates at 2 years (Drake et al., 2015; Kimbrough Marshall et al., 2015). As a result of the varied times, the four-month time frame for this EBP project aligns with the evidence.

Outcome. Numerous measurement tools were utilized to assess primary and secondary outcomes. All of the studies had a common primary goal of increasing mammography rates to detect breast cancer. However, the intervention to elevate this rate varied among the studies. Measurement tools applied to calculate data in the evidence from the literature search included adjusted relative risk, adjusted and crude OR, Chi square, Fisher Exact Test, McNemar test, pre-test and post-test.

Best Practice Model Recommendation

Evidence supports that the best practice to increase mammography rates includes a combination of education, letters, phone and text message reminders. It is imperative to address barriers to scheduling and completing a mammogram among those of low SES, as well as ethnic background such as the African American and Hispanic populations. Methods to address this include utilizing a patient navigator who is dedicated to extracting this information from patients and determining how to overcome these obstacles. Raising awareness of the importance and benefits of breast cancer screening is an important attribute when providing

education. Measurement of outcomes varied from three months to two years. For this EBP project, the most appropriate intervention to address the clinical problem is an informational letter, telephone reminder, and/or text message reminder.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

The purpose of this chapter is to detail the process of implementation of this EBP project which included participants and setting, pre-intervention group characteristics, intervention, comparison, outcomes, times, and protection of human subjects. The implementation of practice change involved development of best practice to increase mammography rates to women who are underserved, underinsured, or uninsured. The project involved collaboration with the project manager, director of project practice improvement, information technology (IT), providers, and medical assistants who are dedicated to enhancing the wellbeing, health, and knowledge of their patients. Numerous barriers existed regarding postponement of breast cancer screening, such as low literacy, lack of insurance, fear, and lack of access to quality care. This EBP project addressed these barriers, as well as raised awareness of best practice interventions for providers, enhanced mammography rates and improved the quality of care to the population served. The purpose of this project was to improve breast cancer screening rates utilizing an evidence-based protocol and answered the PICOT question. The PICOT question for this EBP project is: For women over the age of 40 who seek services at a community health clinic network located in NWI (P), does a combination of an informational letter and text message reminder (I), compared to the current practice of care (C) increase rates of mammography (O) over a 12-week period (T)?

Participants and Setting

The EBP project occurred at a community health clinic network located in NWI. This community health clinic network is a non-profit organization that provides quality health care regardless of the ability to pay to underinsured and uninsured, minority, and economically disadvantaged patients. Stakeholders involved in the practice change included, director of project practice improvement, chief medical officer (CMO), radiology department, IT, providers,

and MAs. The project manager was involved as well in the practice change, although this individual was not employed at this facility. Permission for the project's implementation was obtained on May 29th, 2019, by the director of project practice improvement, who stated a need existed for implementation of this project in addition to the alignment of goals with the organization's values (R. Mullins, personal communication, June 4th, 2019).

Participants who were eligible to participate in this project were identified by review of the EMR at the community health clinic network weekly from September 4th, 2019 through September 25th, 2019. The project manager and director of project practice improvement reviewed the patient charts the week of September 3rd, 2019, and determined eligibility based on age, past medical history, and overdue status for a mammogram. Women who were aged 40 years and older, did not have a history of breast cancer, able to speak English, and were overdue for a mammogram by two years or more, or never had a mammogram met the inclusion parameters for this project. Those who had a history of breast cancer, recently had a mammogram, were under the age of 40, or pregnant were excluded from participation in this project. Patients who were eligible to participate were mailed an informational letter that stated they are overdue for a mammogram and the described benefits of mammography. This letter is available in Appendix C. Two weeks after the informational letter regarding mammography was sent, each individual patient's EMR was reviewed to see if a mammogram was scheduled.

Pre-Intervention Group Characteristics

Demographic characteristics of the participants consisted of Caucasian women, African American women, American Indian women, Asian women, Pacific Islander women, Hispanic women, Native Hawaiian women, other race, and more than one race. These women varied in ages from 40-79. In addition, insurance varied among the participants from self-pay, private insurance, and government subsidized insurance.

Intervention

The Iowa Model (used with permission, see Appendix A) was utilized to develop the various steps to plan for the intervention. The first step was conducting a thorough literature search regarding enhancement of breast cancer screening. Next, appraisal of the evidence, helped to determine which articles were relevant and useful for this project to increase mammography rates. Upon review of the literature, a combination of telephone call and written letter reminders for their scheduled mammograms were supported as the most effective interventions to increase mammography rates. Therefore, this intervention was deemed best practice and implemented for this project. However, this health care clinic changed systems and no longer had the capability to send an automated telephone voice message. Instead, they were able to deliver direct messages. Evidence does support that direct messages or text messages is a relevant intervention for appointment reminders. Thus, implementation of a written informational letter and text message were utilized.

After finalizing the best intervention for implementation, the next stage was development of a protocol to guide implementation of this project. Each participant received an informational letter (see Appendix C) regarding why one should get screened for breast cancer, what a mammogram is, and the effects. At the patient's free will, either they scheduled an appointment for a mammogram or did not. Based on the date of the mammogram, the participant received a text reminder two days before their appointment. Each appointment scheduled is detailed within the community health clinic's EMR. The EMR was reviewed weekly and each appointment kept, rescheduled, cancelled, or no-show within an Excel Spreadsheet. Mammography rates were calculated upon completion of the project.

Comparison

Data driving this practice change involved mammography rates of those who are underserved, uninsured, or underinsured that visit the community health clinic network pre-intervention compared to mammography rates post-intervention. The number of those eligible to participate in this EBP project were documented. Two weeks after sending out the

informational letter (see Appendix C), the number of those who scheduled a mammogram appointment was documented. This is considered pre-data. Next, the number of those who completed their mammogram was documented after receiving the intervention. This is considered post-data.

Outcomes

The primary outcome of this project is to increase breast cancer screening rates utilizing mammograms for those that are an underserved population. Measurement of these outcomes were calculated by identification of those who are due or past due for a mammogram, implementation of an intervention, and identification of those who are due for a mammogram actually obtained one after the intervention from review of the EMR. This measurement is the rate of mammography. This data was categorized according to ethnic background, age, and insurance status to detail the crude rates of mammography. The data were analyzed utilizing the Chi square test of independence. Demographic information was calculated by descriptive statistics.

All information collected was protected to maintain standards of Health Insurance Portability and Accountability Act (HIPAA) and proper research ethics. This was accomplished by IT generating an Excel spreadsheet and physical handwritten documentation by the project manager of ethnic background, age, and insurance status by date, omitting patient identifiers. This information was secured in a lockbox with access only by the project manager. Upon completion of this EBP project, materials will be kept for three years then these documents will be destroyed per IRB laws.

Time

The interventions required for this project took approximately three months to complete. Implementation of this EBP project occurred from September 30th, 2019 to December 23rd, 2019. This was an ideal time to implement this project, as October is Breast Cancer Awareness Month, and women may be more willing to complete screening as a result.

Protection of Human Subjects

Protection of human subjects was maintained throughout this project. Before implementation of this EBP project, the project manager completed an ethics course during fall semester of 2018 as a requirement of the DNP curriculum of Valparaiso University. In addition, an online training course offered through the Citi Program titled “Social Behavioral Educational Researchers”, “Public Health Researchers”, and “Researchers” was completed in April 18th, 2019. Certificates of completion are available in Appendix D. It was determined that this project was exempt from IRB approval from Valparaiso University and the community health clinic network. All questions and concerns were addressed by the project manager. All data and confidential information were maintained in a secure location. Upon completion of this EBP project, materials will be kept for three years then these documents will be destroyed per IRB laws.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to increase mammography rates among an underserved population through the use of an educational letter and text message reminders over a 12-week period. The mammography rate was determined based on the number of maintained mammography appointments after receipt of the informational letter (Appendix C) and a text message reminder. This chapter will present details regarding inclusion criteria, demographic characteristics of participants, and a statistical analysis.

