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Development, Implementation and Evaluation of a Screening Mammography Program

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Section I: Abstract

Breast cancer is a major public health concern in the United States and remains a priority for national women's health centers, primary care practices and cancer control organizations such as the American Cancer Society (ACS). The cancer care continuum includes the spectrum of prevention/risk reduction, early detection, treatment, and living with the diagnosis. Currently there are no proven primary prevention options for women at average risk of developing breast cancer; therefore, secondary prevention interventions such as screening mammography and clinical breast examination (CBE) are required to reduce morbidity and mortality. This manuscript describes a Doctor of Nursing Practice (DNP) led quality improvement project aimed at increasing mammography screening completion rates in one community health center within a reputable safety-net community health network with access to a mobile mammography van. The intent of this project was to discover the barriers that patients view in complying with their breast cancer screening recommendation, the workflow of the health centers with the best practice, and the creation of a mammography toolkit to provide consistency in processes amongst multiple sites. Although there were challenges in reaching a significant amount of patients to unveil all the possible barriers, overall implementation of this quality improvement project resulted in a well appreciated mammography toolkit, which will be available to all primary care health centers and included in the orientation of medical evaluation workers and health workers as it relates to patients obtaining proper breast health.

Keywords: screening mammography, telephone reminder calls, toolkit, DNP

Section II: Introduction

Background Knowledge

Breast Cancer

Breast cancer is the most common cancer in American women regardless of age or ethnicity. According to the Centers for Disease Control and Prevention (CDC) (2014), breast cancer rates vary by ethnicity. The most common cause of deaths from breast cancer occurs in Hispanic women followed by Caucasian, African American, Asian/Pacific Islander, and American Indian/Alaska Native women. Unfortunately, the risk of developing breast cancer is about 12% in any woman's lifetime (Guimond, 2014). The American Cancer Society (ACS) (2015) estimates about 231,840 new cases of invasive breast cancer and 60,290 carcinoma in situ (CIS) will be diagnosed in women in the US during 2015. In California, the ACS estimated that 25,270 new cases of female breast cancer and 4,320 deaths would occur during 2015 (ACS, 2015a; ACS 2015b).

Currently, there are contradictory recommendations for obtaining screening mammograms. The United States Preventive Services Task Force (USPSTF) (2013) recommends biennial screening mammograms for women between 50-74 years of age; whereas, the ACS recommends starting at 45 years of age or having an option to start at 40 compared to American College of Obstetricians and Gynecologists (ACOG), and National Comprehensive Cancer Network (NCCN) who recommends starting at the age of 40 and completing yearly mammograms as long as the woman is in good health (ACS, 2015; Somerall, 2013; NCCN, 2015). Due to the conflicting recommendations, it can cause confusion in women and will most likely cause them to wait to get their screening mammogram. Therefore, it is the provider's

clinical judgment to help decide and recommend what age is best for their patient to obtain their initial breast cancer screening based on risk factors and family history.

Screening Mammography Barriers

Faye Wong, Assistant Chief for Policy and Development of the Program Services Branch Division of Cancer Prevention and Control National Center for Chronic Disease Prevention and health promotion from The Centers for Disease Control and Prevention developed *The Manual of Intervention Strategies to Increase Mammography Rates* (2008), and documented various barriers which include: women who are less likely to adhere to their screening mammogram recommendation, barriers encountered by women, physician/provider barriers, needs of special populations, and readiness of women to adopt new behaviors. Her manual provided background information on the most common reasons why women are not compliant with breast cancer screening.

Women less likely to comply. Women who are less likely to comply with their screening mammogram recommendation have low socioeconomic status, have less than a high school education, are women of color, unaware of similar-aged women who comply with screening mammogram, do not know of any friends or family members with history of breast cancer, and have had no previous mammogram (Wong, 2008; Shelton et al., 2011). Wong (2008) also documented that women who have not had a recent clinical breast exam or pap test, are unaware of breast self-exam, are smokers, do not regularly exercise, and are self-reported to be in poor health are less likely to obtain a mammogram.

Mammography barriers encountered by women. On the other hand, knowledge/feelings barriers that women encounter are: lack of breast cancer knowledge such as risk increases with age, breast cancer can be asymptomatic, and the notion that routine

mammography screening is not necessary if healthy (Wong, 2008). Other barriers include: unawareness about the need of routine screening mammogram, fear related to screening and disbelief in the efficacy of screening mammogram (Wong, 2008). Provider related barriers encountered by women are the lack of recommendation from their provider (Wong, 2008; Shelton et al., 2011). In addition, women encounter access barriers which include: cost of screening mammogram, lack of routine source of health care, lack of time, inability to take time off work, and location of screening mammogram (Wong, 2008).

Mammography barriers encountered by physicians/providers. Not only do women encounter barriers, but providers do as well. These include: patient's refusal of complying with screening mammogram recommendations, older women who have never had a mammogram have negative feelings towards procedure, assumption that another provider referred the patient, and providers perceive they are doing a great job referring appropriate patients for their screening mammograms (Wong, 2008). In addition, knowledge/attitude barriers of providers include: providers do not follow up whether their patients completed the recommended screening mammogram, unsure about the mammogram screening guidelines; providers are less likely to refer older women especially if they never had a screening mammogram before or assume that their patient will not comply or they are concerned about the financial burden on their patients (Wong, 2008). In addition, provider skill barriers include: lack of confidence in screening and educating their patients or feeling uncomfortable performing clinical breast exams (Wong, 2008).

Health care delivery system barriers. Aside from patient and provider barriers, there are also health care delivery system barriers that Wong identified in her manual (2008). These include: providers forget the different age groups and recommended screening procedures, a

screening mammogram is not routinely ordered when a clinical breast exam is done, providers don't routinely see patient for gynecological care, providers have time restraints where other medical issues are more important in addressing during the clinic visit, providers don't have a systematic way of identifying women who are due for screening mammogram, or have a way for contacting patients to inform them of their pending screening (Wong, 2008). Another barrier noted by Yang, Matthews, and Hillemeier (2011), is the distrust of women with the health care system. More specifically, distrust in hospitals, health insurance companies, and medical research (Armstrong, Rose, Peters, Long, McMurphy & Shea, 2006). According to the study done by Armstrong and colleagues (2006), the majority of distrust based on their questionnaire was related to mistakes by the health care system that result in death. Also, they found that participants felt that the health care system was more interested in holding the cost versus doing what was necessary for their health and well-being (Armstrong et al., 2006). Therefore, women are potentially less likely to see their provider and/or obtain the recommended cancer screenings.

Strategies to Improve Screening Mammogram Rates

According to Sebatino et al. (2012), one-on-one education, client reminders, and reducing structural barriers demonstrate strong evidence in increasing screening mammography completion rates. One-on-one education is provided by health care workers or lay workers providing information either in person or via telephone about "indications for, benefits of, and ways to overcome barriers to screening with the goal of informing, encouraging, and motivating people to seek recommended screening" (Sebatino et al., 2012, p. 103). In low-income women, providing intentional one-on-one education demonstrated an increase of 10.4 percentage points in screening (Community Preventative Services Task Force [CPSTF], 2010a).

Another effective intervention includes client reminders, which are often done by mailing a reminder letter or post card or providing a personal telephone call advising the patient about their pending screening test (Sebatino et al., 2012). According to the CPSTF (2010b), client reminders demonstrated a median increase of 14.0 percentage points while enhanced and telephone reminders demonstrated a larger increase of 29 percentage points versus written reminders alone (4.5 percentage points).

Reducing structural barriers is also an effective intervention that can address spatial, timing, and administrative obstacles. Solutions might include adjusting service hours to meet client needs, offering mobile vans, and providing scheduling and translation services. Incorporating these modifications, mammogram completion rates increased 18 percentage points (Community Preventative Services Task Force, 2010c).

Another effective reminder is a text messaging intervention. According to Vidal et al. (2014), women who received text messaging were more likely to obtain their screening mammogram where mail was inaccessible. Vidal et al. (2014) also noted that text messaging was cost effective especially in areas that are difficult to reach such as rural and newly developed suburbs. According to the Cellular Telephone Industries Association (CTIA), now known as the Wireless Association (2014), wireless networks have penetrated 100% of the total US population; therefore, providing the use of phone/text messaging as an effective reminder system.

Community Health Network

Community Health Network (CHN) is an organization recognized for offering high-quality, affordable, and compassionate health care to men, women, and children (SF Health Network, 2015). With several health care centers in San Francisco County, they are often the

primary source of health care for men, women, and children seeking primary care services. Their organization remains focused on several primary care health issues such as early detection of breast, cervical, colon cancer and providing educational outreach.

CHN recommends and adheres to the USPTF guidelines for breast cancer screening. For women aged 50 to 74, a biennial mammogram and a clinical breast exam (CBE) are routinely included as part of the well woman exam. According to the Chief Quality Officer (CQO) of Ambulatory Care, a CBE is not necessary for women to obtain a screening mammogram. As long as a clinician has seen the patient within the last 20 months or as part of an active panel, a screening mammogram referral will be created.

Local Problem

Baseline CHN regional data was collected to measure screening mammography rates for women between 50 and 74 years of age. According to the i2i Data System (n.d.), a review of breast cancer screening rates during December 2013-April 2015, revealed an affiliate completion rate ranging from 69% to 72 % based on the Healthcare Effectiveness Data and Information Set (HEDIS). In contrast, average national goals according to the CA Office of the Patient Advocate (OPA) for mammography screening rates in HMOs and PPOs are 74% and 70% respectively (OPA 2015a; OPA 2015b). However, these rates were limited to women 50 to 74 years of age (OPA, 2015). Comparing CHN's regional data to OPA's, there is a definite need to create a quality improvement project to help achieve similar ratings.

CHN also offers mobile mammography van services to seven of its health centers either monthly, bimonthly, or quarterly depending on the needs of the health center. With its set schedule, the van goes to the health center and sets up near it or in front, so patients do not need to go to the hospital for their screening mammogram. With the differing frequencies of the

mobile mammography van to each health center, as of July 15, 2015, the rates of screening mammography completion ranged from 40.6% to 67.9%.

Considering the low rates of completed mammography screening exams within the network and the ACS estimates of breast cancer for 2015, it was critical that the affiliate develop a quality improvement project that would result in increased adherence to breast cancer screening guidelines. CHN provides well women exams to aid in the detection of early stage breast cancer and offers screening mammograms at their affiliate large public hospital as well as a mobile mammography van. CHN health center's clinicians, which can include a Nurse Practitioner (NP) (with a background in family, women's health, or adult), Physician Assistant (PA), or Medical Doctor (MD), perform patient histories, CBEs, and provide referrals for follow up when indicated. Although clinicians educate women about the importance of breast self-exams, breast awareness and breast cancer screening, the completion rates of screening mammograms are below national goals (OPA, 2015).

As a result, improvement of completion rates for screening mammography has been identified as a continuous quality improvement (CQI) project within the affiliate. Senior leaders within CHN have identified a goal of 75% annual screening mammography completion rate. The CHN serves multilingual, culturally diverse, and low-income patient populations. Clearly, a multifaceted program needed to be developed to optimize screening outcomes.

As an identified CQI by the CQO, the project had been the main focus of the BigAIMS committee, which is a California Association of Public Hospitals (CAPH) sponsored statewide initiative focused on breast cancer screenings for uninsured and underinsured women between the ages of 50 and 74. This author's role along with the committee was to determine which strategy was most successful by doing clinic site visits with the clinic(s) that demonstrated best

practices. The goal was to increase the regional screening mammography mobile van completion rate to 75% by stressing the importance of breast cancer screening and finding an intervention to decrease the no show rates. Review of the data on i2i had been discussed with the CQO, who had approved completing the project within one of the community health centers with the highest no show rates and lowest screening mammography completion rates at the mobile mammography van. Discussion of the proposed intervention was supported by the executive leadership and BigAIMs committee.

Discussion of Problem or Opportunity

Compared to CA, OPA HMO and PPO lowest screening mammography rates of 71% and 66% respectively, CHN's rate at 72% as an affiliate is comparable (OPA, 2015c; OPA, 2015d). As of April 30, 2015, three health centers had the lowest screening mammography completion rates at the mobile mammography van of 37%, 49%, and 66%. The following month, rates were 37%, 52%, and 66%. The author was unaware if anything was done differently with outreach or in-reach, which caused the change in numbers. Two of the health centers numbers remained the same whereas the other one increased by 3%. The current mammogram appointment scheduling process as of April 24, 2015 showed a very complex and confusing workflow. The entities involved: information technology department (IT), the patient, clinic front office staff, medical evaluations assistant (MEA) also known as medical assistant, and provider: 1) IT generated the letter indicating that the patient was due for her screening mammogram; 2) The patient received the letter and called the clinic; 3) Front office staff received the call and transferred to the MEA/provider; 4) If the MEA was available, he/she reviewed the charts/notes – if patient had not been seen, she was scheduled for an exam; MEA submitted an eReferral; 5) provider sees patient to perform clinical breast exam and discusses the importance of screening mammogram.

