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Reducing the No-show Rate of Breast Cancer Screenings: A Quality Improvement Project

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Abstract

Clinical nurse leaders (CNLs) are change agents who "improve quality, cost, or efficiency of healthcare delivery" (Noles, Barber, James, & Wingo, 2019, p. 307). The CNL of a breast cancer clinic recognized the significant impact the high no-show rate of breast cancer screening appointments had on patient outcomes and staff productivity. After conducting a microsystem assessment, the CNL organized a meeting with key stakeholders to identify potential interventions to address this issue. Concerns regarding the efficiency and effectiveness of the current telephone reminder system were raised, indicating an area for improvement. The CNL facilitated the team in researching evidence-based practices to identify a better method to remind patients of their appointments. After conducting the literature review, a text-based reminder system proved to be the most effective, efficient, and economical (Vidal, Garcia, Benito, Binefa, & Moreno, 2014). The aim of this quality improvement project is to reduce the breast cancer screening no-show rate by 2% to enhance the quality of life of patients, decreasing cancer mortality through early detection of breast cancer. During this time, the Covid-19 pandemic hit, preventing the progression and changing the scope of the project where implementation and evaluation of the intervention could not be accomplished. However, the CNL continued communicating and collaborating with staff members remotely to develop a detailed plan with the hopes of the team utilizing components that will work for them. The CNL was driven by professional values and core competencies to engage staff, cultivating an environment that supports change.

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Introduction

Breast cancer is the most common cancer and the leading cause of cancer mortality among women worldwide. Although mammograms are the most effective method for early detection to reduce breast cancer deaths, many women still fail to attend their appointments (Bittencourt & Scarinci, 2019). Perceived patient barriers to getting a mammogram include fear of cost, pain, and results. A lack of breast cancer screening leads to a later diagnosis of the disease and higher mortality rates, which is apparent among low-income, ethnic minority women. For instance, African American women have a breast cancer mortality rate 37% higher than the national average (Faguy, 2019). This health disparity emphasizes the need to improve breast cancer screening adherence, especially among underserved, under-screened women.

This quality improvement initiative will be implemented at a breast clinic that is an extension of a Level 1 trauma, community hospital located in the County of San Francisco. The clinic provides comprehensive breast cancer services, including screening, diagnostic mammography, ultrasound, breast MRI, biopsy, and end-of-life support mainly to low-income, high-risk, disadvantaged women. To increase the breast cancer screening adherence rate, a 12-week evidence-based project to enhance the appointment reminder system was implemented from February to May 2020. Reducing the high no-show rate will allow this microsystem to utilize available resources optimally, promoting the clinic's commitment to providing patients with the highest quality mammography services. Moreover, this initiative aligns with the organization's mission to "advance community wellness in a patient-centered, healing environment" through the promotion of preventative care, improving breast health and wellness (Department of Public Health, 2018).

Problem Description

High no-show rates lead to poor patient outcomes, decreased staff productivity, and significant loss in revenue for a health care system. The no-show rate is defined as the percentage of patients who fail to attend scheduled appointments (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). This issue is particularly evident in microsystems providing care to underserved populations, possibly a contributing factor to poorer health outcomes often observed among this group (Kaplan-Lewis & Percac-Lima, 2013). Data collection and analysis revealed that the average no-show rate at the breast clinic between August 2019 and February 2020 was 22.5% (see Appendix A for run charts). The highest no-show rates of 33.8% and 30.2% were observed in the months of August and February, respectively. It is important to note that the breast clinic transitioned to the Epic electronic health records system in August, while Covid-19 started becoming more prominent in February. These events could have led to the higher no-show rates observed in these two months.

During the microsystem assessment, the CNL observed that majority of screening appointments scheduled at the breast clinic are made without contacting the patients. After receiving a breast cancer screening referral from a provider, the staff at the clinic "drag and drop" the patient onto the schedule, typically one month away (see Appendix B for process map). The patients will then receive a two-week reminder letter sent from an internal communications department and one-day reminder phone call made by staff at the breast clinic. If a patient's address information is not updated, the phone call may be the first time the patient is aware of this appointment, a possible contributing factor to the high no-show rate.

The CNL also noticed that the patient navigator who is responsible for making phone call reminders was tasked with many responsibilities. From helping patients fill out the pre-breast cancer screening form to translating for patients, the navigator's role is essential to creating a positive patient experience at the breast clinic. She shared that these tasks can be time consuming, causing the appointment phone call reminders to be put on hold. Given the current reminder process, completion of these calls largely impact the appointment adherence rates. On average, the patient navigator is responsible for making around 35 phone calls daily. Depending on the day she may not have enough time to execute this task, requiring assistance from other team members. Additionally, the notable no-show rate greatly reduced the number of screenings the x-ray technologists could perform, as the no-show rate could be as high as 57.1% on a given day. Consequently, a lack of breast cancer screenings not only leads to poor patient outcomes but also reduces staff productivity.

To address these concerns, this quality improvement project focuses on developing a more efficient and effective appointment reminder system. After thorough research and investigation, the CNL recommends an evidence-based intervention to improve the patient appointment adherence rate. With successful implementation, this project has the potential to improve patient outcomes and enhance staff workflow.

Literature Review

A review of literature was utilized to identify effective appointment reminder interventions that are also successful in reducing the no-show rate. Databases, such as CINAHL and PubMed, were used to find the most current evidence-based practices where search strategies focused on peer-reviewed articles published no earlier than 2012 and were written in English. To guide research, a Population, Intervention, Comparison, and Outcome

(PICO) framework was created to yield the highest level of evidence that is appropriate and specific to the aim of this quality improvement project. The following PICO question was formulated and applied: Which reminder-related interventions (I) are most dynamic in reducing breast cancer screening no-show rates (O) among low-income, underserved women 40 to 74 years old (P) (see Appendix C for evaluation table)? Search terms included mammogram, breast cancer screening, no-show, reminder system, appointment compliance, and adherence. Given the limited literature on appointment reminder interventions implemented in a breast clinic, the research was broadened to include studies conducted in other outpatient settings.

Lin et al. (2020) explored the effects of various reminder methods, including mail, telephone, and combined mail and telephone reminders on first-time mammography screening appointments for middle aged women in Taiwan. Of 240 eligible women, 204 participated and were separated using a quasi-experimental design with random assignment into four groups: control, mail reminder, telephone reminder, and mail and telephone reminder. The screening rates for the four groups were 13.3%, 34.8%, 47.7%, and 35.3%, respectively. This study demonstrated that women who received an intervention had higher attendance rates, where telephone contact had the most significant influence.