Participants

Participants who were eligible to participate in this project were identified by review of the EMR at a community health clinic network located in NWI weekly from September 4th, 2019 through September 25th, 2019. The project manager and director of project practice improvement at the facility reviewed patient charts and determined eligibility based on age, past medical history, and overdue status for a mammogram. Women who were aged 40 years and older, did not have a history of breast cancer, able to speak English, and were overdue for a mammogram by two years or more, or never had a mammogram, met the inclusion criteria for this project. Women who had a history of breast cancer, recently completed a mammogram, were under the age of 40, or pregnant were excluded from participation in this project. The inclusion criteria were based on ACS qualified recommended guidelines of initiation breast cancer screening annually starting at the age of 40 (ACS, 2015; Oeffinger et al., 2015).

The ACS (2015; Oeffinger et al., 2015) strongly recommends that women with an average risk of breast cancer should undergo regular mammography screening beginning at the age of 45 who have an average risk. The ACS (2015; Oeffinger et al., 2015) qualified recommendation for women aged 45-54 should be screened annually; women 55 and older should transition to biennial screening; and women should have the opportunity to begin annual

screening between the ages of 40-44. Qualified recommendations indicate that there is clear evidence of benefit of screening but less certainty about the balance of harms, or about patients' values and preferences, which could lead to different decisions about screening (ACS, 2015; Oeffinger et al., 2015). Whereas strong recommendations indicates that the benefits of adherence to that intervention outweigh the undesirable effects that may result from screening (2015; 2015). Yet, the USPSTF (2016) recommends biennial screening starting at age of 50 and is classified as a grade B recommendation. However, for women under the age of 50, the decision to start screening by mammography should be an individual one and is classified as a grade C recommendation (USPSTF, 2016). Grade B is defined as a recommendation for the service (2016). In addition, there is a high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial (2016). Grade C according to USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences (2016). There is at least moderate certainty that the net benefit is small (2016). Presently, the clinicians at this facility have not decided which current breast cancer screening parameters, USPSTF or ACS, to follow regarding initiation of mammograms. The providers at this facility follow the American College of Obstetricians and Gynecologists (ACOG) (2011) guidelines of initiating breast cancer screening annually starting at the age of 40 in women of average risk (ACOG, 2017).

Since this is a site dedicated to those who are uninsured, underinsured, and/or of a low socioeconomic status, those who seek services at these facilities agree to participate in studies that pose no personal risk without formal written consent (Communication 8/12/19). Thus, following review of the electronic medical records, anyone deemed eligible to participate received an informational letter (see Appendix C) stating they were overdue for a mammogram and the describing benefits of mammography of which 621 women met the inclusion criteria. The racial demographic characteristics of the participants consisted of 325 (52.5%) Caucasian women, 205 (33%) African American women, 68 (11%) other race, ten (1.6%) American Indian

women, five (.8%) Asian women, three (.5%) Pacific Islander women, two (.3%) Hispanic women, two (.3%) Native Hawaiian women, and one (.2%) more than one race (See Table 2.1). The majority of those deemed due for a mammogram within this group were in the age range of forty to forty-nine for a total of 236 (38%) (See Table 2.2), which does not correlate with current ACS or USPSTF guidelines of initial breast cancer screening parameters. However, this age range aligns with current practice within this facility and correlates with ACOG guideline from 2011 of initiation of breast cancer screening utilizing mammograms. In addition, 46 (7.4%) women under the age of forty were accounted for in this EBP project due to receipt of the informational letter. Per discussion with the site facilitator on 3/25/20 each provider chose to follow what they felt was appropriate regarding breast screening initiation. The most frequent insurance held by the sample was Anthem Hoosier Healthwise, a form of Medicaid which 199 (32%) of the participants provided at the time of service. One hundred fifty-two (24.5%) of the participants were self-pay (See Table 2.3).

Table 2.1

Racial Demographic

Race	Frequency	Percent
African American	205	33.0
American Indian	10	1.6
Asian	5	.8
Caucasian	325	52.3
Hispanic	2	.3
Native Hawaiian	2	.3
Pacific Islander	3	.5
More than 1	1	.2
Other	68	11.0
Total	621	100.0

Table 2.2

Age

Age	Frequency	Percent
39 or less	46	7.4
40-49	236	38.0
50-59	179	28.8
60-69	143	23.0
70-79	17	2.8
Total	621	100.0

Table 2.3

Insurance

Insurance Type	Frequency	Percent
Self-Pay	152	24.5
Medicaid	23	3.7
MD Wise Hip	20	3.2
UMR Medicaid Whole	17	2.7
Anthem Hoosier Healthwise	199	32.0
National Gov. Services	44	7.1
BCCP United Health Services	23	3.7
Sliding Fee Scale	7	1.1
Care Source Hip MCE	18	2.9
First Health Care Benefits	5	.8
United Healthcare Medicare	27	4.3
MHS Hip MCE	35	5.6
Administrative Concepts Inc.	1	.2
Ambetter	18	2.9
Aetna	6	1.0
Cigna	15	2.4
Palmetto GBA	1	.2
Security Administrative Services	1	.2
Other	9	1.4
Total	621	100.0