The appointment was made with the patient or was blind scheduled and a letter was sent with appointment date and time. After internal review of the current screening mammography referral process there was definitely an opportunity for improvement, such as having a better follow up system.

Intended Improvement

AIM statement

The initial aim of this QI project was to demonstrate incremental improvements in mammography completion rates with the mobile mammography van by December 2015, help create a mammography toolkit, and present the findings to CHN.

Objectives

- To understand patient barriers of those who did not keep their screening mammogram appointment with the mobile mammography van
- To understand what process(es) are working in the health centers with high mammography completion rates compared to the other affiliated health centers
- To understand where in the screening mammography referral process there is a need for improvement
- To provide relevant education and resources in a toolkit for CHN's local primary care health centers

Review of Evidence

Evidence based literature on strategies to improve screening mammogram compliance rates was found through searches of the CINAHL and Science Direct databases, using the following keywords and phrases: screening mammogram reminders, screening mammogram interventions, improve breast cancer screening, reminders, screening mammograms, breast

cancer awareness, and breast cancer screening. The inclusion criterion were identification of breast cancer awareness and interventions to improve breast cancer screening or adherence to screening mammograms. Another criteria was that the study had to be published within the past six years. The purpose of this literature review was to explore effective strategies that improved patient adherence to their screening mammograms using Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Research Evidence Appraisal tool (Appendix A). The highest level of evidence is level one, which is an experimental study (randomized control trial or RCT) or a meta-analysis of RCTs. Next, is level two, which is a quasi-experimental study, followed by level three, which can be a non-experimental study, qualitative study, or meta synthesis. Once the strength of evidence is established, it was further broken down into rating its quality of scientific evidence A, B, C with A being the highest and C being the lowest. High quality means there is consistent recommendation based on extensive literature review compared to low quality, which was little evidence with inconsistent results, inadequate sample size, and no solid conclusion

An extensive review of recent literature demonstrated that knowledge about breast cancer, screening mammogram processes, access to care, and cultural beliefs play an important role in women completing their screening mammograms (Anakwenze, 2015; Kim, 2010; von Friederichs-Fitzwater, 2010). Therefore, effective interventions should include patient education such as an informational powerpoint or DVD, educational handouts and brochures, navigator programs, and telephone and/or text reminders.

Educational intervention. In a cross-sectional study with a pre-test and post-test conducted by Anakwenze and colleagues (2015), women's attitudes were initially evaluated towards their knowledge on risk factors and breast cancer. They utilized the transtheoretical

model (TTM) and the health belief model (HBM) as a framework for their educational intervention. Women watched a powerpoint presentation, which covered information on “breast cancer etiology, symptoms, and protective factors.”(Anakwenze, Coronado-Interis, Aung, & Jolly, 2015, p 579). Upon completion of the presentation, the women were given a post-test and provided information on low cost screening mammograms services offered by the Jamaica Cancer Society” (Anakwenze et al., 2015). The study found significant increases in women’s awareness of breast cancer and knowledge of screening tests, from 60.5 to 94.6% and 57.8 to 89.9% respectively on post-test. This increased knowledge resulted in one fifth of the women obtaining their screening mammogram. This study was classified as a level two, good quality per JHNEBP research appraisal criteria.

Others, such as von Friederichs-Fitzwater and colleagues (2010) conducted a pilot study on a sample of 160 American Indian/Alaskan Native (AI/AN) women and used the Knowledge, Attitudes, and Beliefs (KAB) multiple-choice survey in pre- and post-test design. After the post-test, women watched an informational DVD covering general information about the breast, “breast self exams, mammogram screening, breast cancer myths, and stories shared by AI/AN breast cancer survivors” (von Friederichs-Fitzwater, Navarro, & Taylor, 2010, p. 583). The study found significant increases in women’s knowledge about breast health and risk factors post intervention, from 36 to 95% ($p < 0.0001$). In addition, McNemar’s test was utilized to evaluate whether women changed their mind to get a screening mammogram after viewing the DVD. It also revealed a significant increase that women were more likely to get a screening mammogram ($p < 0.0001$). The study also demonstrated that women who were more educated about breast health and importance of obtaining a screening mammogram were more than likely to get a screening mammogram. After a follow up telephone survey a year later, those 118 women who

intended to get a screening mammogram, 95% actually got one done. In addition, 80% of those women who stated they didn't intend to get a screening mammogram actually received one. This study was classified as a level two, good quality per JHNEBP research appraisal criteria.

In a post-test only control group study, low-income Hispanic women were randomized into an intervention and control group (Deavenport, Modeste, Marshak, & Neish, 2011). The intervention included an educational mammogram video *Quality Mammography Can Save Your Life*, written handouts and a brochure "Is It Time for Your Yearly Mammogram?" based on HBM available from the ACS. Results demonstrated low-income women in the intervention group had greater perceived benefits, $F(1, 208) = 3.10; p < .01$, a greater net score of perceived benefits minus perceived barriers, $F(1, 208) = 5.25; p < .05$, and greater self-efficacy, $F(1, 208) = 10.32; p < .01$, and greater intentions to obtain mammograms, $F(1, 208) = 32.37; p < .001$ (Deavenport et al., 2011). After conducting two multivariate linear regression analyses (MLR), "when the intervention and HBM variables were entered in the second block, receiving the intervention ($p < .001$), having greater perceived benefits ($p < .01$), lower perceived barriers ($p < .01$), a greater net score of perceived benefits minus barriers to screening ($p < .001$), and greater self-efficacy ($p < .001$) significantly and independently predicted intention to obtain a mammogram" (Deavenport et al., 2011, p. 458). Overall, providing educational information either in video or written format were effective interventions in encouraging women with their intent to obtain a screening mammogram and positively influenced their health beliefs. This study was classified as a level two, good quality per JHNEBP research appraisal criteria.

Another study utilized HBM as their theoretical framework and conducted a randomized controlled study (RCT) in Chinese American women (Wu & Lin, 2015). The study's intervention was an interactive telephone counseling session individually tailored based on the

assessment questionnaire. On the other hand, the control group received an informational brochure on mammography and breast health developed by the NCI. Evaluation of the individually tailored telephone calls demonstrated that most participants felt the material was appropriate (93%), relevant (85-93%), comprehensive in including different aspects of breast cancer (92-98%), beneficial (94-98%), and clear (91%) (Wu & Lin, 2015). In addition, 86% stated that they learned new mammography screening information from the call. Mammography utilization at the 4-month follow up interview demonstrated 40% of the women (n = 34) in the intervention group went to obtain mammograms whereas 33% of the women in the control. Although there was an increase in screening mammography adherence in the intervention group, the authors recognized their study's limitation, which is that it utilized self-reports instead of chart review for verification of screening result. Regardless, the study demonstrated an appropriate intervention that helped encourage and empower Chinese American women to adhere to the screening mammogram recommendation. This study was classified as a level one, high quality per JHNEBP research appraisal criteria.

In another study on Chinese American women done by Lee-Lin and colleagues, a targeted educational intervention was utilized based on both the HBM and TTM theoretical frameworks (Lee-Lin, Menon, Leo, & Pedhiwala, 2013). The design was a pre- and post-test quasi-experimental on foreign-born Chinese American women. A baseline survey was administered and again 12 weeks post-intervention. The baseline survey measured "breast cancer knowledge, practices, perceived susceptibility, benefits, barriers, and cultural beliefs" (Lee-Lin et al., 2013, p. 363). Women attended an hour long targeted breast health education intervention program (TBHEP). Later, women were contacted by trained staff who conducted telephone counseling to help women overcome perceived barriers such as cost, fear or concern about the

procedure, etc. Results demonstrated 50% of the women completed their screening mammogram 12 weeks post-intervention. The study also found that the longer women resided in the US, their likelihood of adhering to the screening mammogram recommendation increased. Similar to the other studies utilizing educational intervention and removing barriers, Lee-Lin and colleagues (2013) demonstrated that a targeted program and culturally appropriate intervention may help promote screening mammogram completion rate. This study was classified as a level two, low quality per JHNEBP research appraisal criteria.

Lee-Lin and colleagues conducted a follow up RCT from their 2013 study (Lee-Lin, Nguyen, Pedhiwala, Diekmann, & Menon, 2015). Their aim was to test the feasibility of a targeted educational program on breast cancer screening in Chinese-American immigrant women 3- to 12-month post-intervention. Similar to the other study, the intervention group received the two-part TBHEP (group teaching with targeted messages and individual counseling sessions) while the control group received a NCI mammography screening brochure. HBM and TTM theoretical models were utilized. The study demonstrated a positive effect on mammogram adherence especially at 12-months post-intervention (71.4%). Although both groups demonstrated an increase in mammogram adherence, the intervention group was more statistically significant at 3-, 6-, 12-month post-intervention at 59.2%, 68.7%, and 71.4% respectively compared to the control group (18.3%, 26.8%, and 42.5%) ($p < 0.001$). This study was classified as a level two, high quality per JHNEBP research appraisal criteria.

Ma and colleagues (2011) completed a study to determine the impact of a workplace education on increasing screening mammogram compliance rate. The study consisted of “2-group quasi-experimental design with pre- and post-intervention assessments and 6-month follow up on mammogram screening” (Ma et al., 2011, p. 361). The intervention group received

breast cancer education and screening navigator while the control group received general cancer education, but later received delayed intervention after completion of the study. The theoretical frameworks utilized were the HBM and Social Cognitive Theory (SCT). At 6-months post-intervention, there was a statistically significant increase in screening mammogram completion rate from 10.3% at baseline to 72.6% ($P < 0.001$). It was important to address the fact that education and access had a great impact on women's adherence to completing their screening mammogram as demonstrated in this study. This study was classified as a level two, good quality per JHNEBP research appraisal criteria.

Navigator programs. Burhansstipanov and colleagues (2010) conducted a study utilizing a navigator program including face-to-face and telephone interventions on medically underserved women (African Americans, Latinas, Native Americans, and poor White women) who had not received their yearly screening mammogram after 18 months. "The intervention included culturally appropriate education and one-on-one assistance scheduling a mammogram and clinical breast exam" (Burhansstipanov et al., 2010, p. 249). Results demonstrated significant associations with rescreening among all ethnic groups who received the intervention ($p < 0.05$). Interestingly, the study found that women who were not recommended by their provider to get a screening mammogram but received the intervention actually got their screening mammogram; therefore, demonstrating that education was vital and may help support women in obtaining their screening without their provider recommendation. Although not to discount those providers who recommended their patients, of the 61% who received recommendation for screening mammogram, 52% did get a repeat mammogram. This study was classified as a level three, low quality per JHNEBP research appraisal criteria.

Another effective strategy suggested by Percac-Lima and colleagues (2012) in improving compliance of screening mammogram was the use of a navigator system, which was culturally tailored designed to help overcome barriers in Bosnian refugees and immigrants. The patient navigator was a bi-lingual female who received extensive training on breast cancer prevention, treatment, and patient navigation. She conducted telephone calls and explored patients' specific barriers and assisted in making their screening mammogram appointment. In addition, she made home visits and conducted community educational meetings. The individually tailored intervention included scheduling appointments, reminder calls, arranging transportation, handling or helping with insurance and cost issues, and accompanying women to their appointment if they felt uncomfortable going alone (Percac-Lima, Milosavljevic, Oo, Marabel, & Bond, 2012). Utilization of a patient navigator demonstrated an increase from 40 to 61 women being up to date with their screening mammogram. The limitation addressed in the study was the use of one patient navigator and targeted refugees from one country, which cannot be generalized. Regardless, use of a patient navigator demonstrated a positive effect in women complying with their screening mammogram. This study was classified as a level three, good quality per JHNEBP research appraisal criteria.

Reminder system. Goelen and colleagues (2010) performed an individual level randomized trial on women 50 to 69 years of age who had not had a mammogram in four semirural communities in Belgium. The control group received a reminder letter of their pending screening mammogram with an information brochure; whereas the intervention group received usual care in addition to a telephone reminder. Volunteers were utilized to conduct the intervention. Two sites (A & B) used a local radiology center while the remaining two (C & D) used mobile mammography unit. Although site A had the highest screening mammography

completion rate, there was no difference between the control and intervention group, 31% and 32% respectively. On the other hand, sites B, C, D overall had a 4-5% difference between the intervention and control, 22% compared to 18%, with a relative risk of 1.22 (Goelen, De Clerq, & Hanssens, 2010). This study was classified as a level one, high quality per JHNEBP research appraisal criteria.