Chambers et al. (2016) implemented a randomized control trial to determine if a telephone call would increase breast cancer screening appointments among lower socio-demographic women in Scotland. 856 women were selected to be a part of this study and were randomly assigned into four groups: control, simple telephone reminder, telephone reminder with support, and telephone support plus anticipated regret. Women who were part of the control group received a reminder letter, while women in the telephone intervention groups received both a

letter and phone call. The breast cancer screening attendance rate for each group was the following: control 6.9%, telephone 16.5%, telephone and support 11.3%, and telephone support and anticipated risk 13.1%. This data revealed that a simple telephone reminder doubled the attendance of breast cancer screening. It proved challenging getting in contact with all the participants, as 261 were unreachable.

Junod Perron et al. (2013) conducted a randomized controlled non-inferiority trial to determine if text message reminders were as effective as telephone reminders in reducing the no-show rate for primary care clinic appointments. The non-inferiority margin was defined as a change less than 2% in the rate of missed appointments. This study occurred at the Geneva University Hospitals between November 2010 and April 2011. A total of 6,450 patients were included with 3,285 individuals receiving text messages and 3,185 receiving phone calls. The rate of missed appointments for text messages and phone calls were 11.7% and 10.2%, respectively, indicating that text message reminders produce a similar impact as telephone reminders. Moreover, text messages were found to be more cost-effective as additional administrative resources were needed for the telephone reminders.

Anthony, Molokwu, Alozie, and Magallanes (2019) implemented a text message reminder system to determine its effect on clinic appointment adherence among the young, low-income, and uninsured population. A convenience sample of 173 participants receiving care at a Ryan-White funded HIV clinic in El Paso, Texas, was observed 6 months prior to and after implementation of the intervention. A text service was set up using Google's text messaging service that was free of charge and had no additional fees. After analyzing the data, it indicated that the attendance rate improved by 7.1%, which translated to 38 extra patients seen at the

clinic. In this research, a text-based reminder system was receptive among the patient population, as it significantly reduced the no-show rate.

Vidal et al. (2014) utilized a quasi-experimental design to analyze the impact a text message reminder had on the mammography appointment adherence rate in women aged 50 to 69 years old in Catalonia, Spain. Of the 12,789 women who were included in this study, 3,719 of them provided the National Health Service with their phone numbers to receive text messages. The control group received a letter reminder, while the experimental group received both a letter and text reminder. Data analysis indicated that 65% of women who only received a letter and 74.9% of women who received both a letter and text message attended their appointments. The researchers also determined that the impact of text message reminders was more significant among women without previous screening who had limited access to postal mail. Additionally, a text message reminder system was deemed more efficient and cost-effective than letter reminders.

Across these various studies, telephone and text message reminders proved superior in improving patient appointment adherence rates when compared to postcard and letter reminders. In both the Chambers et al. (2016) and Lin et al. (2020) studies, telephone contact significantly increased mammography attendance rates. Similarly, the research conducted by Anthony et al. (2019) showed text messages improving the attendance rate in a HIV clinic by 7.1%. In fact, telephone and text messages produce a similar impact on reducing no-shows, as highlighted in the findings of Junod Perron et al. (2013). Additionally, this particular study along with the one led by Vidal et al. (2014) revealed telephone reminders require additional administrative resources, increasing cost and time spent on this communication method. The literature review

clearly identifies a text-based reminder system to be the most efficient, cost-effective approach to remind patients of their appointments.

Rationale

The average no-show rate for breast cancer screenings at the clinic during August 2019 to February 2020 was 22.5%, which translates to 160 missed appointments per month. However, the daily no-show rate could be as high as 57.1%. This data clearly indicates the urgency to address this issue. When the no-show process was analyzed, the following barriers to patient screening were identified: appointments are scheduled without contacting patients, inefficient reminder system, limited staffing, lack of patient preference for communication method, and language barrier (see Appendix D for fishbone diagram). The literature review conducted provides convincing evidence that supports the use of text messages to remind patients of their appointments, as this reminder process helps address the obstacles to breast cancer screening identified in the microsystem.

To help guide the implementation of this quality improvement project, Rosswurm and Larrabee's evidence-based model of change will be utilized. Of the six defining stages, the first step is to assess the need for change in practice through involvement of key stakeholders and collection of data. The second step calls for linking problem intervention and outcomes, where potential interventions are identified. After, a literature review is conducted to synthesize the best evidence through assessment of feasibility, risks, and benefits. Next steps involve designing, implementing, and evaluating the intervention. If the change in practice is successful in addressing the issue, the final step of model calls for integration and maintenance of the initiative into the standards of practice (Rosswurm & Larrabee, 1999).

Project Overview

This quality improvement initiative focuses on enhancing the current reminder system to improve patient outcomes and promote staff productivity. Utilizing text messages has demonstrated to be an appropriate means of communication to remind patients of their appointment information. Literature further supports that a text-based reminder system is efficient, cost-effective, and successfully improves appointment adherence rates (Junod Perron et al., 2013).

The aim of this project is to reduce the no-show rate of breast cancer screenings by 2% for low-income, underserved women 40-74 years old by December 2020. The process begins when a physician refers the patient to the breast clinic for a mammogram. The process ends when a patient navigator sends out a text message via MyChart to remind the patient of their appointment details. Enhancing the reminder process will allow the breast clinic to: (1) improve patient outcomes through early diagnosis of breast cancer, (2) improve staff productivity with increased number of patients seen, and (3) improve staff satisfaction with workflow. It is important to address this issue, as reducing the no-show rate will significantly enhance patient outcomes and quality of life through early detection of breast cancer with increased screening.

Methodology

Context

To better understand the needs of this breast clinic, the CNL first conducted a microsystem assessment to observe and learn the current processes and procedures in place (see Appendix E for microsystem assessment). This clinic provides comprehensive breast cancer services to low-income, high-risk women 40 to 74 years old, mainly of African American, Asian, Caucasian, and Latina ethnic backgrounds. Staff members include the clinic

director, radiologists, x-ray technicians, eligibility specialist, schedulers, and patient navigators. Key stakeholders include the CNL, clinic director, lead technician, and patient navigators, who will be vital for the integration of this project.

At the start of the shift, the team meets at the PDSA huddle board to discuss important announcements, upcoming events, and the agenda for the day. The patient navigators are tasked with assisting patients in filling out required paperwork, directing patients to the desired waiting area, and initiating reminder phone calls for appointments scheduled the following day. Also, the patient navigators who are fluent in Spanish or Chinese may be asked to help translate during a procedure. Of the two navigators, one works part-time and is available two days of the week. Consequently, there is typically only one patient navigator at the clinic and depending on the day the workload can be overwhelming.