Figure 1.1

Racial Demographic Bar Graph

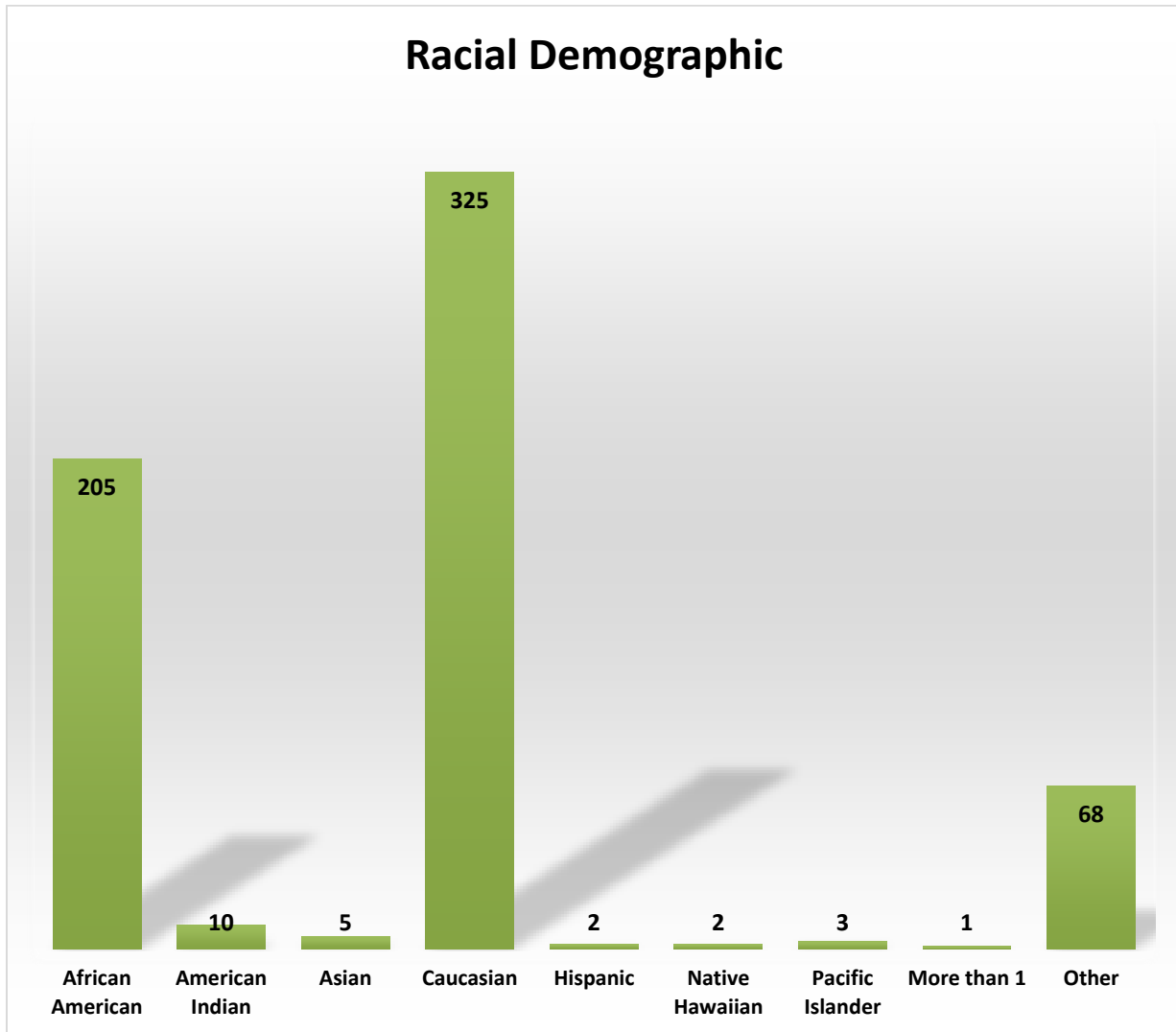


Figure 1.2

Age Bar Graph

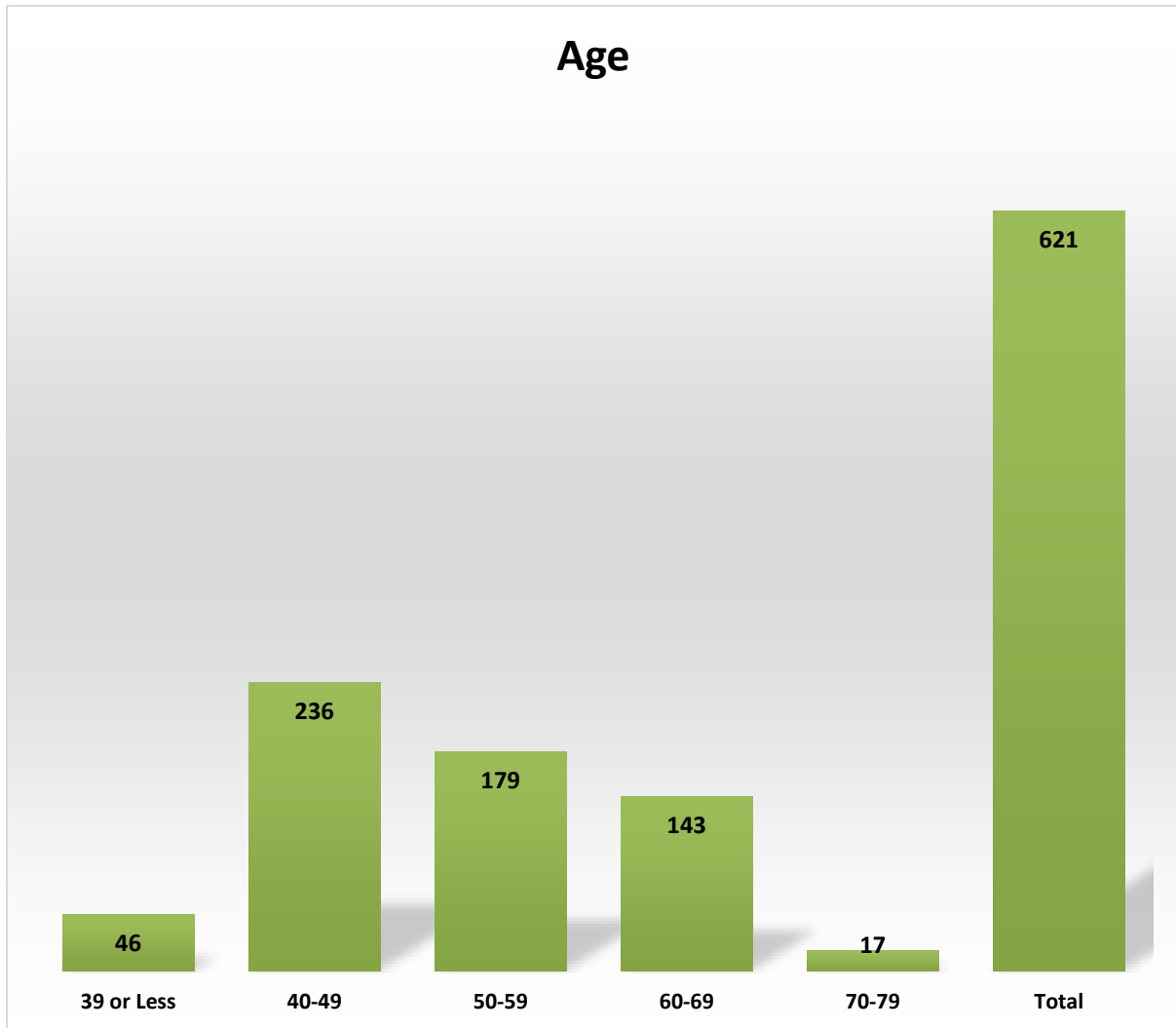
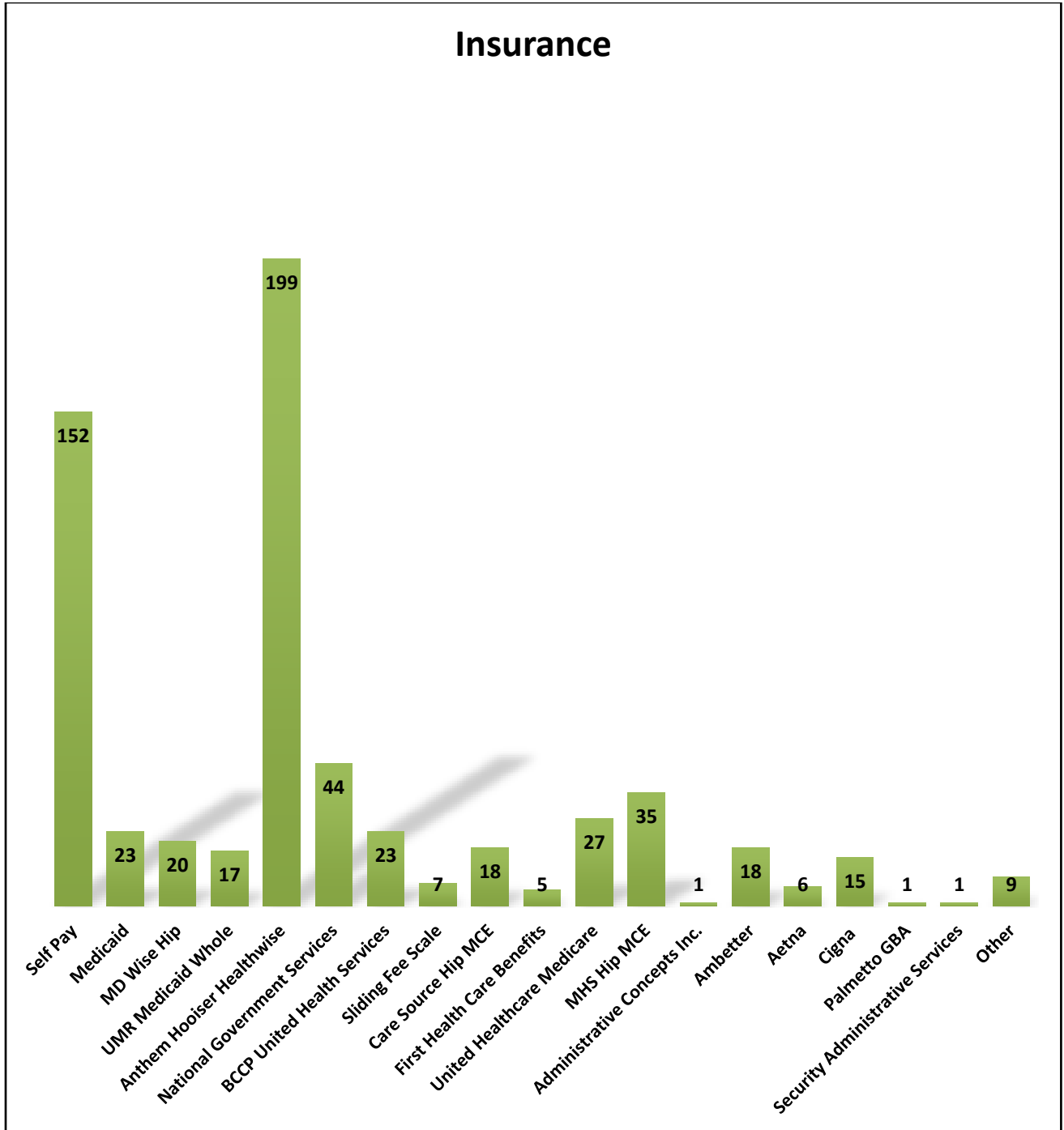