Similar to telephone reminder calls, Lakkis and colleagues (2011) conducted a RCT on two types of short message service (SMS-text) as a reminder for obtaining a screening mammogram. The study included females between 40 and 75 years of age under the Health Insurance Plan at the American University of Beirut. There were two groups, group A received a general SMS-text reminding them of their pending screening mammogram, while group B received an additional informative SMS-text about the benefits of getting a screening mammogram aside from the reminder that they are due for one. At 6 month post-intervention, 30.7% completed one in group A, whereas group B 31.6% completed one (Chi-square test, $p\text{-value} \geq 0.05$). Although the difference was not statistically significant, there was still a slight increase in the second group, which warranted additional studies to support its effectiveness. This study was classified as a level one, low quality per JHNEBP research appraisal criteria.

Vidal and colleagues (2014) also studied the effectiveness of the use of text-message reminders to improve screening mammogram compliance. A quasi-experimental study was used on women 50 to 69 years of age in Catalonia, Spain. All women received a reminder letter for their upcoming screening mammogram. Those who registered their cell phone in the population-based database from the National Health Service also received a SMS-text 3 days prior to their appointment as a reminder. As a result, 74% completed their screening mammogram compared to the 65% who only received the letter. The study showed that women who received text

messaging were more likely to get their screening mammogram where mail was inaccessible. In addition, it demonstrated that text messaging was cost effective especially in areas that are difficult to reach such as rural and newly developed suburbs. This study was classified as a level two, high quality per JHNEBP research appraisal criteria.

Toolkit. Tyson, Burton, and McGovern (2015) evaluated the impact of a toolkit on the use of measurement tools in stroke rehabilitation. According to Tyson, Burton, and McGovern (2015), it was recommended to use measurement tools in assessing a patient with a stroke during rehabilitation. Data was taken before and after implementation of the toolkit of the use of the standardized measures and used staff interviews. They found that implementing a toolkit with standardized measures helped staff appropriately identify problems, monitor patient progress effectively, make timely decisions, communicate and promote inter-team relationships. Therefore, improving quality of care. This study was classified as a level two, high quality per JHNEBP research appraisal criteria.

Spruce and Sanford (2010) focused their study on increasing colorectal cancer screening (CRC) and based it on the Nevada Colon Cancer Partnership (NCCP) toolkit in helping providers implement interventions in their setting. The toolkit, which was available online, helped providers utilize CRC recommendations with their patients in order to increase patient compliance. Also, it demonstrated the new model of care, which was multifaceted, patient centered, and incorporated active staff involvement alongside the clinician. Therefore, a discussion of cancer screening was more than likely to happen and not solely placed as the clinician's responsibility. A survey was provided to 106 clinicians that included nurse practitioners, physician assistants and physicians with a response rate of 28%. Questions included were: How satisfied are you with the overall usefulness of the toolkit?; How satisfied

are you with the educational content of the toolkit?; How satisfied are you that the information is presented clearly?; How satisfied are you with the office strategies to improve CRC screening rates in your practice?; How satisfied are you with the algorithms, updated information, and tools provided?; How likely are you to utilize some of these recommendations in practice?; How likely are you to share this resource with other providers?; After this presentation, will you change office policy and implement new roles to increase recommendations for CRC screening?; How likely are you to change from FOBT to FIT?; How likely are you to recommend a colonoscopy based on new knowledge of preps?; After seeing this toolkit presentation, how likely are you to increase colon cancer screening in your practice? (Spruce & Sanford, 2010). The results demonstrated that clinicians would use the recommendations in their practice and felt that toolkit was useful in making the change. This study was classified as a level two, good quality per JHNEBP research appraisal criteria.

Discussion of literature review. Overall, this review suggested that there are various ways to empower women to stay compliant with their screening mammogram, whether it was via educational interventions such as powerpoint presentations, using a navigator system, or a reminder system. Also, implementing a toolkit to the practice can get all staff involved, create standardized workflows, and ultimately provide optimal patient care. According to Sebatino and colleagues (2012), one-on-one education, client reminders, and reducing structural barriers demonstrated strong evidence in increasing screening mammography completion rates. One-on-one education was provided by health care workers or lay workers providing information either in person or via telephone about “indications for, benefits of, and ways to overcome barriers to screening with the goal of informing, encouraging, and motivating people to seek recommended screening” (Sebatino et al., 2012, p. 103). In low-income women, one-on-one education

demonstrated an increase of 10.4 percentage points (Community Preventative Tasks Force [CPSTF], 2010a). As previously mentioned, client reminders are another effective intervention, which was done by mailing a reminder letter or post card or providing a personal telephone call advising the patient about their pending screening test. According to the Community Preventive Services Task Force (CPSTF) (2010b), client reminders demonstrated a median increase of 14.0 percentage points while enhanced and telephone reminders demonstrated a larger increase of 29 percentage points versus written reminders alone (4.5 percentage points). Another effective intervention was reducing structural barriers, which addresses spatial, timing, and administrative obstacles (Sebatino et al., 2012). These interventions included adjusting service hours to meet client needs, offering mobile vans, and providing scheduling and translation services. Incorporating these modifications, mammogram completion rates increased 18 percentage points (CPSTF, 2010c). In addition, the use of a toolkit with practice recommendations would help provide a systemic way to approach cancer screening and assist clinicians to ensure patients are receiving appropriate cancer screening services, follow up, and necessary tests and/or procedures (Spruce & Sanford, 2010).

Implications for Nursing Practice. Nurse practitioners provide high quality and compassionate health care services to a diverse population, across the life span, and are the forefront of primary care. According to the American Academy of Nurse Practitioners (AANP) Standards of Practice for Nurse Practitioners (2013), the process of care includes development of a treatment plan with one of the care priorities of promoting optimal health. Jones, Katapodi, and Lockhart (2015) believed nurse practitioners play a significant role in empowering their patients to adhere to screening mammography recommendations through their advanced knowledge and practice skills. As breast cancer risks increases with age, it is important that nurse practitioners

educate their patients about their risks to be able to make informed decisions. In addition, nurse practitioners should develop a plan that is realistic for the patient; therefore, she or he can be compliant with getting the necessary services. When nurse practitioners are able to build rapport with their patients, help break down their barriers, it will not only encourage their patients to get their screening mammogram, but also empower them into taking control of their health. In a cross-sectional study done by Nuno and colleagues (2011), women who were recommended by their provider to get their breast and cervical cancer screening were more likely to adhere to their screening mammogram within 1 year and a pap smear within 3 years (OR 4.9, 95% CI 3.0-7.9 and OR 8.2, 95% CI 4.3-15.7).

Conceptual Framework

The conceptual framework, which was applied in this QI project, was Ronald Lippitt's change theory. According to Mitchell (2013), Lippitt associates the process of change in seven steps:

- 1) Diagnose the problem
- 2) Assess motivation and capacity for change
- 3) Assess change agent's motivation and resources
- 4) Select progressive change objective
- 5) Choose appropriate role of the change agent
- 6) Maintain change
- 7) Terminate the helping relationship

Lippitt's change theory provided the necessary steps beginning with identifying the problem, which was the high no show rates and low screening mammography completion rates within CHN, and the factors involved in order to be able to select the best change agent to create a

positive impact. For example, step two allowed discussion/evaluation of the current screening mammography referral process. For step three, prioritization was discussed with the CQO and step four roles/responsibilities was designated to allow implementation of change. Then, step five discussed and handled any conflicts, questions, and clarifications from employees about the change. While step six provided continuous communication about the progress, any updates and provided feedback. Lastly, step seven introduced the successful change and was formally adopted within the network with the intention of ongoing education provided to all staff members. By utilizing Lippitt's change theory in the QI project and introducing incremental interventions, positive outcomes were expected through individualized action plans by patients, clinicians, and imaging centers (Appendix B).

Section III: Methods

Ethical Issues

This evidence-based change of practice quality improvement project was approved by the DNP committee of the University of San Francisco and deemed exempt from the Institutional Review for the protection of human subjects (IRB). The City and County of San Francisco Department of Public Health also granted approval for this project to be conducted. HIPAA was never breached and replies were provided anonymously from both health center staff and patients. Other participants included staff members from the chosen health center, which included medical evaluation assistants (MEAs), health workers (HWs), nursing staff, diagnostic imaging center staff, nurse managers from the CHN, and members present at BigAIMs committee meeting .

One of the ethical principles involved in this QI project was beneficence. According to American Nurses Association (ANA), it meant "compassion; taking positive action to help

others” (ANA, 2016, p. 1). The purpose of this QI project was to investigate what was causing the non-compliance of screening mammography. Therefore, it demonstrated beneficence since the goal was to help increase the mammography screening rates. Also, in helping create a toolkit, it was assisting others to see what was efficiently working at the best practice health centers; therefore, working towards standardizing practices to achieve continued increases of screening mammography completion rates.

Similar to beneficence was non-maleficence, which was avoidance of harm (ANA, 2016). By trying to investigate the root cause of non-compliance and encouraging providers and staff to educate their patients on the importance of breast cancer screening, they are trying decrease the risk of the patient getting diagnosed with breast cancer.

Another important ethical principle was fidelity. According to the ANA (2016), it involved advocacy and dedication to patients. As health care providers, it is important that they are looking out for the best interest of their patients. In this QI project, its main focus was to help achieve patient compliance and to continue advocating for their cancer screening tests, which could potentially save their life.

Lastly, this QI project exhibited the ethical principle of justice, since there was an equal distribution of resources to all the health centers regardless of whether or not they were one of the best practice health centers (ANA, 2016). The information and toolkit was shared amongst all, so that there is a standardized workflow to follow to help patients obtain the breast cancer screening needed.

Setting

Implementation of this QI project occurred at a primary care health center in San Francisco, serving the Castro Mission neighborhood. It is part of a larger community health

network serving almost 70,000 patients who are from low income and underserved communities (SFDPH, 2015). These primary care health centers are geared towards functioning as patient centered medical homes with the approach to care for the “whole person.” The health centers offer various services not limited to primary care provided by physicians and nurse practitioners, but also include clinical pharmacists, nutritionists, optometrists, social workers, etc. (SPDPH, 2015).

The health center was chosen as the pilot site since it was one of the top three health centers with the highest no show rates for screening mammograms via the mobile mammography van. As of January 2016, their screening mammography completion rate was 64.9% compared to their sister health center, which has a rate of 71.9%. A survey was completed in order to better understand the work processes of the screening mammogram referral process. Questions included: education given about mammograms, who provides the education, the comfort status of providing education and whether additional training was warranted, what they thought the reason(s) were for their low screening completion rate, and scheduling process (Appendix C). This author received support from the health center nurse manager and CQO.

There were a variety of positions that enabled this chosen health center to function. These included full and part-time clinicians (doctors and nurse practitioners), licensed and non-licensed nurses (registered nurses [RNs], licenses vocational nurses [LVNs], MEAs, HWs), eligibility workers (EW), behavior health workers (BH), and front office clerks. With the patient centered model, each provider has their own panel management team, which consists of a RN, MEA/HW, EW, and BH. This panel management team allowed patients to have consistency with their visits; therefore, allowed patients to recognize their team’s faces and built rapport for better care.

The CHN patient population break down during the fiscal year 2013-2014 in primary care includes: race – 18% African American, 33% Latino, 19% White and 25% Asian; gender – 47% males sought primary care services compared to 53% female; age – 18% age < 18, 6% age 18-24, 40% age 25-44, 12% age 65+ (SFDPH, 2015). Also, the payer sources for primary care services were: 54% Medi-Cal, 14% Medicare, 11% Healthy SF, 1% Private, 16% Other and 4% uninsured. This was important since CHN serves primarily low income and underserved communities and provides the necessary primary care services, with a 73% cumulative screening mammography completion rate.

Planning the intervention

Background. Initial baseline data was gathered using the i2i program, focusing on screening mammogram completion rates within eleven clinics of the CHN. Unfortunately, health center A has not been able to reach the CHN goal of 75% completion rate in the past year, but also had one of the highest non-completion rates of screening mammograms with the mobile mammography van. Initially, the goal of this project was to demonstrate an incremental increase of completed screening mammograms within the chosen health center (health center A), but later focused on the mobile mammography van since the service was under utilized monthly and there was a time restraint. As a result, this author consulted with her DNP committee chair, CHN's CQO, and health center A's nurse manager to focus on the mobile mammography van completion rates.

Intervention. After the decision was made to focus on the mobile mammography van and was approved by all parties, this author performed site visits at the top three performing health centers with best practices (health centers B, C, and D). In addition, a site visit was also completed at a sister organization (health center E) that was in a similar situation, but had since

increased their screening mammography completion rates using text messaging as a reminder. After presenting the findings from the site visits to the CQO, it was decided to create workflows, which demonstrated the referral process from the best practice health centers.