A SWOT analysis was conducted to identify the breast clinic's potential strengths, weaknesses, opportunities, and threats (see Appendix F for SWOT analysis). The main strength is that staff members are open to change and management proactively enhances the current practices. This is extremely valuable, as having a supportive team will make the implementation process run more smoothly. The limited number of staff is the biggest weakness, affecting the workflow of the unit. As a result, the growing list of no-shows is not consistently addressed through staff-made follow-up phone calls. A leading opportunity for the clinic is the hiring of a registered nurse in the near future who can help improve workflow. Covid-19 is significantly impacting the operations of the breast clinic, halting all screening procedures.

Improving patient outcomes through early diagnosis of breast cancer is the most important benefit of this change initiative. The secondary benefits include improved staff workflow and productivity and increased revenue of the breast clinic. With a text-based reminder

system, the objective is to reduce the current 22.5% no-show rate of breast cancer screenings by at least 2%, which correlates to 13 additional appointments per month or 156 per year (see Appendix A for run charts). According to the Office of Statewide Health Planning and Development (2019), each bilateral mammogram screening at the breast clinic cost $965. An additional 156 screening appointments per year translates to an increase of $150,540 in revenue. In contrast, the projected cost of training and educating staff members on this intervention is $915, resulting in $149,625 in annual revenue. Clearly, the return on investment analysis supports the implementation of this initiative (see Appendix G for cost analysis).

Intervention

Following Rosswurm and Larrabee's framework, the CNL first conducted a microsystem assessment to evaluate the need for change (see Appendix H for Rosswurm and Larrabee's model of change). During this step, the no-show data was also gathered and analyzed to better understand the extent of the issue. Next, the CNL facilitated a meeting with the key stakeholders to discuss the reminder system process and its impact on the no-show rate. The patient navigator expressed difficulty with completing the phone call reminders during a busy day, as her priority is to help patients navigate the screening procedure to provide a positive patient experience. She also shared that reaching patients prove to be a challenge, as she often leaves voicemails. During this discussion, it was noted that text messages could be sent to patients via the software MyChart due to the recent adoption of Epic. After identifying this possible intervention, the CNL performed a literature review to determine the impact and effectiveness of text messages on the no-show rate. Research supports the use of a text-based reminder system, as it successfully reminds patients of their appointments and is efficient and cost-effective (Vidal et al., 2014). The fourth step of Rosswurm and Larrabee's model of change calls for designing the practice

strategy, where the CNL created a detailed implementation and evaluation plan. These recommendations will be presented to the key stakeholders. After, implementation and evaluation of the text-based reminder system will follow. Data analysis will be utilized to identify the impact of this intervention on the no-show rate and a survey will be employed to determine staff satisfaction with the new workflow. If successful, the last step calls for integration of text messages into the appointment reminder process of the unit.

Measures

The IHI Family of Measures, including outcome, process, and balancing measures, is used to define and detect the impact of implementing a text-based reminder system. Reminding patients through text messages has been shown to be an efficient, effective means to improve appointment adherence rates. One outcome measure is a 2% reduction in the no-show rate, which will be evaluated at six months and one year post-intervention. Data tables will be used to keep track of the progress, as the results will be compared to the baseline data (see Appendix I for data tables). The second outcome measure is 100% staff satisfaction with the new workflow and will be assessed through a survey (see Appendix J for staff satisfaction survey). The process measure assesses the number of text messages sent compared to phone calls made. If more than 50% of patients can be reached through text, it is a strong indication for the reminder process to be modified. The balancing measure is characterized as an increase in no-show rate caused by poor communication between staff and patients. Defining these various measures will help determine the validity and reliability of this quality improvement project.

Ethical Considerations

This project upholds the ethical principles of privacy and confidentiality. The data that was collected for this quality improvement initiative did not reveal any identifiable health

information. Additionally, to minimize the likelihood of a breach of information, the CNL only reviewed and analyzed data with patient identifiers at the breast clinic. This information was then placed into a locked shredder bin in compliance with the Health Insurance Portability and Accountability Act (HIPAA) policy, ensuring the protection of private information.

This project was reviewed by faculty and meets the criteria as an evidence-based activity defined by the Evidence-Based Change of Practice Project Checklist (see Appendix K for Evidence-Based Change of Practice Project Checklist).

Results

One month prior to implementation of the text-based reminder system, the lead technician will collaborate with the internal communications department to send out letters to all patients. This letter will inform patients that appointment reminders can now be sent through text message, providing instructions on how to change communication preferences on MyChart if desired. During this time, the breast clinic director will organize a one-hour training for patient navigators to learn how to utilize the text message function of MyChart. Other departments in the organization have already started using this capability to remind patients of their appointments. It will be extremely helpful for the director to collaborate with these units to learn the resources that were used during their trainings and if these could be available to the staff at the breast clinic.

Once the intervention is ready to implemented, the director will generate a report to determine how many patients opted for receiving appointment reminders through text message. Those individuals will be part of the intervention group, where the patient navigator will use MyChart to send out appointment reminders. Patients who do

not opt for receiving text messages will be part of the control group that will continue receiving appointment reminder phone calls.

The clinic director will also generate an Epic report after each month to determine the exam volume of breast cancer screenings performed and the number of no-show appointments for both the intervention and control groups. This information will then be used to compute the no-show rate, one of the outcome measures for this quality improvement project. These values will be logged into the data tables created by the CNL to monitor the progress of the intervention (see Appendix I for data tables). At the six-month mark, the average exam volume, no-show appointments, and no-show rate for these months will be determined. These values will be compared to the baseline data to evaluate the effect of the text-based reminder system, providing insight on the short-term impact text messages have on reducing the no-show rate. If the no-show rate of the control group is 22.5%$\pm$ 0.5%, it confirms that the baseline data is reflective of the no-show rate at the clinic using phone call reminders. If the no-show rate of the intervention group is 20.5% or less, meeting the 2% reduction goal, it suggests text messages improve appointment adherence rates. To gain a better understanding of the long-term impact of the intervention, monitoring and logging of monthly data should continue for an additional six months. One year of implementation and surveillance will offer more concrete evidence regarding the impact of a text-based reminder system on reducing the no-show rate. At this time, if the no-show rate of the intervention group continues to be 20.5% or less, it demonstrates that text messages effectively improve patient appointment compliance.

After six months of implementation, a survey will also be given to the patient navigators to assess staff satisfaction, which is the second outcome measure defined for this initiative (see Appendix J for the staff satisfaction survey). Questions on the survey evaluate staff satisfaction with understanding of their role with the new practice, support during the transition, current workload, and new workflow. The results will help determine whether the use text message reminders positively or negatively impact staff processes at the clinic. If the surveys indicate 100% staff satisfaction, it reveals that a text-based reminder system clearly improves staff workflow.