Figure 1.3

Insurance Type Bar Graph



Changes in Outcomes

As expected, the intervention to promote adherence to the mammogram appointment was statistically significant. However, in order to ascertain if breast cancer screening rates truly increased within this health community clinic network, future EBP projects of this subject should take the length of implementation at the same time frame a year prior and compare that result to the EBP project results. Statistical testing, significance and outcomes will be discussed.

Statistical Testing and Significance

Primary outcome. The primary outcome of this project was to increase breast cancer screening rates utilizing mammograms for an underserved population. Data analysis was performed utilizing SPSS software version 22. A chi-square test of independence was performed to test the variables significance to increase mammography appointment adherence. Secondary outcomes of those who needed further diagnostics from an abnormal mammogram were documented by review of the EMR.

Significance. This EBP project addressed the PICOT question of “For women over the age of 40 who seek services at a community health clinic network located in NWI (P), does a combination of a phone call and letter reminder (I), compared to the current practice of care I increase rates of mammography (O) over a 12-week period (T)?” Which was later modified to “For women over the age of 40 who seek services at a community health clinic network located in NWI (P), does a combination of an informational letter and text message reminder (I), compared to the current practice of care I increase rates of mammography (O) over a 12-week period (T)?”. The PICOT question was modified due to a system change within the organization, which resulted in the inability to provide an automated phone call. The primary outcome was adherence to scheduled mammogram appointments after receiving an informational letter and text message reminder.

One aspect of this project was to provide education regarding how breast cancer is screened, what a mammogram is, and why one should get a mammogram. This was

accomplished by creation of an informational letter (see Appendix C) mailed to all of the individuals following review of the EMR who met the inclusion criteria for this project.

Six hundred twenty-one (100%) women received the informational letter. It was at the participants' discretion to schedule a mammogram. Of the women who received the informational letter, 590 (9%) scheduled a mammogram, while 31 (5%) did not (See Figure 1.4). Lack of insurance could be a rationale for not scheduling an appointment, as 29 (93.5%) of the 31 (5%) women who did not schedule an appointment were self-pay. Women who elected to schedule an appointment received a text message reminder two days prior to the mammogram.

Of those who scheduled an appointment 457 women (73.6%) (See Figure 1.6), completed their mammograms. From this subset of the participants, 332 women (72.6%) (See Figure 1.5) received a text message reminder two days before their appointment. However, 125 women (27.4%) (See Figure 1.5) did not receive a text message reminder. This could be contributed to an appointment scheduled less than two days from receiving an informational letter, or same day mammogram appointments. Yet, 164 women (26.4%) (See Figure 1.6) who scheduled an appointment did not complete their mammogram. It was noted that from the 164 women (26.4%) that did not adhere to their appointment, 129 women (78.6%) participants were self-pay. This could be due to inability to pay for the mammogram, lack of insurance, or lack of federal health insurance.

A chi-square test of independence was calculated comparing adherence to mammography appointments between the intervention of the informational letter and text message reminder. A chi-square test of independence was selected to analyze results as nominal data that was collected. The nominal data collected was the informational letter, text message reminder, scheduled mammograms, and completed mammograms. Each of these components had two levels, yes or no. Also, demographic information was collected. The chi-square test of independence measured if the informational letter and text message reminder variables were independent of the outcome which is the mammogram completed. As a result of

the sample of participants being drawn from those that received the informational letter, a statistical analysis on the significance of the informational letter could not be completed. One hundred percent of the sample received a letter thus this was a constant number. A data analysis could not be completed in SPSS for this component due to this constant number. For future EBP projects of this subject, one way to test significance of an informational letter is to take 50% of the total sample to receive only the informational letter compared to the other 50% of the total sample receiving a text message. However, the chi-square test of independence showed a significant association for text message reminders ($X^2(1)=3.927, p < .05$). Therefore, the text message reminder is not independent of the number of completed mammograms. Results are displayed in Table 2.4.