Initially the goal was to understand what these high performing health centers were doing to accomplish high completion screening mammography rates. In addition, this author attended health center A's staff meeting to get a better understanding of their mammogram referral process and determine what they thought was the cause of lower than expected screening mammogram compliance rate. As a way to assist in assessing the current state, this author developed a telephone script to help MEAs/HWs conduct their outreach calls to further investigate why their patients were not adhering to their recommended screening mammogram and then offering to reschedule. The author also used this telephone script when reaching out to the patients who didn't attend their screening mammogram appointment with the mobile mammography van. In the midst of planning and implementing the intervention, the author was able to help recreate a toolkit, which is currently in the process of being distributed to the clinics of CHN. As part of the work to increase consistency across all sites a draft mammography toolkit was in the early stages of development but the individual who put it together left the organization. This author obtained access and approval to improve and evaluate the usefulness of the toolkit. After the initial revision was done, the author met with her DNP advisor for guidance and edited the toolkit to make it more user friendly and presentable. Once the author completed editing the toolkit, it was presented to health center A's nurse manager and CQO for feedback. Then, the author collaborated with another member of the BigAIMs committee and further edited the toolkit to present to the larger committee for feedback. Currently, the toolkit is undergoing its final revisions and will be presented to the nurse manager's meeting in May for

feedback and approval with the intention of dissemination and utilization by all the primary care clinics. This author has been assured that the toolkit is of value to the organization and that the delays that have occurred are no indication of the lack of value it will add but more due to the processes of the organization.

Objectives. The initial project plan focused on the mobile mammography van no show rate was discussed with some of the members of the DNP committee and CHN's CQO prior to implementation. The information on the in-reach and outreach screening mammogram referral processes gathered from the site visits and survey was shared with the BigAIMs committee to be analyzed to determine barriers, success factors, and opportunities for improvement. It helped better understand patient barriers of those who did not adhere to their screening mammogram appointment with the mobile mammography van, understand what process (es) were working in the health centers with high mammography completion rates compared to the other affiliated health centers, understand where in the screening mammography referral process there was a need for improvement, and provide relevant education and resources in a toolkit for CHN's local primary care health centers.

The findings also revealed variation among clinics and/or providers and the presence or absence of standardized processes. A standardized work flow sheet was developed in addition to relevant education and resources in a toolkit. Performance improvement tools such as the Gap analysis and others were utilized to optimize adherence to the new work flow and intervention. Evaluation of the intervention and toolkit was partially assessed by process acceptance by learners (providers, MEAs/HWs) along with increased compliance rates of completed mammograms by patients. Unfortunately, not enough patients were reached to a strong conclusion on the effectiveness of the intervention nor was there enough feedback received from

learners about the toolkit despite multiple attempts. Due to challenges out of the control of the author to be able to attend health center's meeting to present the toolkit and get feedback. On the other hand, the author is scheduled to attend the diagnostic imaging center's team meeting and the nurse manager meeting to present the toolkit and gather more feedback. The aim was to provide a streamlined process, which will in turn increase completion rates of patients getting their screening mammograms.

Site visits. This author first completed three site visits within the CHN to gain a better understanding of the screening mammography process at the health centers known to have the best practices, which have at least 75% screening mammogram completion rate. During these site visits, the author either met with one of the panel management team members at health centers B and C and the interim nurse manager at health center D. Out of the three health centers visited, health center D did not offer the mobile mammography van service since their health center was on the same campus as the diagnostic imaging center. Each health center conducted huddles either in the morning, afternoon, and evening to touch base with their panel management team and go over what screenings or lab work their patients were due prior to being seen by their provider.

Mobile mammography van questionnaire. The author attended one of health center A's staff meeting, which included RNs, MEAs, HWs, front office clerks, and behavior health workers to introduce herself and her role prior to conducting any outreach calls. During this meeting, a questionnaire addressing mammograms, education given, potential barriers, etc. was distributed and collected (Appendix C). Staff was able to express their concerns on what their health center was lacking (Appendix D).

Telephone script. The author also created a telephone script to help health center A's perform outreach calls as well as to use herself during her outreach calls (Appendix E). It included: an introduction, what to say if the patient was unavailable or if someone else answered the phone, a script when performing outreach calls to offer screening mammogram appointment and calling about a missed appointment. In addition, potential replies to possible patient answers was created along with the telephone script to help those making outreach calls to be knowledgeable on how to reply to certain patient responses (Appendix F). Since the health center was in a constant staffing shortage, the nurse manager was found working on the floor doing patient care instead of completing her administrative duties. In addition, it caused minimal protected time for MEAs/HWs to perform their own outreach calls. As a result, to help alleviate the stress, the author was the primary person doing the outreach calls with the patients who did not adhere to their screening mammography appointment with the mobile mammography van.

Toolkit. An early version of a toolkit was first presented during one of the BigAIMs committee meetings, which was started by one of the members of the BigAIMs who is no longer with the department. It comprised a lot of useful information such as removing patients from the active patient list, resulting out-of-network mammograms results, the referral processes with the diagnostic imaging center, etc. However, this early version was still in a rough draft form and was only presented and not properly implemented within the system. It was also noted that the documents were inconsistent and did not represent the current workflow as was discovered during the site visits at health centers B and C. Therefore, workflow and process maps were created to help with standardization of the workflow and understanding of roles. As a result, the author helped create the outreach and in-reach screening mammography referral workflow/processes along with improving the information previously developed in the toolkit.

The workflows would allow staff members have a clearer understanding of their responsibilities in the referral process and act as a guide when doing either in-reach or outreach referrals. Once the workflows were created the author also created a narrative portion for those who prefer reading step-by-step instructions versus looking at a process map. Both workflows and process maps, were reviewed by the CQO for approval. The process map was then created using a different program, Visio, by another BigAIMs committee member who was helping the author. In addition, the author communicated with the lead radiation technologist at the diagnostic imaging center to ensure the information was up to date and correct and if not, edited the necessary information. Once the author completed her version of the toolkit, it was sent to the other committee member to review and add the other necessary components from the initial mammography toolkit. There was constant communication with that particular member and the author to ensure all information was up to date. After the author and the other committee member completed the draft of the mammography toolkit, it was emailed to the BigAIMS committee for review and was part of the agenda at the next BigAIMs meeting. During this meeting, the author and the other committee member briefly went over the toolkit and provided time for feedback from those who were present. Since one of the committee members was not present during the meeting, she emailed her feedback, which was also discussed during the meeting. After feedback was provided to the author and the other creator of the toolkit, information was taken into account and later included in the toolkit as necessary. Once all information was edited according to the feedback provided, the toolkit was finalized with the other member to be presented to one of the future nurse managers meeting. The toolkit will also be presented to the diagnostic imaging center staff at one other their staff meetings in the future. After presentations have been made and feedback provided, it will be finalized with the intent to

disseminate to all the primary care health centers of CHN and possibly include as a learning tool at the MEA/HW orientation.

Staff involvement. There were a few individuals involved in planning the intervention. The CQO provided encouragement as well as provided continued support of this project. Health center A's nurse manager gave approval to conduct the intended intervention at her center and made her services available. The main constraint of this project was time and availability of staff to assist in performing the intervention. Since health center A had continuous short staffing issues, there wasn't any protected time for the author to teach MEAs/HWs how to perform outreach calls. In addition, the main breast cancer screening HW was out on leave; therefore, the author did not have a point of contact person and didn't know how she performed the outreach and in-reach processes. In addition, when the author needed help gaining information about patients in EHR, if the nurse manager was on the floor, the author couldn't perform the outreach calls until the next week she was available.

Since the author was not an employee or affiliated with CHN, it was difficult to connect with certain staff members especially from other health centers to get more information about their processes. Utilization of email was the primary source of communication for the author and sometimes the emails were not addressed in a timely manner. Therefore, the project would have periods of no movement until communication was achieved. Overall, the author was able to connect with the important staff members to get the information needed to be included in the toolkit, even though the intervention of calling patients who did not adhere to their screening mammography recommendation wasn't as successful as initially planned.

Expenses. A majority of the interventions was performed during normal business hours; therefore, there was minimal effect on productivity. The informational meeting was held during

the normal monthly staff meeting; therefore, staff productivity was not disrupted. In addition, the author was present at the health center on a weekly basis as schedules permitted to assist in the intervention. Majority of the data collection was done during the author's time, but based on the hourly compensation of a nurse practitioner employed by the organization ranging from \$68-\$98, it was an estimated \$6,800-\$9,800 total for the time put into the project.

According to the lead radiation technologist of the diagnostic imaging center, the cost of a person not attending their screening mammogram with the mobile mammography van was approximately \$900. Considering that the cost of the patient not attending their screening mammogram appointment was close to \$1,000. The average estimated cost of breast cancer treatment based on tumor stage and type allowed by the insurance company after diagnosis ranges from \$60,000 to \$134,0000 (Blumen, Fitch, & Polkus, 2016). In addition, according to Blumen and colleagues (2016), the average costs allowed per patient in the 24 months after index diagnosis ranged from \$72,000 to \$183,000 (Appendix G). Most recently in December, at one site, five patients did not adhere to their screening mammogram referral, which was a loss of approximately \$5000 revenue to the mobile mammography van. If the processes were followed as outlined in the toolkit, the avoidance of these missed appointments could pay for the program in just a couple of months utilizing one site and there are multiple sites. In the worst case scenario, if one of the patients who wasn't screened as indicated unfortunately ended being diagnosed in the long run with breast cancer stage I/II, the patient's insurance would be responsible with an estimated cost of \$82,000 for treatment. In comparison, if outreach calls were being made by either a NP, MEA, or HW, the cost would significantly be less. A straightforward outreach call doesn't take any longer than 15 minutes; therefore, if a MEA/HW who gets paid an estimated \$20-30 hour, performed the call it would only be \$5-\$7.50 a call.

Based on the high costs of treatment, it is critical that health care providers encourage and enforce the need of a lifesaving screening.

Since majority of CHN patients are from low income underserved communities, it is critical that health care providers encourage their patients to adhere to their screening mammogram to reduce the risk of breast cancer and its financial burden. Although screening mammograms are not 100% false proof, it is ethically implicated for advanced practice nurses and other health care providers to practice beneficence and non-maleficence.

Communication matrix. There was continuous communication between the author and the DNP committee chair, to ensure deliverables were met. Regular scheduled advising sessions were performed to assess progress, provide feedback, direction, and constructive criticism during the course of the project. These meetings were conducted either in person, over the phone, or virtual communication via ZOOM or email. More frequent meetings were conducted if it was necessitated. Status updates were communicated to the committee chair, especially any changes or unforeseen barriers/setbacks due to the affiliate's Executive Leadership or operational constraints.

The author also had continuous communication with one of the committee members, Dr. Cathy Coleman, who is a subject matter expert in breast cancer and a volunteer with the diagnostic imaging center that is affiliated with the project. Feedback, direction, and constructive feedback were provided throughout the project timeline via phone, in person, or virtual communication. Deliverables were first submitted to the Committee Chair for approval. After any suggestions were made and changed by the author, it was then submitted to the other committee members for approval.

The author also provided continuous status updates to the CQO and regularly attended the BigAIMs meetings. The toolkit was reviewed by the CQO and one of the other members of the BigAIMs; therefore, constant communication was conducting to ensure all the information needed in the toolkit was included (Appendix H). As previously mentioned, there were some communication and other types of challenges the author encountered since she wasn't an employee.

Implementation of the Project

The site visits to the health centers with best practice began in May and ended in July 2015. At health center B, the author observed how the MEA performed their mammogram outreach process and maneuvering through their complex EHR. She demonstrated how the reports were run and specifically by provider indicating which patients did not have a screening mammogram in the past 24 months documented in their chart. Prior to initiating any outreach call, she also reviewed the patient's chart to see if the patient had any other pending doctor's orders. Unfortunately, the MEA was not able to get a hold of any of her patients in her panel to perform an outreach call while the author was present. On the other hand, the MEA was still able to walk the author through the steps she performed during an outreach call. Once she was able to get a hold of the patient and offer an appointment, it was documented in the patient's EHR as a telephone encounter, an eReferral was placed, and screening mammogram ordered. If the patient requested the mobile mammography van, then the MEA had to physically write down the appointment in the designated mobile mammography van binder.

Similarly, the author observed health center C's mammogram outreach, where each MEA/HW is responsible for their own panel and performed outreach not only for mammograms,

but also if the patient was due for their cervical screening and/or colorectal screening. Their process was also similar to health center D's outreach.

During the site visits, the author noted similarities and differences in the screening mammogram processes. For example, one health center conducted their screening mammogram outreach calls, which consisted of only reminding patients of their pending screening service and offering to make an appointment. On the other hand, the other health center, would also remind the patient that she is due for other screenings such as cervical cancer screening and/or colorectal screening. It was also noted that on occasion when there was a staffing shortage, the mammogram outreach calls were not a priority since clinic duties were more important.