The evaluation and result of both outcome measures will provide valuable insight for the proceeding steps of the intervention. Ideally, the target of both measures will be reached, where the text-based reminder system will effectively reduce the breast cancer screening no-show rate by 2% while also leaving staff 100% satisfied with the new workflow. This provides strong evidence that text messages should be integrated into the reminder process. Conversely, if only one outcome measure is reached, it will be important to assess the advantages and disadvantages of the intervention to determine what will be best for the clinic and staff moving forward.

Discussion

Summary

It is important to note that the Covid-19 pandemic occurred during the timeframe of this quality improvement initiative, impacting the objectives and development of the project. Initially, the CNL expected to facilitate and provide guidance through the beginning stages of implementation. However, the circumstances shifted the breast clinic's priorities, halting the

progression and changing the scope of the project. As a result, implementation and evaluation of a text-based reminder system could not be executed during this time.

To adapt to the unprecedented events, the CNL continued working remotely. Communication between the CNL and the staff was exchanged through emails and video conferencing, where key discussions regarding data analysis and progress updates occurred. Through this collaboration, the CNL developed very specific recommendations for the implementation and evaluation process that outlined the following: (1) timeline, (2) roles of each team member, (3) key steps, and (4) measurement strategies and tools (see Appendix L for project charter). With this information, the staff can utilize components that will work for them when the time is appropriate.

Conclusion

A high no-show rate continues to be a multifaceted issue that significantly impacts various processes of a microsystem. This quality improvement project focuses on enhancing the appointment reminder system to address the no-show rate of breast cancer screenings prevalent in a breast clinic. A more effective and efficient text-based reminder process can optimize the clinic's resources to provide patients with comprehensive breast cancer services, ultimately advancing breast health and wellness. In addition to improving patient outcomes, the use of text messages to remind patients of their appointments further enhances staff productivity and workflow.

The CNL facilitated the team in research and collaborated with staff to develop a detailed proposal for implementation and evaluation of the intervention. With an informed plan and the resources provided, there is an opportunity for sustainability of the evidence-based practice within this microsystem after analyzing the post-intervention data. Furthermore, if successful,

there is potential for spread of the project to improve the screening appointment adherence rates at 11 other clinics this breast center provides mammography services to. This project provides a sound foundation for implementation, evaluation, and transferability of the intervention to improve the quality of life of patients through early detection of breast cancer.

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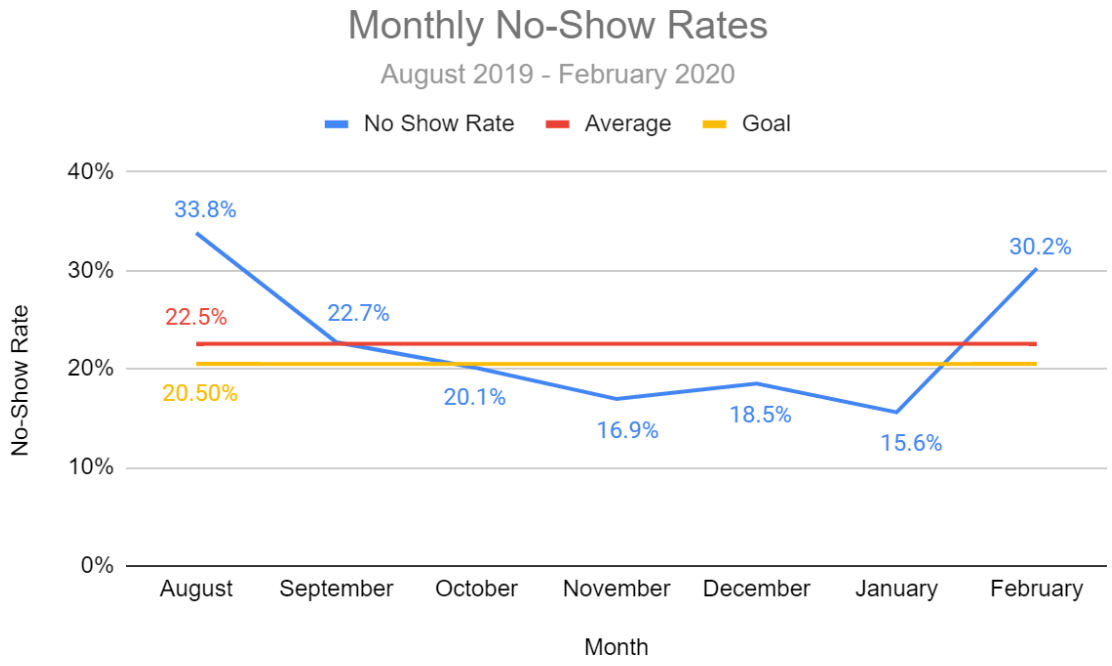
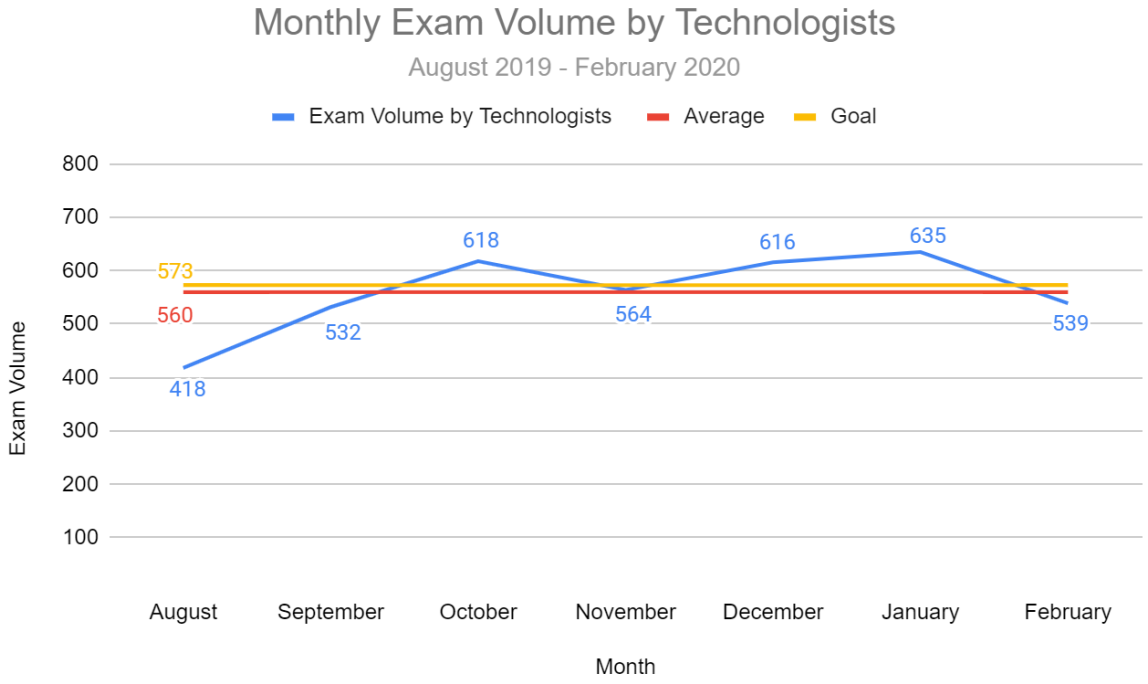
Appendix A