Figure 1.4

Mammogram Scheduled After Informational Letter

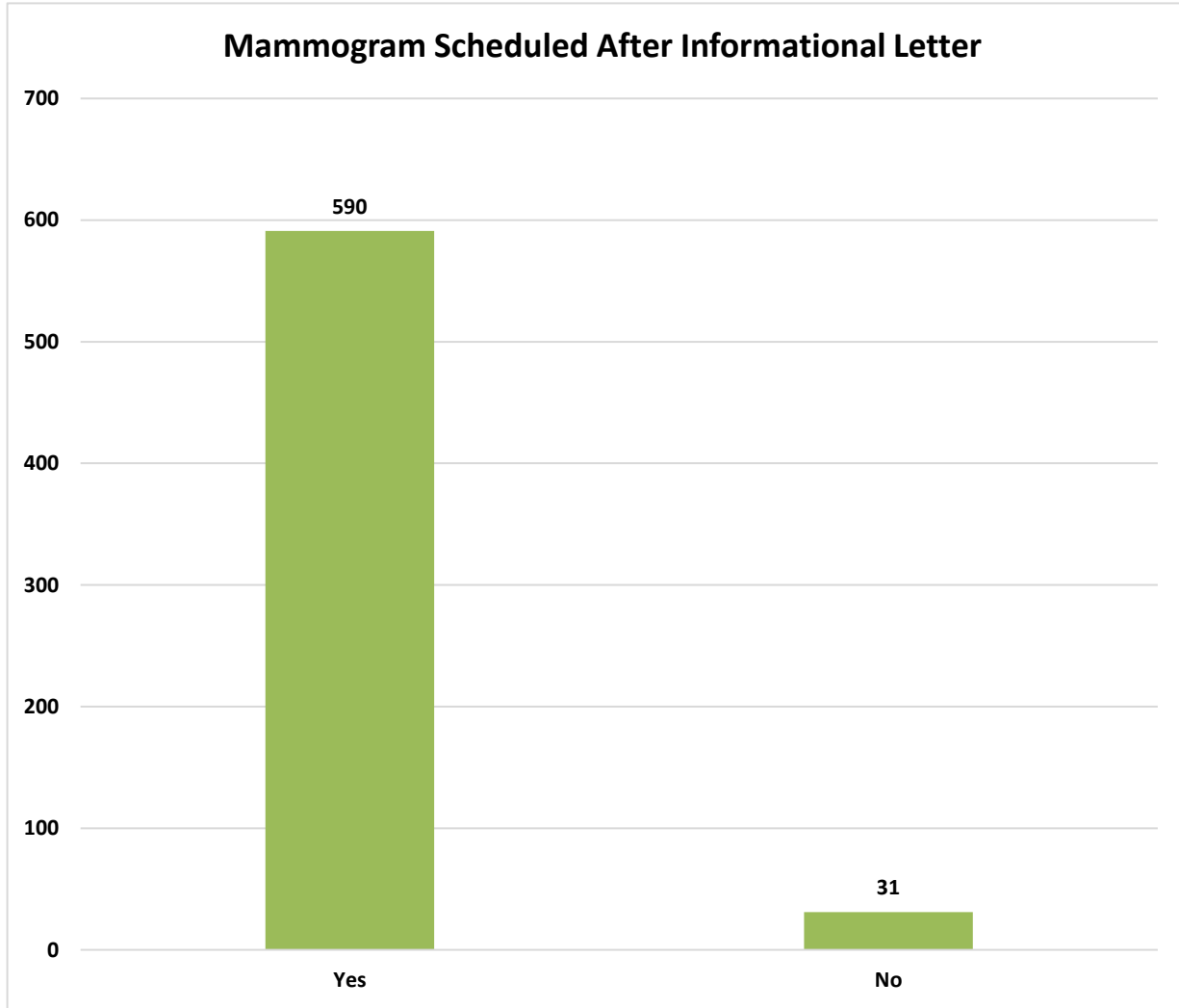


Figure 1.5

Reminder Text Message Sent for Scheduled Appointment

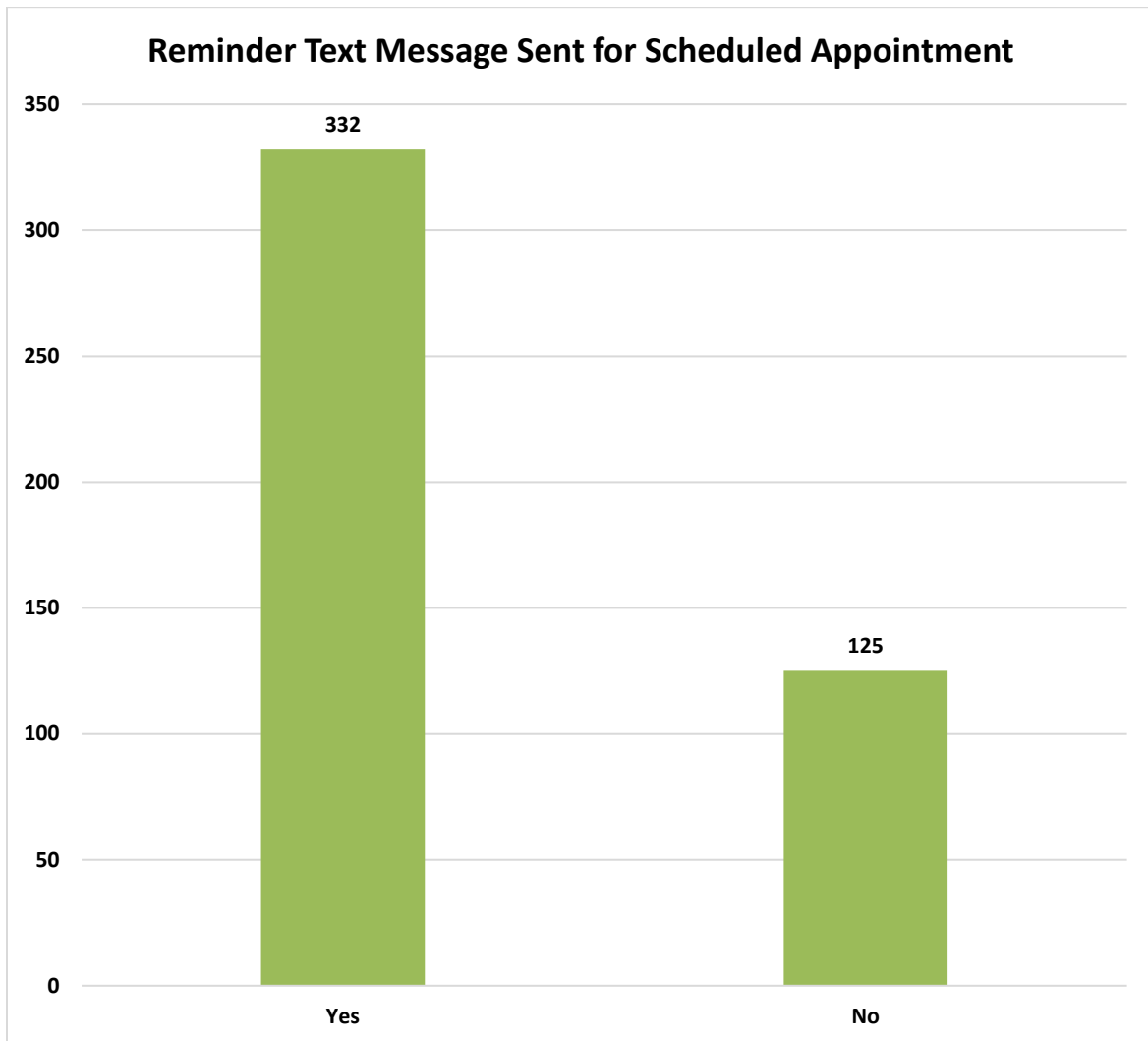


Figure 1.6

Mammograms Completed

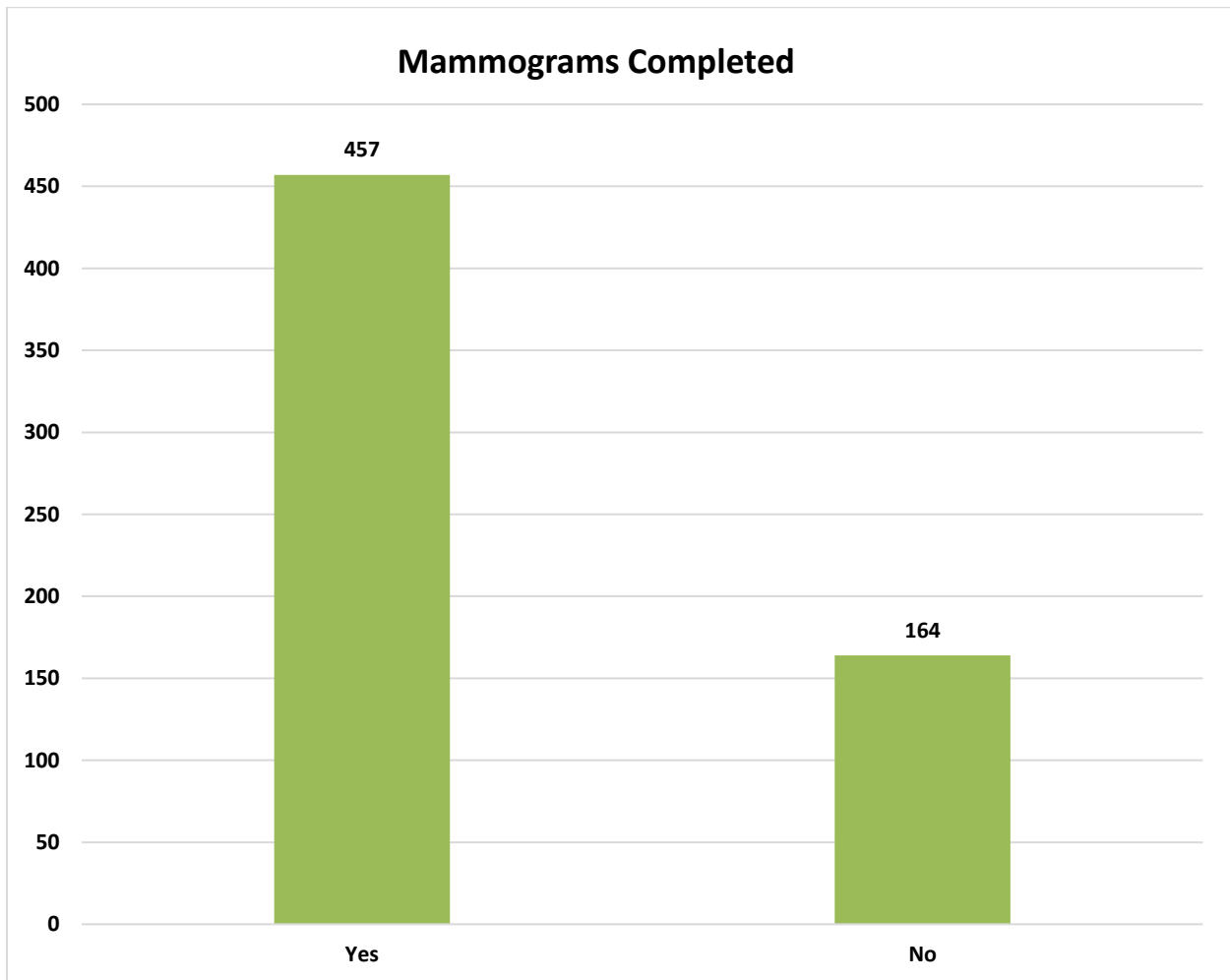


Table 2.4

Chi Square Analysis

Intervention	Number of Valid Cases	X ²	df	p value
Informational Letter	621	-	-	-
Remindtext* Mammocomplete	621	3.927	1	.048

-No statistics computed for informational letter due to constant value.