A site visit was also done with a sister organization (health center E) where the mobile mammography van was also offered. According to this organization, they had a very similar situation where patients were not compliant in obtaining their screening mammogram. As a result, they applied for a grant and used it towards an innovative text messaging reminder system, known as CareMessage, which has greatly improved their compliance rates. This organization also had AmeriCorps volunteers keeping track of patients who were offered screening mammograms and wanted to be enrolled in the text messaging initiative. Therefore, other staff members were able to focus on patient care and clinic duties. As of December 2015, their health center had the highest screening mammography completion rate with the mobile mammography van. Their health center demonstrated a completion rate of 73% compared to the four CHN health centers that offer mobile mammography van monthly.

Although text messaging seemed promising to pilot at health center A, after consulting with the CQO, it was deemed unrealistic given the author's timeline and financial constraints of the organization. According to the CQO, information technology would need to get involved and

there was already a health center that was piloting text messaging with currently no significant improvement of screening mammogram completion rates. In addition, consent of patients would have to be done over the phone and then the patient would need to come in to the health center to sign the form and get training on how to use their cell phone to be able to communicate via text messaging.

After conducting the site visits within CHN and the sister organization, this author conducted an informational meeting at health center A with the nursing staff and MEAs/HWs to obtain a better understanding of their role in the screening mammogram process and their thoughts on why they had a low screening mammography rate. A questionnaire was provided and completed then given to the author at the end of the meeting (Appendix C). Based on the replies from the questionnaire, the author gained a better understanding as to what could be causing the low completion rates of the screening mammography (Appendix D).

Planning the study of the intervention

The author was successful in conducting the site visits, attending health center A's staff meeting, creating a telephone script, and updating the mammography toolkit. The intervention developed by this author consisted of obtaining the list of patients who did not complete their screening mammogram with the mobile mammography van and reaching out to them to find out their barrier. Ideally, this author wanted to collaborate with one of the HWs who was the primary breast cancer screening person of the health center, but she was out on leave. Unfortunately, no one took over her duties and her return didn't have a specific date. Therefore, this author had to find other means to gain the information needed and a gap analysis was done (Appendix I).

The nurse manager connected the author with the operations manager, who was fairly new to her role and was also responsible in running the mobile mammography van. She

provided copies of the appointment lists beginning in August 2015, which her staff used to perform calls and eligibility checks. Unfortunately, it wasn't documented on the lists if these patients kept their appointment. This discovery demonstrated that health center A did not have a systematic way of keeping track of their patients who did not keep their appointments with the mobile mammography van; therefore, patients were missing out on a potentially life-saving screening service. After discussing with the operations manager at health center A their process, it was noted that patients who did not keep their appointment, their names were deleted from the list. In doing so, it wouldn't create a blank encounter, which would affect billing. When this author contacted the lead radiology technologist from the diagnostic center offering the mobile mammography van, it was found that they only kept track of the patients who showed up to their appointment the day of the mobile mammography van was at the health center. Unfortunately, the list was not kept or a copy given to the health center at the end of the day since it was assumed that the health center was keeping track of their patients.

Since the author did not have access to CHN's complex computer system, she collaborated with the nurse manager who wasn't always available. With the copies of the mobile mammogram appointment list given by the operations manager, the nurse manager looked into each patient's chart whether there was a screening mammogram result. Luckily, there were no more than 25 patients on any given month to be checked. Although, if the nurse manager was not available due to staffing issues or being on vacation, the list wouldn't be checked until the following week when she was available. Once the nurse manager was able to go through the list, she marked off the patients who had no screening mammogram result. There were at least one to four patients that were identified as not completing a screening mammogram on their designated appointment with the mobile mammography van. After careful review of the patients, it was

noted that some patients didn't fit the criteria CHN was following. There were a couple patients who weren't 50 years old and scheduled to have a screening mammogram. Since the author did not have EHR access, it was difficult to determine whether the patient was considered high risk or whether the patient requested it herself since there are conflicting recommendations for the initiation of screening mammogram. As a result, the author used the telephone script she created and attempted to reach out to the patients using the number that was on the list.

During the outreach calls, it was found that majority of the numbers did not work or were incorrect. The numbers were either disconnected, the person who answered said that no one by that name was around, the voice mail was not set up or full, or the voicemail greeting had a different name. When the author brought this up to the nurse manager, it was unfortunately a common trend; therefore, the author suggested to make sure that when the patient comes into the clinic their information be confirmed. Apparently, that was supposed to be done, but based on the calls it proved otherwise.

After the site visits were conducted and the findings were shared with the CQO, the author created workflows, which demonstrated the outreach and in-reach processes for the screening mammogram referral. A narrative was also created and later included in the mammography toolkit, which was introduced during one of the earlier BigAIMs meeting held in July. The toolkit was further reviewed and revised alongside with another BigAIMs committee member and discussed with the CQO. It was later presented to the BigAIMs committee for feedback before presenting to health center A, the diagnostic imaging center, and at the nurse manager's meeting.

A GANTT chart was created as a tool to better visualize the timeline of the proposed QI project (Appendix J). There was the project planning phase, which was mostly conducted during

the months of May through August; the implementation phase during the months between September and January; and the evaluation phase which took place beginning in February and beyond.

Methods of evaluation

Evaluative instruments. In order to better visualize the trend in completion rates of screening mammograms with the mobile mammography van, the lead radiation technologist provided the numbers in an excel spreadsheet (Appendix K). The mammography toolkit was also emailed to the BigAIMs committee prior to presentation at the meeting for feedback. In assessing the learners, a survey was created to evaluate the mammography toolkit based on a five-point Likert type scale, in which participants chose the corresponding answer based on their agreement to the statement. There was also a section where participants were able to write down what other improvements they wanted to see or suggestions for the toolkit (Appendix L). The following statements on the mammography toolkit evaluation were:

- I found the referral workflows easy to understand and follow.
- I would feel comfortable using the telephone script when performing outreach calls.
- I understand the mammogram referral process for Avon Breast Center and mobile mammography van.
- I found the mammogram FAQs and telephone script FAQs very useful.
- I would feel comfortable referring to the toolkit when doing in-reach and outreach mammogram screening referrals.
- Overall, I found this toolkit useful and helpful.
- Overall, I found this toolkit easy to understand and navigate through.

The first draft of the mammography toolkit was emailed to the main participants of the BigAIMs committee for review prior to the BigAIMs meeting. When the toolkit was presented at the BigAIMs meeting later that week, members provided constructive criticism and had some clarifying information. Overall, the toolkit was given positive reviews and the CQO suggested that it should be a part of the MEA/HW orientation.

Unfortunately, when the survey was emailed to the participants who attended the meeting and the core BigAIMs email list, only two completed the online survey. The author had sent out reminder emails and gave the participants a week to reply, with no luck. In addition, the author attempted to reach out to the health center A's nurse manager and operations manager to be able to present the toolkit and survey during one of the staff meetings. The brief presentation would cover the contents in the mammography toolkit, such as the in-reach and outreach mammogram referral processes, the telephone script, the mammogram frequently asked questions, the telephone script potential replies, and the talking points providers need to discuss with their patients. Although the nurse manager agreed to have the author present in April, she had to cancel last minute due to an important time sensitive training that had to be done. The author will attempt to present at health center A's May staff meeting pending the nurse manager's approval in addition to presenting during May's nurse manager meeting. On the other hand, the author attended the diagnostic imaging center's meeting and received feedback (Appendix M). Majority of the respondents strongly agreed or agreed to the usefulness of the toolkit. Once additional information is gathered, it will be sent to the committee prior to the project presentation.

Strengths, weakness, opportunities and threats analysis (SWOT)

Screening mammography completion rates. A SWOT analysis was conducted which identified strengths, weaknesses, opportunities and threats for the initial project work related to

screening mammography rates (Appendix N). Identified strengths were the enthusiasm of the author to help, positive relationships with health center A's nurse manager and operation manager and staff, positive relationship with CQO, support from the nurse manager and CQO to conduct the QI project, cost efficient, the monthly availability of the mobile mammography van to the health center, and the \$5 Safeway gift card incentive provided by the mobile mammography van. Opportunities to be considered is the possibility of conducting future workshops on how to conduct outreach calls, implementation of the toolkit to be a part of the MEA/HW orientation, and continued incentives for patients who adhere to their screening mammogram. Another opportunity was to have the mammography toolkit available to all primary care health centers of CHN with yearly or bi-yearly updates, which could lead to standardization of practices and sustainability.

On the other hand, the identified weaknesses were the lack of dedicated time for MEAs/HWs to perform outreach calls, lack of dedicated time for the author to perform a workshop how to conduct outreach calls, lack of accountability of staff, lack of knowledge of EW conducting calls, and lack of educational material in the patient rooms or educational material to be handed out. The main weakness was that no one assumed the duties of the primary HW who was responsible for the breast cancer screening. Threats were also assessed, which included lack of buy in from staff and providers, since this might add another task to their growing responsibilities. During one of the oral interviews, it was noted that some providers do not check their no show que if their patient attended their screening mammogram at the diagnostic imaging center; therefore, the patient missed out on a life-saving service.

Mammography Toolkit. A SWOT analysis was also used with the mammography toolkit project (Appendix O). Similar to the SWOT analysis of screening mammography rates, the

identified strengths were the enthusiasm of the author to help and the positive relationship with the CQO and BigAIMs committee, reduction of variability, time efficient, a great resource of information such as information on the most common replies to patients responses. Opportunities to be considered are the presentation of the toolkit during the MEA/HWs orientation with a pre- and post-assessment on their knowledge of mammograms and referral processes and having the toolkit available to all primary care health centers as a reference guide. In addition, it should be reviewed and edited as necessary for any changes or updates on a yearly or bi-yearly basis.

Besides strengths and opportunities, the weaknesses identified are lack of dedicated time to perform outreach calls, lack of dedicated time for author to present toolkit and get feedback, and lack of standardized workflows/processes. Alongside are threats which include lack of buy in from staff and providers since this might change their process that they are used to and ultimately the increase risk of patients diagnosed with breast cancer if the toolkit's reference isn't utilized properly.

Budgetary return on investment plan. According to the breast imaging lead radiology technologist, the cost of a missed appointment with the mobile mammography van is approximately \$900. Since one in eight women are diagnosed with breast cancer, it is the health center's clinicians and other health care members' responsibility to ensure that their patients get the potentially life-saving screening service they qualify for and need. In a study done by Blumen, Fitch, and Polkus (2016), the treatment costs for breast cancer by tumor stage and type of service ranged from \$61,000 to 183,000 (Appendix G). As shown in Appendix P, the cost of development of the toolkit ranged from \$7,000 - \$10,000, which included the cost of the author's and others' time in creating the toolkit, presenting it to the health center and the cost of training the MEAs/HWs. In addition, the cost of outreach calls per year ranges from \$2,000-\$3,500. Also,

it demonstrates the cost of one no show and the estimated cost of treatment based on the stage of cancer, which ranges between \$7,000-\$135,000.

If the health center is successful in filling all the appointment slots available with the mobile mammography van, the cost avoidance could be significant considering each missed exam costs the tech time and the loss of revenue of approximately \$1,000. If on average there are five missed appointments each month during the year, it would approximately cost \$54,000. Then, if one of those missed appointments unfortunately became a cancer diagnosis, it would cost an additional average \$6,100-\$135,000 depending on the stage and tumor. For the year, it could potentially cost \$60,100-\$189,000. The potential return on investment if MEAs/HWs are performing outreach calls is \$51,121-\$175,573 (Appendix P). Overtime, if the processes are followed in the toolkit, the no show rate should start to decrease and eventually pay for the program as well as continue to save lives. After implementation of the toolkit, the only costs that would incur is the training of the MEAs/HWs, which will hopefully be performed during new hire orientation and the MEAs/HWs performing the outreach calls. As a result, yearly it would cost approximately \$2,100-\$3,700. Based on those numbers, the potential return of investment will be \$58,010-\$185,295. Any improvement in patient compliance with screening mammograms is an accomplishment and would lead to delivering optimal patient care through education, empowerment, and ensuring patients are offered life saving screening services and assisted in making appointments at their convenience.

Analysis

This quality improvement project consisted of both qualitative and quantitative aspects. During the planning phase, the author conducted oral interviews with different staff members with various roles at different health centers. In doing so, the author was able to understand the

workflows of the best practice health centers and discover what was resulting in their patients' compliance. In addition, the author was able to understand the dynamics of the diagnostic imaging center when dealing with eReferrals for mammogram screenings at the facility as well as the mobile mammography van. Qualitative analysis was also completed when the author was able to reach out to the limited number of patients who didn't attend their mobile mammography van screening mammogram appointment. Results demonstrated that the majority of numbers attached to the patients were either wrong numbers, disconnected, or voicemails were full or not set up. Patients who were reached demonstrated that they did not adhere to their recommended screening mammogram due to having different insurance and fear of the mammogram procedure. In addition, the author was able to get qualitative feedback after presentation of the mammography toolkit.