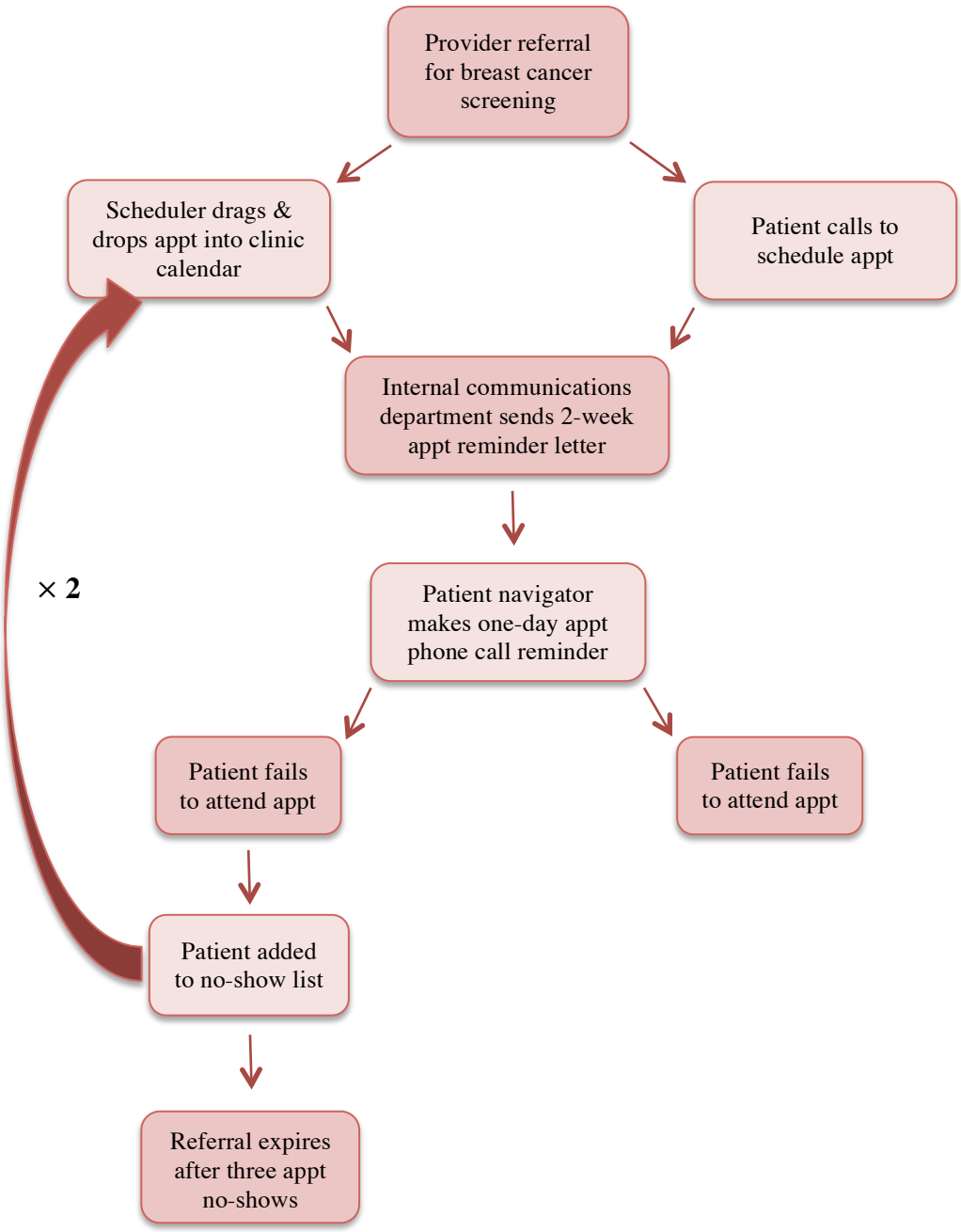
Run Charts





Appendix B

Process Map



Appendix C

Evaluation Table

PICO question: Which reminder-related interventions (I) are most dynamic in reducing breast cancer screening no-show rates (O) among low-income, underserved women 40 to 74 years old (P)?