**p value statistically significant. $p < .05$*

Secondary outcomes. The goal of this EBP project was to increase mammography rates. Early detection of breast cancer is essential to improved patient outcomes. Secondary outcomes that were analyzed in this EBP project were the number of abnormal mammograms from the women that adhered to their appointment. From the participants that completed their mammogram, 39 (8.5%) need further diagnostic testing due to an abnormal result. Data demonstrates the need to improve mammography rates through the use of informational letters and text message reminders.

CHAPTER 5

DISCUSSION

The purpose of this EBP project was to determine if implementation of an informational letter and text message reminder compared to the clinics' current practice of care increased rates of mammography. Secondary outcomes that were examined were the number of abnormal mammograms that needed further analysis. This chapter will provide an explanation of findings, strengths, and limitations of the EBP project, as well as implications for the future.

Explanation of Findings

Primary outcomes. Project findings support the use of a combination of an informational letter and text message reminders as an effective intervention to increase adherence to mammogram appointments. The literature supports a combination of two methods to increase breast cancer screening rates. For example, Chan et al. (2018) showed in their RCT 34.4% (947) women that received a signed physician letter and postcard completed a mammogram compared with 24.0% (660) women in the control group ($p < 0.001$). Another RCT conducted by Fortuna et al. (2013) significantly showed that compared to the reminder letter alone, a letter and a personal call was more effective at improving screening rates for breast cancer (17.8% vs. 27.5%; AOR 2.2, 95% CI 1.2-4.0). Two interventions were utilized in this EBP project, an informational letter and text message reminder for a scheduled appointment. A chi-square test of independence was used to evaluate the significance between the informational letter, text message, and completion of the mammogram. While the text message was a statistically significant intervention ($X^2(1)=3.927, p < .05$), it cannot be dismissed that the mailed informational letter explaining what breast cancer is and the rationale for obtaining a mammogram contributed to a scheduled and completed mammogram. Due to each participant receipt of the informational letter, a statistical analysis on the significance of the

informational letter could not be completed as this was a constant number. A data analysis could not be completed in SPSS for this component due to this.

Several studies included within the final literature search that were of high and good quality, had a large number of participants, greater than 2,000 were utilized as a guide to facilitate this EBP project. The Johns Hopkins Research and Non-Research Evidence Appraisal Tool defines high quality (grade A) evidence as “consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence” (Dang & Dearholt, 2017, p. 286). The next quality rating is good quality (grade B) which is “reasonably consistent results; sufficient sample size for the study design; some control, and fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence” (Dang & Dearholt, 2017, p. 286). Several high and good-quality studies included to support this EBP project had 90 to 724 participants. Therefore, the number of participants in this EBP project of 621 was a median range and an adequate number in comparison to the current studies utilized as evidence. The racial demographic characteristics of the participants consisted of 325 (52.5%) Caucasian women, 205 (33%) African American women, 68 (11%) other race, ten (1.6%) American Indian women, five (.8%) Asian women, three (.5%) Pacific Islander women, two (.3%) Hispanic women, two (.3%) Native Hawaiian women, and one (.2%) more than one race (See Table 2.1). Yet, the SES of the participants in this EBP project are not representative of the local population in NWI as a whole. The majority of participants who sought services at these clinics were of low SES and either were uninsured, self-pay, or had some type of federally qualified insurance such as Medicaid, Anthem Hoosier Healthwise, MD Wise Hip, Managed Health Systems Healthy Indiana Plan Managed Care Entity (MHS Hip MCE) or Ambetter (R. Mullins, personal communication, June 4th, 2019). Lake County Indiana, where the Merrillville, Hammond, and Lake Station facilities are located, has 9.7% of this

population under the age of 65 do not have health insurance and 15.9% of this population live in poverty as of 2017 (census.gov, 2019). Porter County Indiana, where the Portage and Chesterton facilities are located, has nearly 8% of this population under the age of 65 do not have health insurance and 10.4% lived in poverty as of 2017 (2019).

Secondary outcomes. Women of a lower SES have higher cancer death rates than those with higher SES, regardless of demographic factors such as race/ethnicity (ACS, 2019). Therefore, one of the goals of this EBP project was to increase mammography rates. As a result of timely mammograms, early detection of an abnormal growth could be detected. Secondary outcomes that were analyzed in this EBP project were the number of abnormal mammograms from the women that adhered to their appointment. From the participants that completed their mammogram, 39 (8.5%) needed further diagnostic testing due to an abnormal result. Data demonstrates the need to improve mammography rates through the use of informational letters and text message reminders.

Strengths and Limitations of the DNP Project

Strengths

Several strengths of this EBP project were identified. One strength was use of the Iowa Model as a guide to develop a protocol that fits the organization where this project was completed. The Iowa Model involves numerous problem-solving steps based on a trigger. The steps include 1) identification of a trigger, 2) clinical applications, 3) organizational priorities, 4) forming a team, 5) piloting a practice change 6) evaluating the pilot 7) evaluating practice changes and dissemination of results (Melnik & Fineout-Overholt, 2015). Also, each step allowed for feedback. The project manager referred to this model to ascertain the needs of this organization. The trigger was lack of consistent screening of breast cancer through mammograms within this organization. After meeting with the site facilitator, it was revealed that some providers consistently obtain a family history of breast cancer, inquiring when the last mammogram occurred, and any abnormal results, whereas others do not routinely obtain this

history. In addition, there was not a consensus on which current practice guidelines, ACS or USPSTF for breast cancer screening should be implemented. Based on the initial meeting, the project manager was able to identify that the EBP project is relevant and applicable to this clinical setting, meeting the clinical application step in the Iowa Model. The next step in the Iowa Model is organizational priorities and obtaining support from the organization. According to Melnyk and Fineout-Overholt (2015) higher priority topics that impact the organization the greatest as a result of costs, volume, and risk are given priority over projects that may not align with the company's strategic plan or goals. Therefore, it was necessary to note who the stakeholders were, if the practice question or trigger aligned with the company's priorities, how the practice change would be implemented, resources necessary to do so, feasibility, and outcomes expected during this phase of organizational priorities of the Iowa Model. This was achieved by submitting a project proposal and the project manager communicated how the intervention could be implemented. The project manager communicated frequently with the facilitator and identified key stakeholders such as the Quality Manager of Practice Improvement, IT, and organizational leaders, which was consistent with this step of the Iowa Model (2015) and a team was formed. Piloting the practice change of a mailed informational letter and text message reminder for scheduled mammograms, was successfully implemented as 458 appointments were scheduled and kept within a 12-week time frame. Upon evaluation of the pilot, a step within the Iowa Model, the informational letter created by the project manager regarding mammography and breast cancer screening is currently used to educate patients among their numerous clinics. The project manager evaluated the practice changed and determined this protocol was relatively easy for the facilities to put into practice. Findings showed that the intervention of text message reminders for one's appointments was statistically significant. In addition, the large sample size allowed for increased confidence that the results were an effect of the intervention rather than by chance. Finally, the cost to implement the interventions of this EBP project were minimal.