The author also took into consideration the data collected presented at the BigAIMs meeting demonstrating the screening mammogram completion rates within each primary care health center within CHN. In addition, the author studied the show rates of patients utilizing the mobile mammography van. Some variability existed in the mobile mammography van show rates, since the appointment lists are constantly changing with patients rescheduling, canceling, or the patient was scheduled for the wrong imaging test. For example, if the patient was scheduled for a screening mammogram, but needed a diagnostic imaging, her name could still remain on the list and become a no show at her screening mammogram appointment. In conjunction with the changing of patient lists, if the list was printed prior to any changes made, then that would also cause variability. This author didn't use any specific software since the quantitative data of the different health centers screening mammogram completion rate were

provided during the BigAIMs meeting and the breast imaging lead radiology technologist provided the excel spreadsheet for her mobile mammography van.

The toolkit was first presented in July and was further developed with the help of the author and another member of the BigAIMs committee. During the site visits, the author was able to create workflows and process maps demonstrating outreach and in-reach referrals for screening mammograms. Once created, it was reviewed by the CQO and shared with the other member to create in Visio and include in the toolkit. After continuous feedback from the CQO and best practice health centers, the toolkit was presented to the BigAIMs committee for more feedback prior to presenting to the nurse managers meeting and health center A's meeting.

Section IV: Results

Program evaluation/outcomes

In planning and implementing this evidence-based QI project several factors were considered: 1) identifying the problem within CHN, 2) reviewing literature which demonstrated the best practice and conducting site visits at the health centers with 75% screening mammogram completion rates for a possible solution, 3) developing an intervention based on evidence based literature and site visits with best practice, 4) implementing the planned intervention, 5) evaluating/analyzing the intervention, and 6) reporting the outcomes to the appropriate parties.

The identified problem during the BigAIMs meetings was focused on screening mammogram completion rates. Since there were a couple health centers that had low screening mammogram completion rates within CHN, the author chose to focus her QI project with the health center that also had the highest no show rates with the mobile mammography van. Questionnaires and oral interviews were conducted with different staff members from health centers A, B, C, D and the diagnostic imaging center. In addition, the BigAIMs committee

feedback of the toolkit were evaluated along with the limited number of patients that were reached during the outreach calls. Feedback from health center A's staff meeting and nurse manager meeting in May will be evaluated once surveys are completed.

Although there wasn't a significant amount of patients reached during the outreach calls, the main success factor in this intervention was the creation of the mammography toolkit. The toolkit comprises of very important details dealing with mammography. It consisted of the in-reach and outreach mammogram referral process with corresponding workflows, the diagnostic imaging center appointment process, and mobile mammography van workflow. All the workflows were based on the best practice health centers. Additional references were also included in the toolkit, such as the mammogram checklist for staff to review with patients about mammograms, mammogram process reference guide for clinic staff and providers, and mammogram FAQs. Other helpful resources helped with conducting outreach calls such as a telephone script for scheduling a screening mammogram appointment, with corresponding telephone script FAQs based on possible responses from patients. If the FAQ was not in the telephone script, the reader can refer to the mammogram FAQs for potential answers. Another helpful part of the toolkit was inclusion of how clinic staff and providers can navigate when their patients have out-of-network mammograms or need to remove a patient from EHR. With all the helpful information and resources included in the toolkit, it was positively accepted during the BigAIMs committee meeting. The most rewarding outcome was the suggestion of the CQO that the toolkit become a part of the MEA/HW orientation in addition to having it available to all the primary care health centers as a reference to decrease variability amongst health centers.

V: Discussion

Summary

There were several barriers all along the QI project ranging from choosing which health center to conduct the test of change, communicating with the nurse manager to agree upon having her health center the pilot site, absence of the primary HW dedicated to breast cancer screening, figuring out which patients did not attend their screening mammogram appointment with the mobile mammography van, trying to conduct a workshop with MEAs/HWs responsible for performing outreach calls, and having no access to CHNs complex computer system. Despite these challenges, the author was able to be successful with information gathered and resources available especially in helping fine tune the mammography toolkit. Dealing with such a large network, the main lesson learned was that not everything was as simple as it seems coming into an organization as an outsider. Sometimes having a plan doesn't always work out the way it was intended; therefore, it was important to be flexible and understanding and continue to push for implementation of the project. The results may not have been what were initially expected, but something beneficial did come of this QI project the mammography toolkit. There were many discoveries made both positive and negative, but at the end of it all, a resourceful toolkit was created to help all health centers achieve the 75% screening mammogram completion rate.

In order to sustain the test of change, it is important for all staff members to assume accountability of their role in encouraging their patients to stay compliant with their screening services, especially clinicians including advance practice nurses. In addition, monitoring of the screening mammogram completion rates should be continued and data should be provided to each health center to demonstrate performance. Although topics that the BigAIMs committee focuses on may change, screening mammography must still be a priority to all health centers as in any cancer screening service.

The implication for advanced practice nurses is to hopefully encourage them to build rapport with their patients and empower them to comply with their screening mammogram recommendation. Having access to a toolkit will enable providers to have important data they can share with their patients at their fingertips. According to Healthy People 2020 (ODPHP, 2014), patients are more than likely to adhere to their cancer screening test if recommended by their health care providers. Advanced practice nurses should think of their patients as someone they can help decrease the risk of breast cancer and any other type of cancers. The findings of the QI project were presented in a paper while the creation of the mammography toolkit will hopefully be disseminated this year once final revisions have been made after feedback at health center A's staff meeting and nurse managers meeting in May.

Barriers to implementation/limitations

There were many barriers that the author faced during the planning and implementation of this QI project. Initially, the author was focused on creating a QI project to increase screening mammography completion rates within one health center, then later decided to focus on the mobile mammography van completion rate, which affects multiple sites. The author attended several BigAIMs committee meetings, some held at sites that needed help with the screening mammogram completion rates and decided to choose the health center with appropriate staffing and the center that was more likely to show positive results. This health center also offered the mobile mammography van monthly. When the author attempted to reach out to the health center nurse manager, through phone, email, and face to face, it wasn't until the CQO got involved that there was finally communication between the author and the nurse manager. Communication was a significant barrier since the nurse manager was on vacation during the initial phase that author was trying to implement the intervention.

After discovering all these barriers in trying to implement the chosen intervention of reminder calls, this author in tandem with key leadership decided to help improve a draft toolkit specifically for mammograms. The toolkit development was already in the early stages of being created by the BigAIMs committee; therefore, based upon her experience conducting the site visits at the best practicing health centers, diagnostic imaging center and combining some of the information from the draft version of the toolkit, as well as interviews, the author was able to create workflow processes and diagrams to demonstrate the outreach and in reach referral processes for mammograms.

Interpretation

The anticipated outcome of this QI project was to demonstrate incremental increases of the completion rate of screening mammogram with the mobile mammography van by utilizing reminder calls and discovering patient barriers regarding compliance with cancer screening recommendations. Although there was not a significant number of patients reached and it was unknown whether there were more patients who did not attend their screening mammogram with the mobile mammography van, it is important that each health center adopt best practices that will allow them to keep track of screening services. A suggestion the author had made prior was to obtain a copy of the mobile mammography van's list once all patients have been screened. In doing so, whoever is assigned to perform outreach calls to those who did not attend, can capture the names before they are deleted in the electronic record appointment list. A positive outcome that resulted in this QI project, was creation of the mammography toolkit, which contains important information gathered from the author's site visits and also contribution of health center's B mammogram FAQs. Another positive outcome was the decision of the CQO to potentially include the toolkit as part of the MEA/HWs orientation in addition to having it

available at all primary care health centers as a reference. This toolkit possibly will positively impact screening rates due to the decrease in variability across the different sites within the system.

The implications of this QI project for future professional and staff development is to continually update in the toolkit. For example, designation of a person who is willing to update the toolkit either yearly or bi-yearly to ensure that the information is the most accurate and up to date. Also, a pre- and post-assessment could be created and distributed at the MEAs/HWs orientation to demonstrate their understanding of mammograms and the in-reach and outreach referral process.

Conclusions

The overall usefulness of the intervention would be effective in a setting where MEAs/HWs have the designated protected time to conduct the outreach calls, but with unforeseen circumstances, where there is a staffing shortage that may not always be the case. Since the author had some difficulty initiating the intervention at health center A, the short duration of participation have influenced the outcomes of the change project. Without the dedicated people, time, and understanding it is common for staff to only do the bare minimum of their responsibilities.

As the risk of breast cancer increases with age, or family history, it is crucial that health care providers recommend best practices for adherence to screening mammography (Mahon, 2012). Since there are differing recommendations for initiation of obtaining a screening mammogram, it is important for providers to follow the CHN guidelines unless the patient has high risk factors that need to be considered. Once the patients are recommended, it is important that they are followed up to ensure adherence. In addition to the recommendation from a

provider, a reminder call shows promising results in women adhering to their screening mammogram (Goelen, DeClerq, & Hanssens, 2010).

The toolkit includes the CHN mammogram criteria; therefore, MEAs/HWs and providers will be aware of when to recommend screening for their patients. Since the MEAs/HWs review the patient's chart prior to their appointment, it is important for them to capture their pending screening mammogram if it was missed by the provider. The MEAs/HWs must work side by side their provider like checks and balances, so that their patient receives optimal care and the necessary cancer screening services, which could potentially save their lives. In conclusion, efforts to analyze systems, operations, and team contributions related to breast cancer screening services led to improved communication, collaboration, and evidence based best practices in a complex community health network.

Section VI: Other information

Funding

No external funding was obtained for the design, implementation, and interpretation of this QI project.

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Section VIII: Appendices

Appendix A

Breast Cancer Screening Intervention Evaluation based on Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Research

Evidence Appraisal

Author (Year)	Design/Strength	Setting	Participants	Training Intervention	Outcome
Anakwenze, C., Coronado-Interis, E., Aung, M., & Jolly, P. (2015).	Cross-sectional study with pretest/posttest Level 2, Good quality	4 parishes served by Western Regional Health Authority	Jamaican women 35-39	Questionnaire Powerpoint	<ul style="list-style-type: none"> Significant increase in breast cancer awareness, knowledge of screening test, & intent to screen; 1/5 participants had mammogram post-intervention
von Friederichs-Fitzwater, M. Navarro, L., & Taylor, S. (2010).	Pilot study Pre & post test Level 2, Low quality	AI/AN community	American Indian Alaska Native	DVD	<ul style="list-style-type: none"> With more knowledge women more likely to get mammogram
Burhansstipanov, L., Dignan, M, Schumacher, A., Kreba, L., Alfonis, G., & Apodeca, C. (2010)	Non-experimental Level 3/Low quality	Greater Denver Metropolitan area	Underserved women: African Americans, Latinas, Native Americans, and poor White women	Written education Face to face or telephone education	<ul style="list-style-type: none"> Statistically significant associations found between having received the intervention and adhering to a repeat screening mammogram for all racial/ethnic groups ($p < 0.05$).
Deavenport, A., Modeste, N., Marshak, HH, &	Post-test control group	Clinics	Low-income Hispanic women	Audiovisual Written media	<ul style="list-style-type: none"> Low-income women in the intervention group had greater perceived benefits, $F(1, 208) =$

Neish C. (2011).	Level 2, Good quality				3.10; $p < .01$, a greater net score of perceived benefits minus perceived barriers, $F(1, 208) = 5.25$; $p < .05$, and greater self-efficacy, $F(1, 208) = 10.32$; $p < .01$, and greater intentions to obtain mammograms, $F(1, 208) = 32.37$; $p < .001$.
Wu, TY & Lin, C (2015)	RCT Level 1/High Quality	Chinese community	Chinese American	Telephone counseling National Cancer Institute brochure	<ul style="list-style-type: none"> 4-month follow-up interviews, 40% of the women ($n = 34$) in the intervention group compared with 33% of the women in control ($n = 27$) went to obtain mammograms ($221 = 1.81$, $P = ns$).
Lee-Lin, F., Menon, U., Leo, M., & Pedhiwala, N. (2013)	Quasi experimental pre & post test Level 2/Low quality	Portland Metropolitan area	Chinese American	Group teaching with targeted messages, followed by an individual counseling session	<ul style="list-style-type: none"> 50% had mammogram post intervention may promote mammography screening among Chinese American immigrant women
Percac-Lima, S., Milosavljevic, B., Oo, SA, Marable, D., & Bond B (2012)	Non-experimental Level 3/Good quality	Urban community health center	Bosnian refugees/immigrants	Interventions Include: scheduling appointments, making reminder calls, arranging transportation, resolving insurance issues and/or accompanying patients who were afraid or felt unable to navigate the mammogram appointment on their own	<ul style="list-style-type: none"> Screening rates increases
Lakkis, N., Atfeh, A., El-Zein, Y.,	RCT Level 1/Low	American University of Beirut	Beneficiaries of the AUB Health	2 different sms-text <ul style="list-style-type: none"> Simple invitation for a screening mammogram 	<ul style="list-style-type: none"> 30.7% (59) of subgroup 1 and 31.6% (61) of subgroup 2 adhered to their mammogram screening