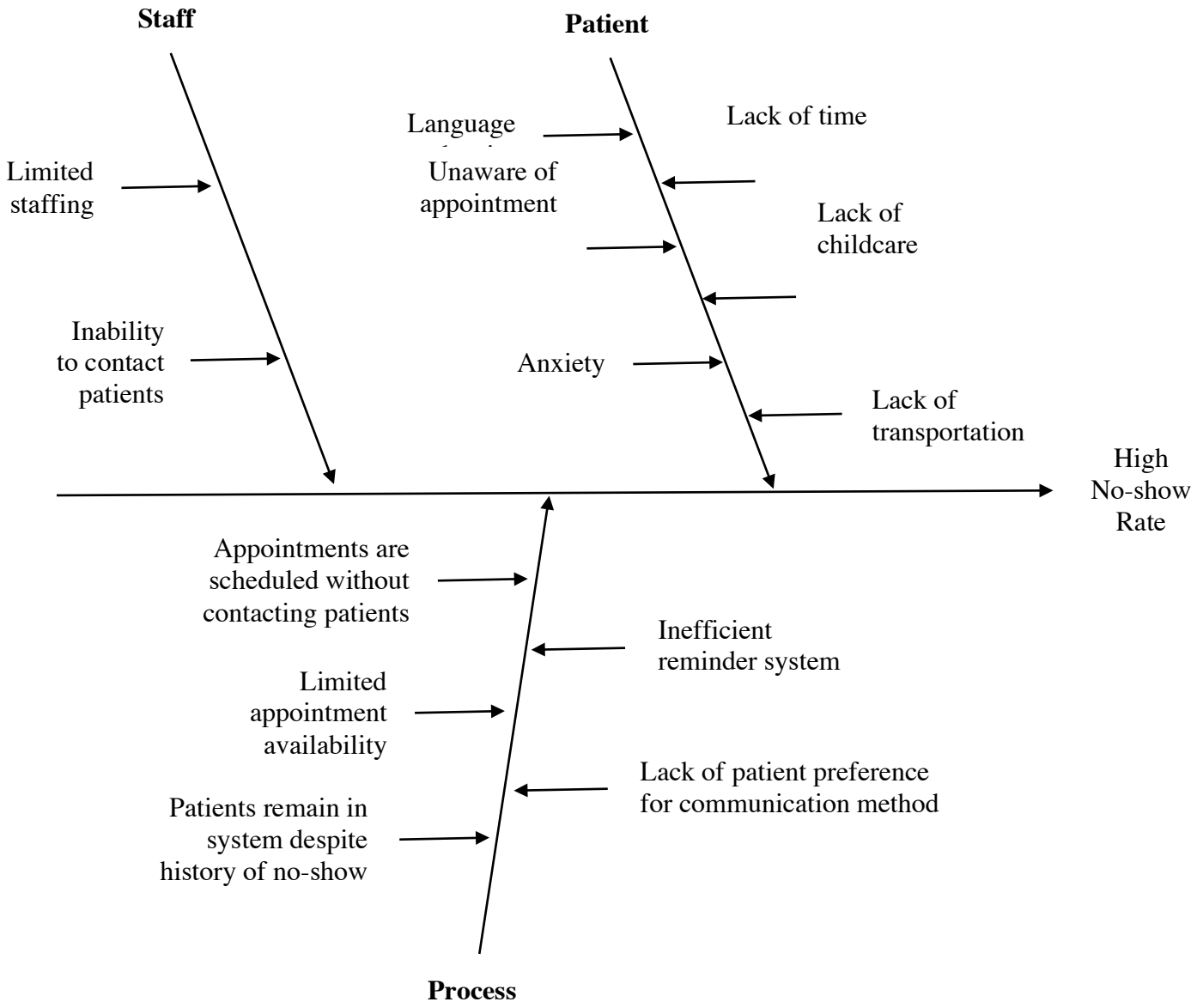
Citation	Conceptual Framework	Design / Method	Sample / Setting	Variable studied and their definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to practice
Lin et al. (2020)	N/A	Quasi-experimental design	Sample: Total N = 205 Intervention N = 145 Control N = 60 Setting: National Cancer Registry of Kaohsiung City, Taiwan	Independent: postcard, mail, telephone reminders, and text message reminders Dependent: mammography screening behavior	Demographic data: education, marital status, employment status, personal monthly income, perception of income, medical insurance, cancer hx, family cancer hx, dlievery hx; Screening rates	Descriptive statistics: analyze demographic characteristics Analysis of Variance: analyze effectiveness of mammography screening b/w the interventions Chi-square tests: analyze differences of mammography screening rate after interventions provided during various times Logistic regression analysis: identify relationship b/w different mammography reminders and mammography screening behaviors	The telephone reminder group had the highest screening rate of 43.8% or 21 women. The control group had the lowest screening rate of 13.3%, only 8 women. Women who received an intervention had significantly higher attendance rates ($p < 0.0001$), where telephone contact had the most significant influence.	Strength: Study provides strong evidence that indicates an enhanced reminder system is effective in improving mammography adherence rates Limitation: (1) Sample only consisted of women who are 45 years old (2) Observation period was only 3 months long

Chambers et al. (2016)	N/A	Randomized control trial	Sample: Total N = 856 Intervention N = 639 Control N = 217 Setting: National Health Service (NHS) East of Scotland Breast Screening Centre in Dundee, Scottland	Independent: reminder letter, simple telephone reminders, telephone support, telephone support plus anticipated regret Dependent: Mammography screening rates	Demographic data: age, attendance hx; Barriers to attending appointment; Screening rates	Analysis: SPSS version 19; one-way ANOVAs Chi-square tests: identify differences b/w treatment groups Logistic regression: assess predictors of made appointment and attended Kendall's tau: assess first-order correlations with AR and intention	The breast cancer screening attendance rate for each group was the following: control/reminder letter 6.9%, telephone 16.5%, telephone and support 11.3%, and telephone support and anticipated risk 13.1%. This data revealed that a simple telephone reminder doubled the attendance of breast cancer screening.	Strength: Interventions and findings can be transferable to other groups of low-income women who fail to show up to their breast screening appointments Limitation: Small sample size due to difficulty contacting patients: 261 were unreachable
Junod Perron et al. (2013)	N/A	Randomized controlled non-inferiority trial	Sample: Total N = 6,450 Intervention N = 3,285 Control N = 3,185 Setting: Geneva University Hospitals	Independent: Text message and telephone call reminders Dependent: Rate of missed appointments	Patient demographics: age, sex; HCP demographic: status, division of practice; Patient satisfaction; Rate of missed appointments	Analysis: Stata software Chi square tests: patient and health care providers' characteristics b/w groups	Text message reminders produce a similar impact as telephone reminders. The rate of missed appointments for the two interventions is the following: text messages = 11.7%; telephone = 10.2%. Moreover, text messages were found to be more cost-effective as additional administrative resources were needed for the telephone reminders.	Strength: (1) Large sample size, (2) First big study conducted in Europe that demonstrates the effectiveness of text messages compared to telephone reminders Limitation: (1) Single center study, where results may not be transferrable, (2) Did not collect information regarding the number of patients reached via text
Anthony et al. (2019)	N/A	Convenience sample	Sample: Total N = 331 Intervention N = 158 Control N = 173 Setting: Ryan White-funded HIV clinic located in El Paso, Texas	Independent: text message reminders Dependent: appointment adherence rate	Demographic data: age, gender, preferred language; rates of clinic attendance	Analysis was conducted using the SAS software	The post-intervention analysis indicated that a text-based reminder system significantly reduced the no-show rates from 24.8% to 17.7%, P value 0.05.	Strength: (1) Study demonstrated that text messages led to a statistically significant improvement in attendance rate of appointments (2) Patient population consisted of high risk, low-income minorities Limitation: (1) Convenience sample where findings may not be transferable

								(2) Researchers did not survey patients to determine access to smartphones with text capabilities
Vidal et al. (2014)	N/A	Quasi-experimental design	Sample: Total N = 12,786 Intervention N = 3,719 Control N = 9,067 Setting: Mammogram screening program in Catalonia, Spain	Independent: text message and letter reminders Dependent: mammography screening rates	Cost of the different interventions; Impact of SMS reminders on breast cancer screening rates	Cost-effective analysis; Sensitivity analysis	Data analysis indicated that 65% of women who only received a letter and 74.9% of women who received both a letter and text message attended their appointments. The researchers also determined that text message reminders significantly improved mammography screening rates, especially among women without previous screening who had limited access to postal mail. 74.9% of women who received a text message Additionally, a text message reminder system was deemed more efficient and cost-effective than letter reminders.	Strength: Meets reliability, validity, and applicability criteria. Limitation: Study designed only to measure immediate impact rather than long-term results