Limitations

Several limitations occurred within this EBP project. Once approval of the informational letter was granted, it was not communicated which clinic population should receive the interventions. As a result, the informational letter was sent to six locations. The project manager was overwhelmed with the amount of data that needed to be collected. Another limitation that occurred was prior to implementation of this EBP project, the clinic had the capability to leave an automated voice message. Evidence supports that best practice was a combination of a phone call and letter reminder for adherence to an appointment. However, in September, the project manager learned that the site no longer had the software to complete automated calls. Due to the project manager's work, school, and clinical schedule, it would have been extremely difficult to individually place reminder phone calls. In addition, it was not feasible to have staff incorporate this task into their schedule. Thus, the alternative of a text message reminder was utilized. Another limitation was during this project was the main office moved locations. As a result, this created a tense environment at times among the employees, as well as rescheduling of meetings or unavailability. Also, October was Breast Cancer Awareness Month. This could potentially have skewed the results of this EBP project, as some participants may be apt to get tested during a month dedicated to breast cancer awareness. An additional weakness of the project was lack of a comparison group designated separately for the informational letter and text message interventions. As stated previously, all of the participants received an informational letter. Fifty percent of the participants should have received the informational letter compared to 50% receiving a text message to compare the significance between the groups. Finally, 7.4% (46) women under the age of 40 received the informational letter and were included in the study. This was a result of their chart being flagged as one who needed a mammogram by their provider.

Implications for the Future

This EBP project was significant in providing an intervention that was simple to implement and will help providers to improve patient outcomes through early detection of breast cancer. Findings from this EBP project can influence practice, theory, research, and education to enhance the patient experience and guide practice. Implications of how this will affect each attribute will be discussed.

Practice

A combination of telephone call and written letter reminders for their scheduled mammograms are supported as the most effective interventions to increase mammography rates. Therefore, this intervention is deemed best practice and initially was implemented for this project. However, due to a system change within the organization, a direct message was substituted for the telephone call. Evidence supported that text messages are a relevant intervention for appointment reminders. Thus, this intervention was implemented at this site and was statistically significant. This intervention was easily adopted at this site, as it did not disrupt the workflow of the providers, MAs, radiologists, and was cost effective. Therefore, other clinics should consider implementation of a text message reminder for appointments if not already in use. One component of this EBP project protocol that was integrated into practice is use of the informational letter. Presently, the clinics utilizes this letter to increase knowledge and raise awareness of breast cancer.

Theory

Use of the Iowa Model as a guide to develop this EBP project was useful for this novice project manager, as it was an organized method to align the sites needs to the goals of the EBP project. This model is specific to problem and or knowledge-focused triggers that address practice change. Within this community clinic, a practice change of increasing adherence to mammogram appointments was addressed. Thus, this model was useful for development and implementation of this EBP project. During development of this protocol, each step allowed for

feedback from the facilitator to alter the parameters of the EBP project to fit the needs of the organization.

Research

While current studies exist regarding which intervention are best to increase mammography rates, further research should be conducted. The project manager believes that we are in the midst of a paradigm shift of a direct message as the new standard to remind one of an appointment and increase adherence.

Education

Patient education is necessary, especially to the underserved population, to increase awareness and knowledge of why one should be screened for breast cancer, what a mammogram is, and how early detection provides an opportunity to make an informed decision. In addition, evidence supports that education enhances the patient's understanding to breast cancer and increases likelihood of compliance to the plan of care. It is the duty of providers to educate patients regarding their care and offer alternatives to the plan of care to ensure quality of life.

Conclusion

In conclusion, results from this EBP project support the use of an informational letter and text message reminder to promote adherence to mammogram appointments. This is consistent with the selected evidenced based literature to guide and develop a protocol suitable for the patient population that this project site serves. The text message reminder was determined to be significant in adherence to a scheduled mammogram. In addition, 6.2% (39) women who had an abnormal mammogram were able to obtain further care at an earlier stage due to early screening. Once the facility determines which guideline to follow, the site facilitator stated this EBP project's interventions will be sustained. This EBP project fulfilled the goals of raising awareness of breast cancer, educating those of a lower socioeconomic status regarding their health, promoting health outcomes, and increasing adherence to mammogram appointments.

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BIOGRAPHICAL MATERIAL**Ingrid N. Cooper**

Mrs. Cooper graduated from Ivy Tech Community College, Gary campus, with an Associate of Science in Nursing degree in 2011. She continued to advance her education by earning a Bachelor of Science in Nursing at Valparaiso University in August 2012. Mrs. Cooper then enrolled in the program for nurse educators at Valparaiso University, earning a Master of Science in Nursing in December 2017. During this time, she became an adjunct faculty member at Valparaiso University, teaching several clinical rotations on a Family Birthing Center at Methodist Northlake Hospital from 2016-2018, and Pediatrics at Comer Children's Hospital in 2018. She bridged over to the Doctor of Nursing Practice program at Valparaiso University and will graduate in May 2020. Mrs. Cooper began her nursing career on a Pediatric Medical Surgical Unit at Franciscan Alliance in 2011. She eventually expanded her nursing skills by transferring to their Family Birthing Center. In 2013 she began working as a Pediatric Intensive Care nurse at the University of Chicago-Comer Children's Hospital. Ingrid pursued additional nursing roles at this institution including the Pediatric Emergency Department, Labor and Delivery, Critical Care Float Team, and her current position on the Post Anesthesia Care Unit. Mrs. Cooper is a member of the Coalition of Advanced Practice Nurses of Indiana and Sigma Theta Tau International Honor Society of Nursing, Zeta Epsilon Chapter. She has served as a member of the Wellness Health Ministry at St. Mary's Catholic Church since 2014. In 2017 she participated as a member of the Magnet Journey and GOJO committees to increase handwashing rates at the University of Chicago. In addition, Mrs. Cooper is a recipient of the CVS Health Foundation Advanced Practice Nurse Scholarship 2020, Indiana Center for Nursing Scholarship 2020, as well as the Herbert H. Gerke Award in 2017, 2018, and 2019. Some of her future aspirations upon becoming a nurse practitioner include women and children's services, emergent or urgent care, palliative care, and nursing education. She is passionate about providing women who are uninsured or underserved access to mammography and implemented an evidenced-based practice project centered on this community she presently serves.

ACRONYM LIST

ACOG: American Congress of Obstetricians and Gynecologists

ACS: American Cancer Society

AOR: Adjusted Odds Ratio

APN: Advanced Practice Nurse

BC: British Columbia

CI: Confidence Interval

CINAHL: Cumulative Index to Nursing and Allied Health Literature

CMO: Chief Medical Officer

EMBASE: Excerpta Medica Database

EBP: Evidenced Based Practice

EBSCO: Elton B. Stephens Co.