Mahmassani, D., & Hamadeh, G (2011)	Quality	(AUB)	Insurance Plan (HIP)	<ul style="list-style-type: none"> Detailed w/information on benefits, etc. 	test during the 6 months follow up interval post-intervention (Chi-square test, $p\text{-value} \geq 0.05$).
Goelen, G., De Clercq, G., & Hanssens S (2010)	RCT Level 1/High Quality	Semirural communities in Belgium		<ul style="list-style-type: none"> Control: received an invitation letter for screening mammography and an information leaflet Intervention: received usual care as well as a telephone reminder call x3 attempts 	<ul style="list-style-type: none"> 22% percent had screening mammography, which was 4% higher than controls (relative risk = 1.22).
Ma, G., Yin, L., Gao, W., Tan, Y., Liu, R., Fang, C., & Ma, X. (2011)	Quasi-experimental design Level 2/Good quality	Worksites in Nanjing	Chinese	Breast cancer education and screening navigation	<ul style="list-style-type: none"> Exposure to the workplace intervention dramatically increased the adherence of mammography from 10.3% at baseline to 72.6% at 6-month follow-up in the intervention group ($P < 0.001$).
Lee-Lin, F., Nguyen, T., Pedhiwala, N., Diekmann, N., & Menon, U. (2015)	RCT Level 1/High Quality	Chinese communities	Chinese	<ul style="list-style-type: none"> Receive a theory-based, culturally targeted breast cancer screening educational intervention (n= 147) or a mammography screening brochure published by the National Cancer Institute (n= 153) 	<ul style="list-style-type: none"> Behavior changed in both groups, with a total of 170 participants (56.7%) reporting a mammogram at 12 months.
Vidal, C., Garcia, M., Benito, L., Mila, N., Binefa, G.,	Quasi-experimental Level 2/high	Spain	50-69 years old	<ul style="list-style-type: none"> Text message reminder 3 days before appointment 	<ul style="list-style-type: none"> Increase completion rate in women without access to postal mail Postal mail and text cost effective

& Moreno, V. (2014)	quality				
Tyson, S., Burton, L., & McGovern, A (2015)	Mixed methods cohort design Level 2/high quality	Ten in- patient stroke services	Members of multi- disciplinary participating stroke teams	<ul style="list-style-type: none"> • Implementation of toolkit with standardized measurement tools 	<ul style="list-style-type: none"> • Use of measurement tools increased 36% to 81%
Spruce, L & Sanford, J (2010)	Survey Level 3/good quality		PCPs in Reno and Las Vegas	<ul style="list-style-type: none"> • Presentation of toolkit 	<ul style="list-style-type: none"> • Providers plan to use recommendations and toolkit useful in making the change

Appendix B

Lippitt's Change Theory

Phase	Lippitt's Phases of Change	Organization Phases of Change
1	Diagnose the problem	<ul style="list-style-type: none"> • Low mammography screening and completion rates
2	Assess motivation and capacity for change	<ul style="list-style-type: none"> • San Francisco Department of Public Health and San Francisco Health Network of community clinics have clinical and operational infrastructure with commitment to women's health, primary care and cancer detection • Medical directors and QI staff motivated to create culture of continuous improvement, learning and equality • Discuss/evaluate the screening mammography referral process at health center and regional referral center with mobile van services
3	Assess change agent's motivation and resources	<ul style="list-style-type: none"> • Prioritization discussed with Chief Quality Officer • Motivated by willingness to pilot new interventions and customize best local approaches • DNP student will be the lead change agent to pilot intervention at chosen health center • Access to internal data, policies, procedures, administrative support, QI staff • Change agent is DNP student, chosen health center, QI project completed on volunteer time
4	Select progressive change objective	<ul style="list-style-type: none"> • Plan, timetables, deadlines must be addressed (GANTT chart) • Designate role/responsibilities to implement change
5	Choose appropriate role of the change agent	<ul style="list-style-type: none"> • Discuss and manage any confrontation/conflicts, questions and clarifications from employees about the change • Consult with QI leaders and CMO about progress
6	Maintain change	<ul style="list-style-type: none"> • Continuous communication about progress, updates and provide ongoing feedback to all stakeholders • Plan for spread will incorporate shared learning and best practices from all centers

		<ul style="list-style-type: none">• Publication and presentation of results and lessons learned
7	Terminate the helping relationship	<ul style="list-style-type: none">• Change is introduced and formally adopted within the affiliate follow up template to promote sustainability of systems changes• Plan for ongoing education provided to all staff members• Change agent will remain available for consultation and reinforcement, but change will ultimately be local health center's responsibility

Mitchell, G. (2013). Selecting the best theory to implement planned change. *Nursing Management*. 20(1), 32-37.

Appendix C

Health Center Mobile Mammography Van Questionnaire

Position/Role: MEA RN EW Clerk HW BH Other _____

1. What education is given about mammograms? Verbal Hand outs
2. Who does the education? Front Office MEA Provider Other _____
3. Do you feel comfortable providing screening mammogram education? Yes No
 - a. If not, what additional training would you like? In-person training Handouts
 Other (please specify):
4. Why do you think the no show rates of the mammo van are high?
 - a. What has your patient(s) mentioned? (Check all that apply)
 - Completed mammogram at different imaging center
 - Doesn't feel the need to get a mammogram (if performs self breast exam)
 - Fear of cancer
 - Fear of pain with test
 - Fear of radiation
 - Fear of results
 - Forgot to go and didn't reschedule
 - No transportation
 - Language barrier
 - Lost referral form
 - Never rescheduled appointment
 - No time
 - Not a priority, scheduling conflict, competing priorities (i.e. health, vacation, family)
 - Tried to reschedule appointment, but no one at imaging center returned call
 - Wasn't reminded to go to appointment
 - Other: (please write in)
5. How are patients scheduled for their mammogram at your clinic?
6. Do you feel that you have enough training on how to schedule appointments?
 - Yes No
 - a. If not, what additional training would you like? In-person training Handouts
 Other (please specify):

7. Do you feel that you have enough training or know what to say when patients say they do not want a mammogram for reasons x, y, z? Yes No
 - a. If not, what additional training would you like? In-service Handouts Other (please specify):

8. How long does it take you to make the appointment and/or do outreach? less than 5 minutes less than 10 minutes less than 15 minutes
 - a. If not enough time, how much time would you need?

9. If the patient has been seen by a provider, can an appointment with the mammo van be made before she leaves the health center? Yes No
 - a. If so, how soon can the patient be scheduled? within 1 month within 2 months within 3 months

10. Do you call the patient(s) to remind her of her appointment? Yes No
 - a. If so, when? 1 week before 2-3 days before 1 day before
 - b. If not, why not?

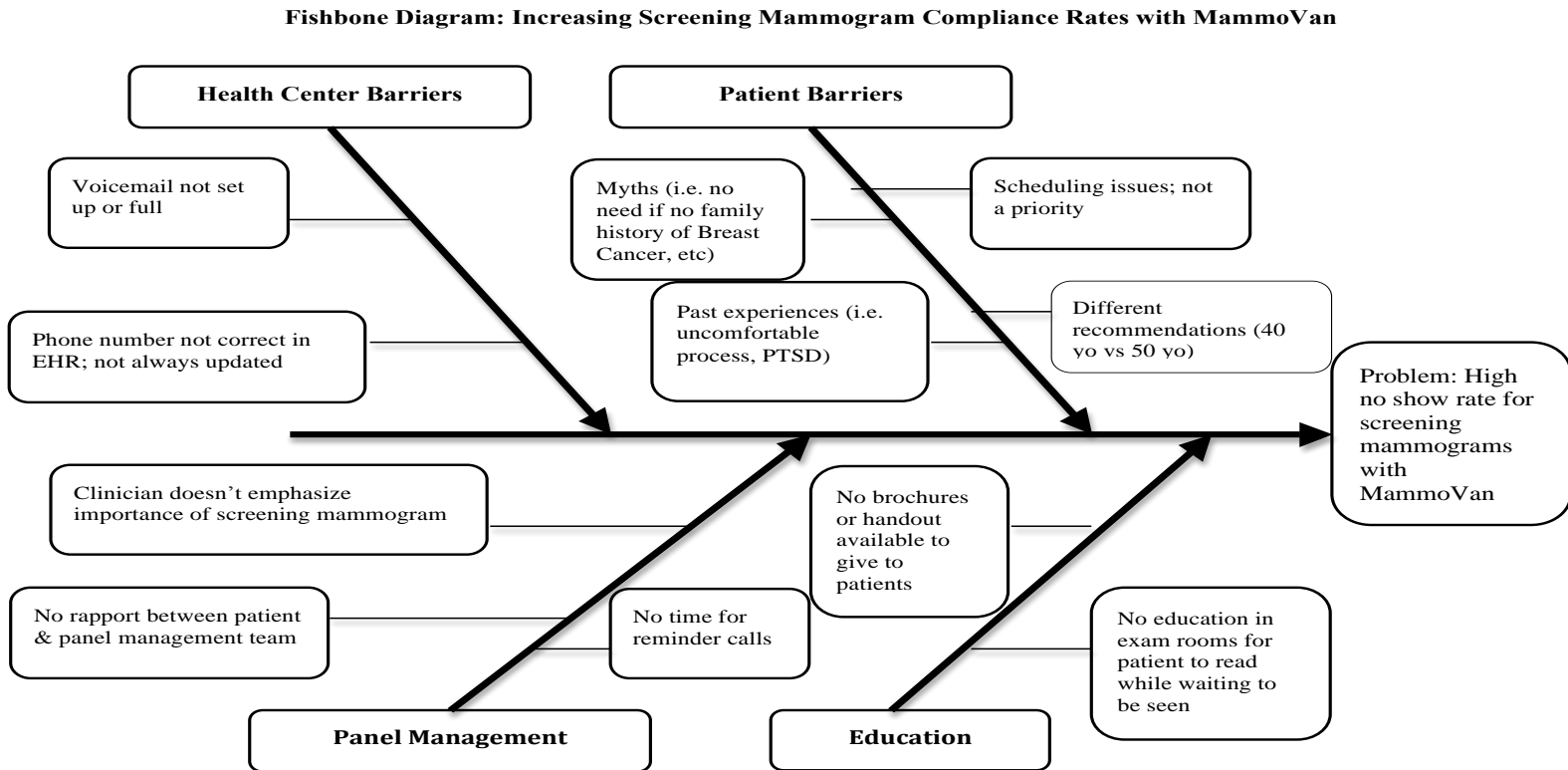
11. What do you think we can do to encourage your patient(s) to keep their mammo van appointment?

12. What changes can you make to increase your clinic's mammo van show rate? Text message reminder 2 phone call reminders – 1 week before and day before Incentives - \$5 Safeway gift card, etc. Other (please specify)

Please provide any additional information you would like to share that would be helpful to improve your clinic's screening rate

Appendix D

Fishbone Diagram: Increasing Screening Mammogram Compliance Rates with MammoVan



Appendix E

Short Telephone Script for Appointment

Introduction:

“Hello, this is _____ (caller’s name) and I am calling on behalf of your provider _____ (provider name) at _____ (health center). May I speak to Ms. _____ (patient name) please?”

Member unavailable:

Ask: “When would be a good time to reach her?” Record date(s) and time(s). Then say, “Thank you for this information. I will try to call back to speak with her at that time.” [Terminate call]

If person on the phone asks what this is regarding, reply, “Unfortunately, I am unable to discuss this with you and will try back later so I can speak with _____ (patient name). Thank you for your time.”

Date: _____ Time: _____

Member available:

OUTREACH CALL

When she comes to the phone, say: “Ms. _____, I am calling because you are due for your screening mammogram, which is a lifesaving screening procedure. May I offer you an appointment with either the Avon Breast Center at San Francisco General Hospital or MammoVan held here near the clinic?”

Do you have any concerns about getting a mammogram so that the experience will be more comfortable? (see barriers below)

**Refer to Mammogram FAQs or Telephone Script FAQs handout as it pertains to the barrier indicated below*

MISSED APPOINTMENT

When she comes to the phone, say: “Ms. _____, I am calling because you missed your appointment at the mobile mammogram van on _____ (appointment) and wanted to remind you that mammograms are an important lifesaving screening procedure.

I noticed that we weren’t able to meet you at your appointment for your mammogram. Did anything come up? We were just wondering if everything was ok and want to work with you to make sure you get the services that are really important and to help us understand why you weren’t able to make the appointment.