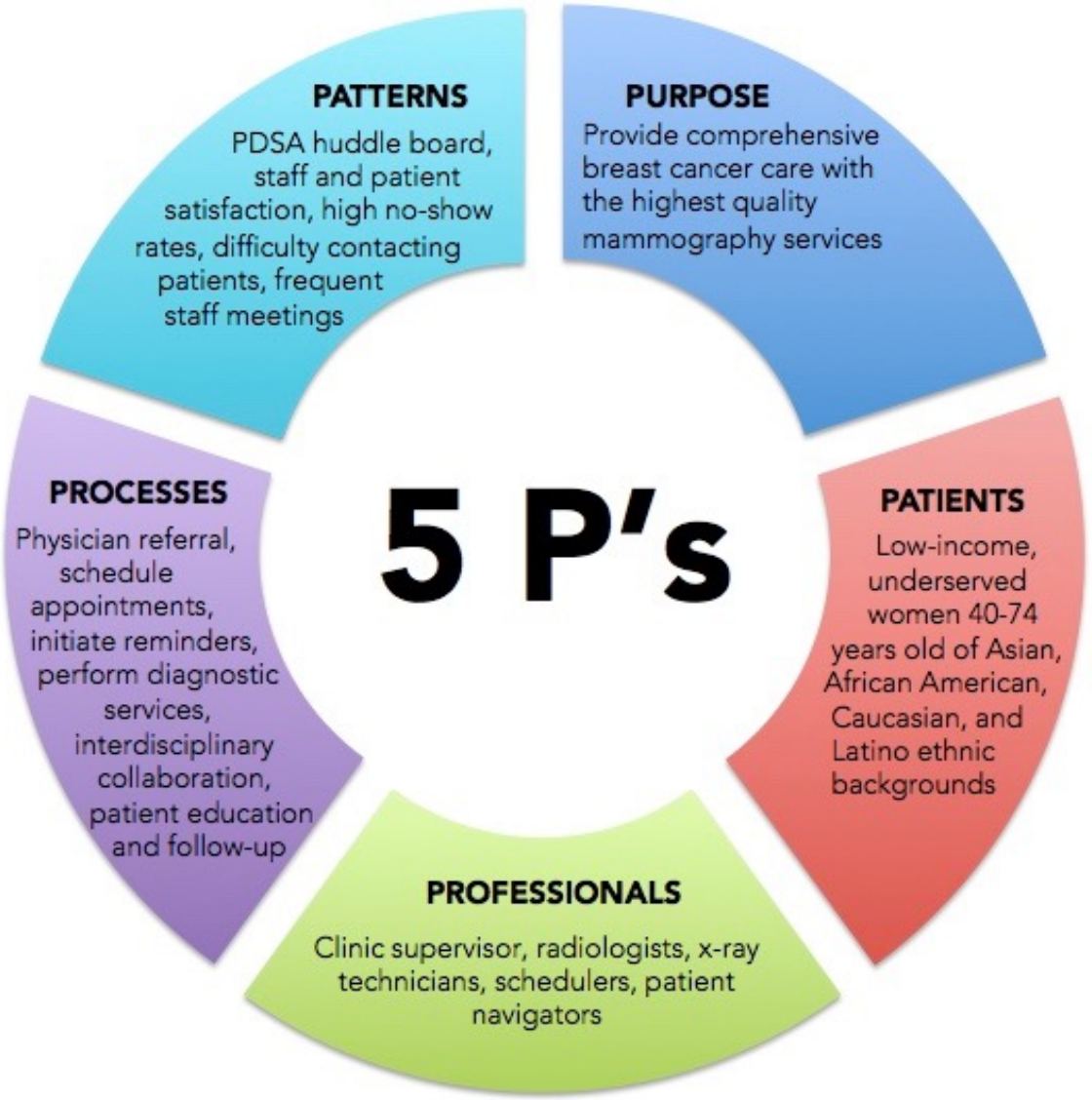
Appendix D

Fishbone Diagram



Appendix E

Microsystem Assessment (5 P's)



Appendix F

SWOT Analysis For Breast Clinic Microsystem

Strengths	**Weaknesses**
• Dedicated, compassionate staff consisting of management, radiologists, x-ray technicians, patient navigators, and schedulers • Staff speak various languages, cultivating a culturally and linguistically appropriate environment • Close collaboration with the Breast Surgery and Cancer Care clinics to deliver leading comprehensive breast cancer care • State of the art digital equipment with numerous diagnostic services offered • Staff is open to and welcomes change	• Switch to EPIC impacts staff accessibility to patient charts, leading to inefficiency of care • Centralized scheduling process is ineffective, as appointments are made without contacting patients • Limited number of staff members: 2 x-ray technicians are on leave and a full-time scheduler recently left • Not enough staff to consistently follow-up with the growing list of no-shows • Mammovan has not been operating for several months, negatively impacting the no-show rate • Limited weekend appointments
Opportunities	**Threats**
• Breast clinic is looking to hire a Registered Nurse in the near future who can help improve workflow • Staff will be given detailed, concrete plans of two quality improvement projects addressing the scheduling and reminding processes that will allow for successful implementation to improve the no-show rate • Addressing the no-show rate will significantly increase revenue, an important consideration for the clinic	• Economic insecurity caused by Covid-19 • Numerous patient barriers impacting attendance that cannot be consistently addressed