EMR: Electronic Medical Record

FQHC: Federally Qualified Health Center

GEE: Generalized Estimation Equation

HIP: Healthy Indiana Plan

HIPAA: Health Insurance Portability Accountability Act

IRB: Institutional Review Board

IT: Information Technology

MA: Medical Assistant

MHS HIP MCE: Managed Health Systems Healthy Indiana Plan Managed Care Entity

NP: Nurse Practitioner

NWI: Northwest Indiana

OR: Odds Ratio

PAM: Patient Activation Measure

PICOT: Population, Intervention, Comparison, Outcome, Time

RCT: Randomized Controlled Trial

SAS: Statistical Analysis System

SES: Socioeconomic Status

SMP: Screening Mammography Program

SMS: Short Message System

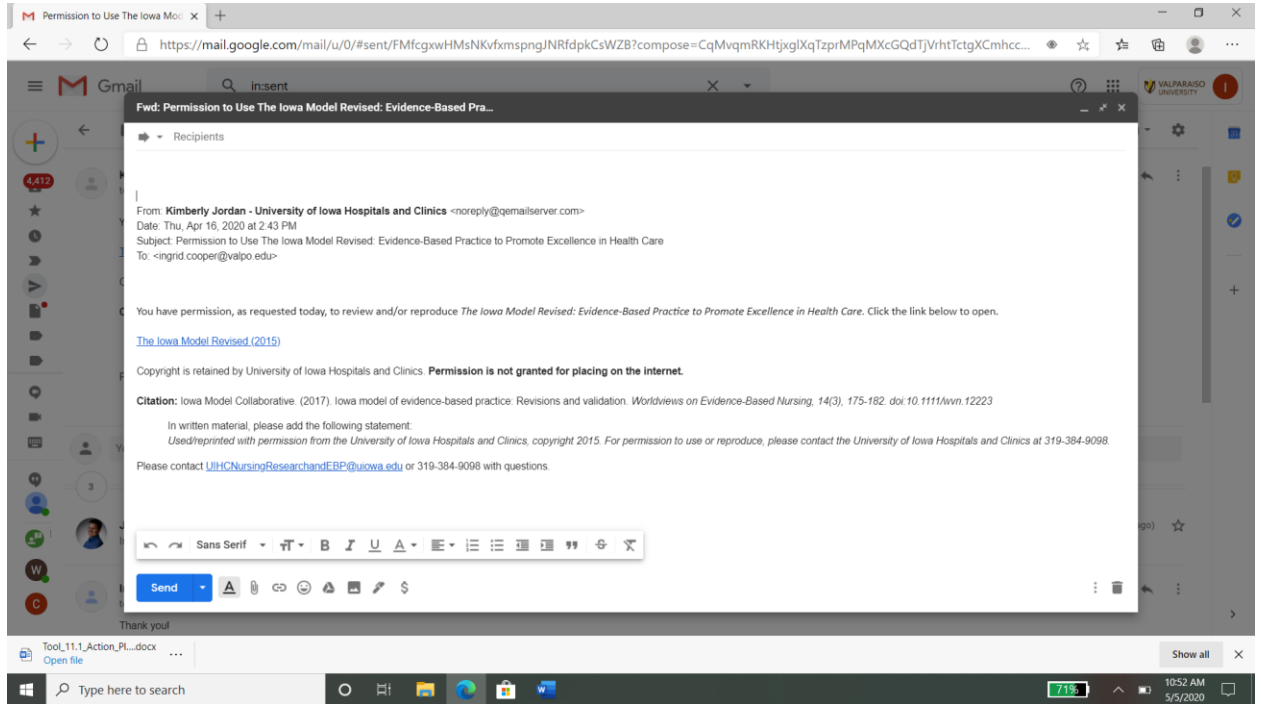
SPSS: Statistical Package for Social Science

USPTF: United States Preventative Task Force

APPENDICES

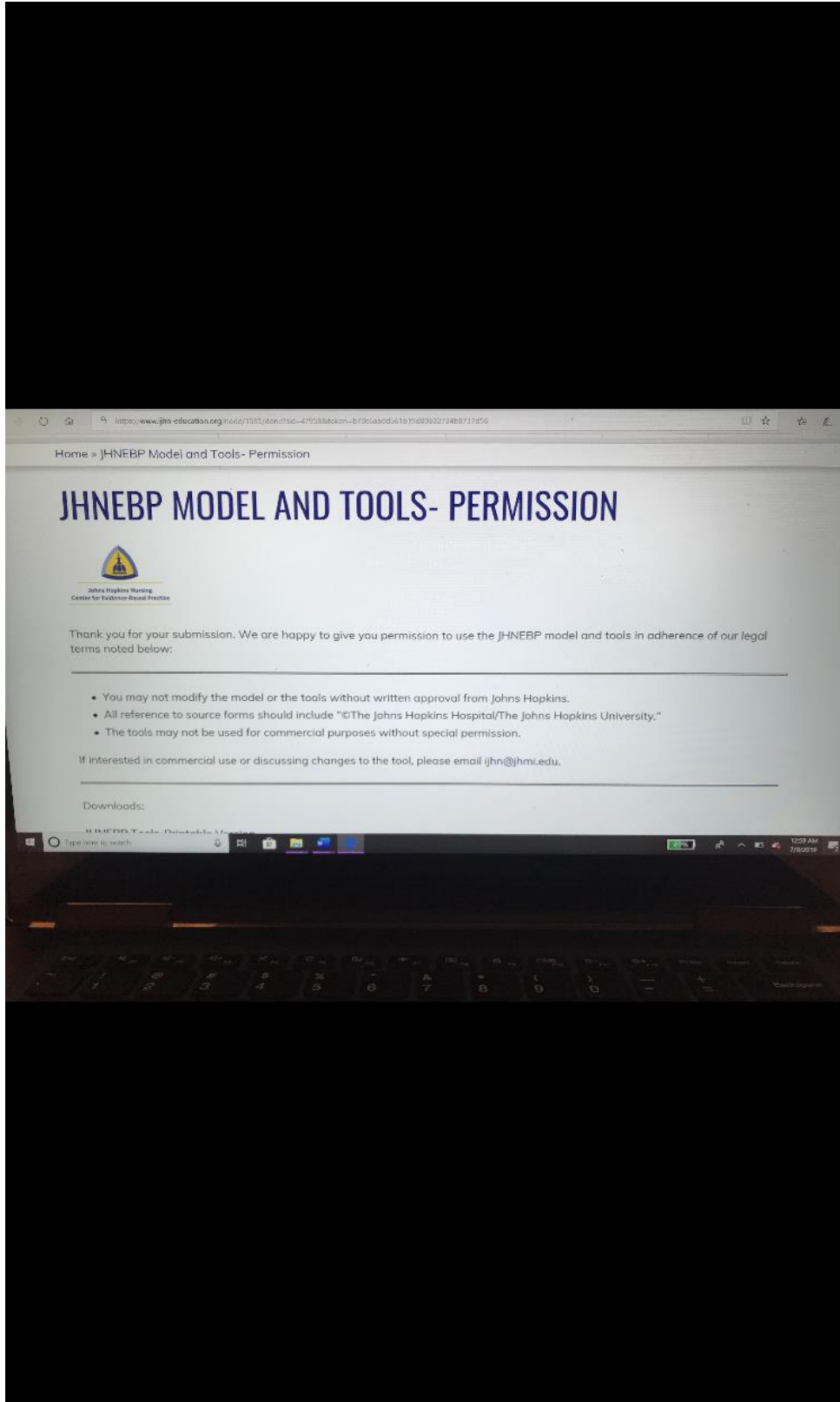
Appendix A

Permission to Use Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



Appendix B

JHNEBP Model and Tools Permission Certificate



Appendix C

Mammogram Awareness Letter

DATE

Dear Community Health Patient:

Do you know it is time for you to have a mammogram? According to our records you are past due for this appointment. As a reminder, according to the American Cancer Society (2019) a mammogram is a “low dose x-ray procedure used to detect breast cancer at an early stage”. Early detection is the key to survival! Often, early breast cancer does not have any signs and symptoms. That is why it is important to get a mammogram because this detects early stages of breast cancer.

The American Cancer Society recommends that those 40-44 years of age can choose to have an annual mammogram; those 45-54 have a mammogram annually; and those 55 and older have a mammogram every two years or may choose to have one every year.

If you have financial difficulties, no insurance, or little insurance, and/or have not seen a doctor in years because you “feel fine” or are scared to know what is happening to your health, or do not understand what a mammogram is or why you need it, you need to schedule a mammogram today! Individuals who fall into one of these categories have low survival rate because when it is discovered that you may have breast cancer it has advanced and standard treatment does not work.

North Shore Health is here for you. We offer onsite mammograms at a low cost for those who are able to pay out-of-pocket or you may qualify through Medicaid. Schedule your appointment at one of the convenient locations today!

LIST each location with address and telephone number

Appendix D CITI Program Certificates