Do you have any concerns about getting a mammogram so that the experience will be more comfortable?

Please mark barrier(s) patient mentioned below:

- Completed mammogram at different imaging center
- Doesn't feel the need to get a mammogram, if performs self breast exam
- Fear of cancer
- Fear of process, compression, pain
- Fear of radiation
- Fear of results
- Forgot to go and didn't reschedule
- Lack of transportation
- Language barrier
- Lost referral form
- Never rescheduled appointment
- No time
- Not a priority, scheduling conflict, competing priorities (i.e. health, vacation, family)
- Tried to reschedule appointment, but no one at imaging center returned call
- Wasn't reminded to go to appointment
- Other: (please write in)

**Refer to Mammogram FAQs or Telephone Script FAQs handout as it pertains to the barrier*

If **YES**, patient wants to make an appointment/reschedule, say: "That's great because it can be life-saving. The chances of getting breast cancer increases with age, so it's very important to get it done routinely.

- **MAMMOVAN:** Can I go ahead and make an appointment for you? The next appointment available at the mobile mammo van is _____. Does that work? Great, you are scheduled for _____ at _____. Thank you. Have a nice day/evening."
- **AVON BREAST CENTER:** I will send a referral to Avon Breast Center and they will contact you directly or send you an appointment letter in the mail. Is there a particular day that would work best for you, so that I can make a note of it for them? If you do not hear or receive anything regarding your appointment in 1-2 weeks, please feel free to call Avon Breast Center at 415-206-4478.

Appendix F

Mammogram Telephone Script FAQs

Patient Reply/Barrier	Potential Responses
I received my mammogram somewhere else	<ul style="list-style-type: none"> • That's great you got your screening! We would love to have a record of that screening for completeness. Is it possible for you to have those records sent to the clinic to your primary care provider? Or you can come by and sign an authorization of release so that we can request those records for you?
Forgot to go and didn't reschedule	<ul style="list-style-type: none"> • Did something come up? Is everything ok? Is there anything I can help you with? • Can I offer to reschedule for you when it's most convenient?
Lack of transportation	<ul style="list-style-type: none"> • I'm sorry to hear that you don't have a way to get to your appointment... • I can try and get you a voucher to and from the appointment • Are there any particular days/times that you would have transportation • I can try and schedule your appointment when you have another appointment the same day when you will have transportation
Language barrier	<ul style="list-style-type: none"> • I'm sorry no one was there that spoke your language. That must have been frustrating and confusing. • What language do you speak? • I can try and make sure that when you go to your appointment that there is someone there who speaks your language • Is there a day/time when you can have someone accompany you at your appointment?
Lost referral form	<ul style="list-style-type: none"> • Sorry to hear you lost your referral form, but we are now doing the referral online • I can reschedule you an appointment if you'd like and send you a letter with your appointment. You will also receive a reminder call at least 1 week prior to your appointment
Attempted to reschedule, but no one at imaging center returned call	<ul style="list-style-type: none"> • I'm glad to hear that you attempted to reschedule, but apologize that no one got back to you • Can I offer to make an appointment for you? • What day/time would work best for you?

Appendix G

Cost/Benefit Analysis

Based on City and County of San Francisco Department of Human Resources:

Hourly range of a Nurse Practitioner: \$69-\$98

Hourly range of health worker I-IV: \$22-39

Hourly range of medical evaluation assistant: \$22-\$27

Toolkit Development

Time of DNP(c), FNP (~100 hours) \$6,900-\$9,800 (using City & County hourly)

Copies of toolkit to be distributed (26 pages x 15) \$39

Copies of survey to be distributed (1 page x 15) \$15

Presentation of toolkit by DNP(c), FNP (30 min) \$34.50-\$43.50
(Includes questions and answers)

30 min training of MEAs/HWs \$11-\$19.50 x 10 trainees = \$110-\$119.50

Outreach call done by MEA/HW (15 min) \$5.50-\$9.75 x 30 calls/month x 12 months =
\$1,980-\$3,510

Total **\$9,078.50- \$13,527**

Estimated cost of missed appointment with Mobile Mammography Van ~ \$900

According to Blumen, Fitch, & Polkus (2016), the average costs per patient allowed by the insurance company in the year after diagnosis were:

Stage	Cost
0	\$60,637
I/II	\$82,121
III	\$129,387
IV	\$134,682

The average costs allowed per patient in the 24 months after the index diagnosis were:

Stage	Cost
0	\$71,909
I/II	\$97,066
III	\$159,442
IV	\$182,655

Appendix H

Communication Matrix

	Project Chair	Project Implementer (PI)/author	Nurse Manager (NM)	Chief Quality Officer (CQO)
Definition of project objectives/aims	Provided advice on project	Met with nurse manager & CQO; conducted informational meeting with health center A	Discussed project PI	Discussed project with PI
Project development	Approval from project committee	Discussed project with NM & CQO	Discussed project with PI	Discussed project with PI
Project Implementation	Assess progress, provide feedback, direction, and constructive criticism	Discussed project with NM & CQO	Discussed project with PI	<ul style="list-style-type: none"> • Discussed project with PI • Provided mammography toolkit for feedback
Project evaluation	Approval from project committee	Discussed project with NM & CQO	Discussed project with PI	Discussed project with PI for dissemination
Timing	Continuous	Continuous	Continuous	Continuous

Appendix I

CHN Mobile Mammography Van (MammoVan) Gap Analysis

Desired State	Current State	Identified Gap	Gap due to knowledge, skills or practices	Outcome measure
<p>100% screening mammography completion rate with the MammoVan</p>	<p>Health center is one of the top 3 that has the highest no show rate at 64% for 2015</p> <p>Primary Breast Cancer Screening health care worker (HW) out on leave</p>	<p>Patients do not show up to their MammoVan appointment</p> <p>No replacement for breast cancer screening health worker</p> <p>No systematic way of keeping track of MammoVan no shows</p>	<p>Gap may be due to:</p> <p>*Knowledge</p> <ul style="list-style-type: none"> - Patients unaware of importance of screening mammogram - Patients unaware of procedure - HW unable to answer patients questions re: mammograms - Panel management (PM) unaware of process to filter who is due for their screening mammogram - Health center unaware of best practice - Eligibility workers (EW) not trained on how to answer mammogram questions from patients - EW unaware of \$5 Safeway card incentive - HW unsure on how to answer patient questions re: mammos <p>*Skills</p> <ul style="list-style-type: none"> - PM unaware of how to approach patient in culturally sensitive way to discuss aspects of mammogram - PM unaware on how to schedule patients on 	<p>Number of patients who attended their MammoVan appointment that day/number of patients scheduled that day</p>

			<p>mammovan eReferral</p> <p>*Practices</p> <ul style="list-style-type: none"> - Lack of PM building rapport - Importance of mammogram not discussed - Mammograms not ordered - Reminder calls not being done - Lack of education provided (verbal, brochures, hand outs) - Reminder calls not being done by panel management d/t time constraints, short staffed - Lack of accountability - Lack of engagement - Providers not checking email - No shows are deleted from list making it difficult to follow up - No standardized way of keeping track of no shows - Front desk not always updating patient contact information - No replacement of HW who was the point of contact for mammograms 	
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Appendix K

Health Center A Mobile Mammography Van Data

2015 CASTRO MISSION					
DATE	Scheduled	Showed	Drop-ins	No show	
6-Jan	21	7		14	
3-Feb	20	11		9	
3-Mar	22	17	2	5	started drop-ins
7-Apr	22	16	2	6	
5-May	28	21	3	7	
2-Jun	32	19	0	13	
7-Jul	31	18	0	13	
4-Aug	25	18	0	7	food provided
13-Aug	22	14	1	8	food provided
1-Sep	20	10	0	10	
6-Oct	20	17	0	3	\$5 Safeway card
3-Nov	22	17	0	5	\$5 Safeway card
1-Dec	23	15	0	8	\$5 Safeway card
TOTALS	308	200		108/12 = 9	64.94% completions

Based on the data collected from the lead breast imaging radiology technologist, updated 01/2016

Appendix L

Survey Monkey

Mammography Toolkit Evaluation Survey

1. I found the referral workflows easy to understand and follow.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
2. I would feel comfortable using the telephone script when performing outreach calls.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
3. I understand the mammogram referral process for Avon Breast Center and mobile mammography van.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
4. I found the mammogram FAQs and telephone script FAQs very useful.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
5. I would feel comfortable referring to the toolkit when doing in-reach and outreach mammogram screening referrals.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
6. Overall, I found this toolkit useful and helpful.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
7. Overall, I found this toolkit easy to understand and navigate through.
 Strongly agree Agree Neither Agree Disagree Strongly Disagree
nor Disagree
8. What other improvements and/or suggestions would you like to see in this toolkit?

Appendix M

Survey Monkey Results

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Q1	5	6	3	0	0
Q2	0	9	5	0	0
Q3	7	6	1	0	0
Q4	4	10	0	0	0
Q5	4	10	0	0	0
Q6	4	10	0	0	0
Q7	2	12	0	0	0

Appendix N

SWOT Analysis – Screening Mammography Rates

Strengths	Weaknesses
<ul style="list-style-type: none"> ➤ Enthusiasm of the author to help ➤ Positive relationships with health center A's nurse manager and operation manager and staff ➤ Positive relationship with CQO, support from the nurse manager and CQO to conduct the QI project ➤ Cost efficient ➤ Monthly availability of the mobile mammography van to the health center ➤ \$5 Safeway gift card incentive provided by the mobile mammography van 	<ul style="list-style-type: none"> ➤ Lack of dedicated time for MEAs/HWs to perform outreach calls ➤ Lack of dedicated time for the author to perform a workshop how to conduct outreach calls ➤ Lack of accountability of staff, lack of knowledge of EW conducting call ➤ Lack of educational material in the patient rooms or educational material to be handed out ➤ Main weakness was that no one assumed the duties of the primary HW who was responsible for the breast cancer screening
Opportunities	Threats
<ul style="list-style-type: none"> ➤ Possibility of conducting future workshops on how to conduct outreach calls ➤ Implementation of the toolkit to be a part of the MEA/HW orientation ➤ Continued incentives for patients who adhere to their screening mammogram ➤ Have the mammography toolkit available to all primary care health centers of CHN with yearly or bi-yearly updates, which could lead to standardization of practices and sustainability 	<ul style="list-style-type: none"> ➤ Lack of buy in from staff and providers, since this might add another task to their growing responsibilities ➤ Increase risk of women diagnosed with breast cancer at later stage due to operational barriers

Appendix O

SWOT Analysis – Mammography Toolkit

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> ➤ Enthusiasm of the author to help ➤ Positive relationships with Chief Quality Officer and BigAIMs committee ➤ Reduces variability ➤ Time efficient 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> ➤ Lack of dedicated time for MEAs/HWs to perform outreach calls ➤ Lack of dedicated time for the author to present ➤ Lack of standardized workflow
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> ➤ Presentation of the toolkit to be a part of the MEA/HW orientation ➤ Conduct pre- and post-test on mammograms and referral process at the MEA/HW orientation ➤ Have the mammography toolkit available to all primary care health centers of CHN with yearly or bi-yearly updates, which could lead to standardization of practices and sustainability 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> ➤ Lack of buy in from staff and providers since this might change their process ➤ Increase risk of women diagnosed with breast cancer at later stage due to operational barriers

Appendix P

Return on Investment

Toolkit Development

Time of DNP(c), FNP (~100 hours)	\$6,900-\$9,800 (using City & County hourly)
Copies of toolkit to be distributed (26 pages x 15)	\$39
Copies of survey to be distributed (1 page x 15)	\$15

Presentation of toolkit by DNP(c), FNP (30 min) (Includes questions and answers)	\$34.50-\$43.50
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30 min training of MEAs/HWs	\$11-\$19.50 x 10 employees = \$110-\$119.50
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Outreach call done by MEA/HW (15 min)	\$5.50-\$9.75 x 30 calls/month x 12 months = \$1,980-\$3,510
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Total	\$9,078.50- \$13,527
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Potential Cost Benefit with Intervention

Mobile mammography van no show cost	\$900 x 5 missed appts/month x 12 months = \$54,000
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Cancer treatment cost positive being found with screening all the eligible patients	\$6,100-\$135,000 (average) with only one
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Total	\$60,100-\$189,900 per year
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Cost Benefit/Return on investment	<u>\$51,021.50-\$176,373</u>
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Post-implementation of Toolkit Costs on Annual Basis

30 min training of MEAs/HWs	\$11-\$19.50 x 10 employees = \$110-\$119.50
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Outreach call done by MEA/HW (15 min)	\$5.50-\$9.75 x 30 calls/month x 12 months = \$1,980-\$3,510
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Total	\$2,090-\$3,705 costs per year
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