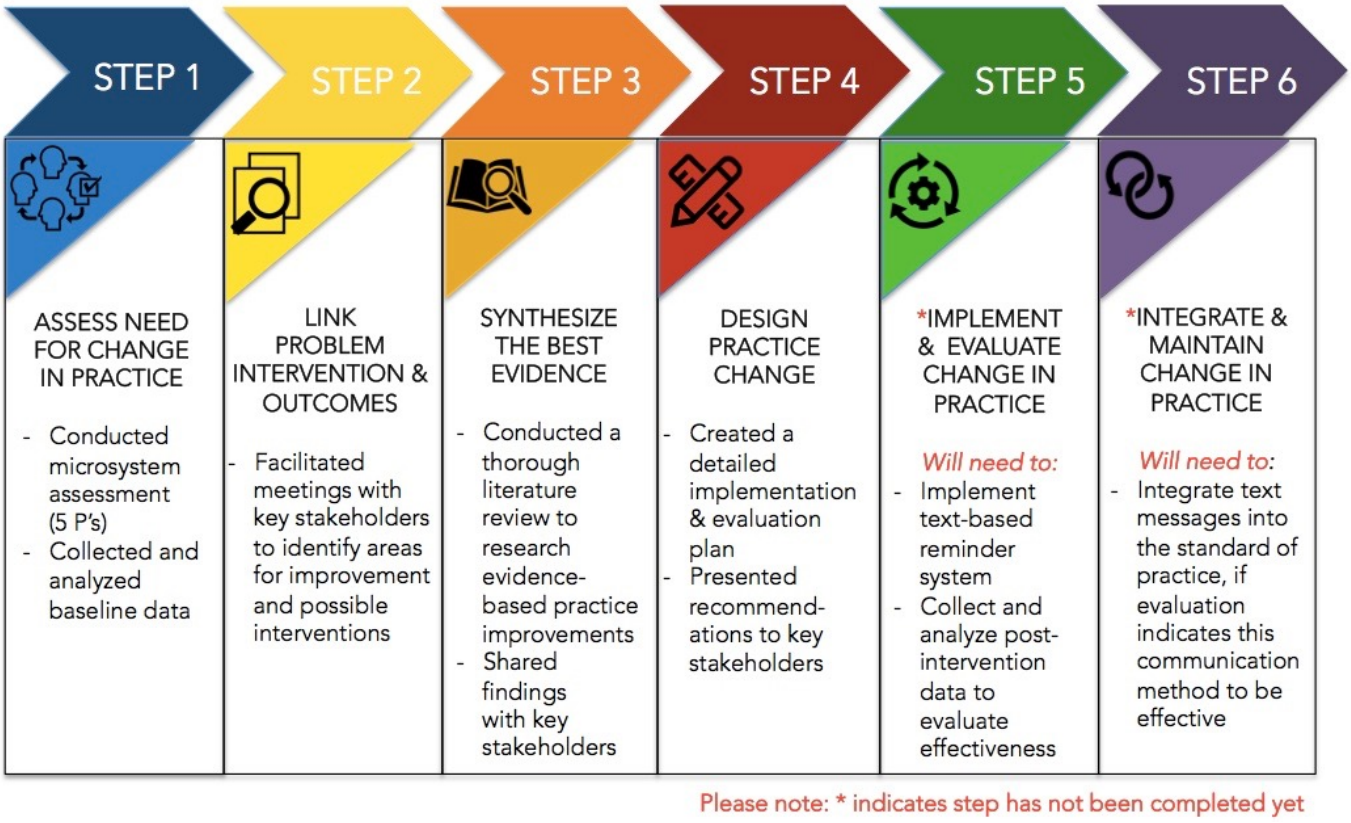
Appendix G

Cost Analysis

Description	Calculation Per Month	Calculation Per Year
Reduce No-show Rate by 2%	Average Scheduled Appointments: 723 Average No-show Appointments: 161 Current No-show Rate: 22.5% Goal: 22.5% - 2% = 20.5% 723 x 20.5% / 100% = 148 missed appointments 161-148 = **13 additional appointments per month with a 2% reduction in no-show rate**	13 x 12 months = **156 additional appointments per year with a 2% reduction in no-show rate**
Calculated Revenue	Bilateral Mammogram Screening Charge: $965 $965 x 13 additional appointments = **$12,545 increased revenue per month**	$12,545 x 12 months = **$150,540 increased revenue per year**
Cost of Implementation (one-time cost)	Text Messaging via MyChart: $0 Staff Training and Education: 5 hours Director: $71/hr x 5 = $355 Lead Tech: $46/hr x 5 = $230 Patient Navigators: $33/hr x 5 x 2 = $330 Total Training Cost: $355+$230+165 = **$915**	
Return on Investment		$150,540 total revenue - $915 total cost = **$149,625 annually**

Appendix H

Rosswurm and Larrabee's Model of Change



Appendix I

No-show Rate Tracking Data Tables

$$\text{No-show Rate} = \frac{Number\ of\ No{-}show\ Appts}{(Exam\ Volume + Number\ of\ No{-}show\ Appts)} * 100$$

	BASELINE DATA	6 MONTH: CONTROL GROUP	6 MONTH: INTERVENTION GROUP	1 YEAR: CONTROL GROUP	1 YEAR: INTERVENTION GROUP
NO-SHOW RATE	22.50%				
AVG NO-SHOW APPTS	161.3				
AVG EXAM VOLUME	560.3				

BASELINE DATA			
Month	**Exam Volume**	**No-show Appts**	**No-show Rate**
August	418	213	33.8%
September	532	156	22.7%
October	618	155	20.1%
November	564	115	16.9%
December	616	140	18.5%
January	635	117	15.6%
February	539	233	30.2%
AVG	**560.3**	**161.3**	**22.5%**

6 MONTH POST-INTERVENTION DATA						
	CONTROL GROUP			**INTERVENTION GROUP**		
Month	Exam Volume	No-show Appts	No-show Rate	Exam Volume	No-show Appts	No-show Rate
1						
2						
3						
4						
5						
6						
AVG						

1 YEAR POST-INTERVENTION DATA						
	CONTROL GROUP			INTERVENTION GROUP		
Month	Exam Volume	No-show Appts	No-show Rate	Exam Volume	No-show Appts	No-show Rate
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
AVG						

Appendix J

Staff Satisfaction Survey

STAFF SATISFACTION SURVEY					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have a clear understanding of my role with the new reminder process.	1	2	3	4	5
Adequate training and resources were provided to me during the transition.	1	2	3	4	5
This intervention has improved my workload.	1	2	3	4	5
I am satisfied with the new workflow.	1	2	3	4	5

Appendix K

Evidence-Based Change of Practice Project Checklist

University of San Francisco
School of Nursing and Health Professions

Student Project Approval:
Statement of Determination

Title of Project: Reducing the No-show Rate of Breast Cancer Screenings: A Quality Improvement Project

Brief Description of Project: This quality improvement initiative will be implemented at a breast clinic that is a part of a Level 1 trauma, community hospital located in the County of San Francisco. To increase the breast cancer screening adherence rate, a 12-week evidence-based project to enhance the appointment reminder system was implemented from February to May 202. Reducing the high no-show rate will allow this microsystem to utilize available resources optimally, promoting the clinic's commitment to providing patients with the highest quality mammography services.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
(http://answers.hhs.gov/ohrp/categories/1569)

☒ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☐ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

Signature of Student: **Date:** 3/22/2020

STUDENT NAME: Julisa Lau
DATE: 3/22/2020
SUPERVISING FACULTY: Dr. Wanda Borges

Instructions: Answer YES or NO to each of the following statements:

Project Title: Reducing the No-show Rate of Breast Cancer Screenings: A Quality Improvement Project	**YES**	**NO**
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	✓	
The specific aim is to improve performance on a specific service or program and **is a part of usual care**. ALL participants will receive standard of care.	✓	
The project is **NOT** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **NOT** follow a protocol that overrides clinical decision-making.	✓	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	✓	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	✓	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	✓	
The project has **NO** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	✓	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	✓	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."*	✓	

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files. If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

Appendix L

Project Charter

GLOBAL AIM

The global aim of this project is to enhance the appointment reminder system in a breast clinic microsystem to improve patient outcomes and enhance staff workflow and productivity.

SPECIFIC AIM

The specific aim of this project is to reduce the no-show rate of breast cancer screenings by 2% for low-income, underserved women 40-74 years old by December 2020.

BACKGROUND

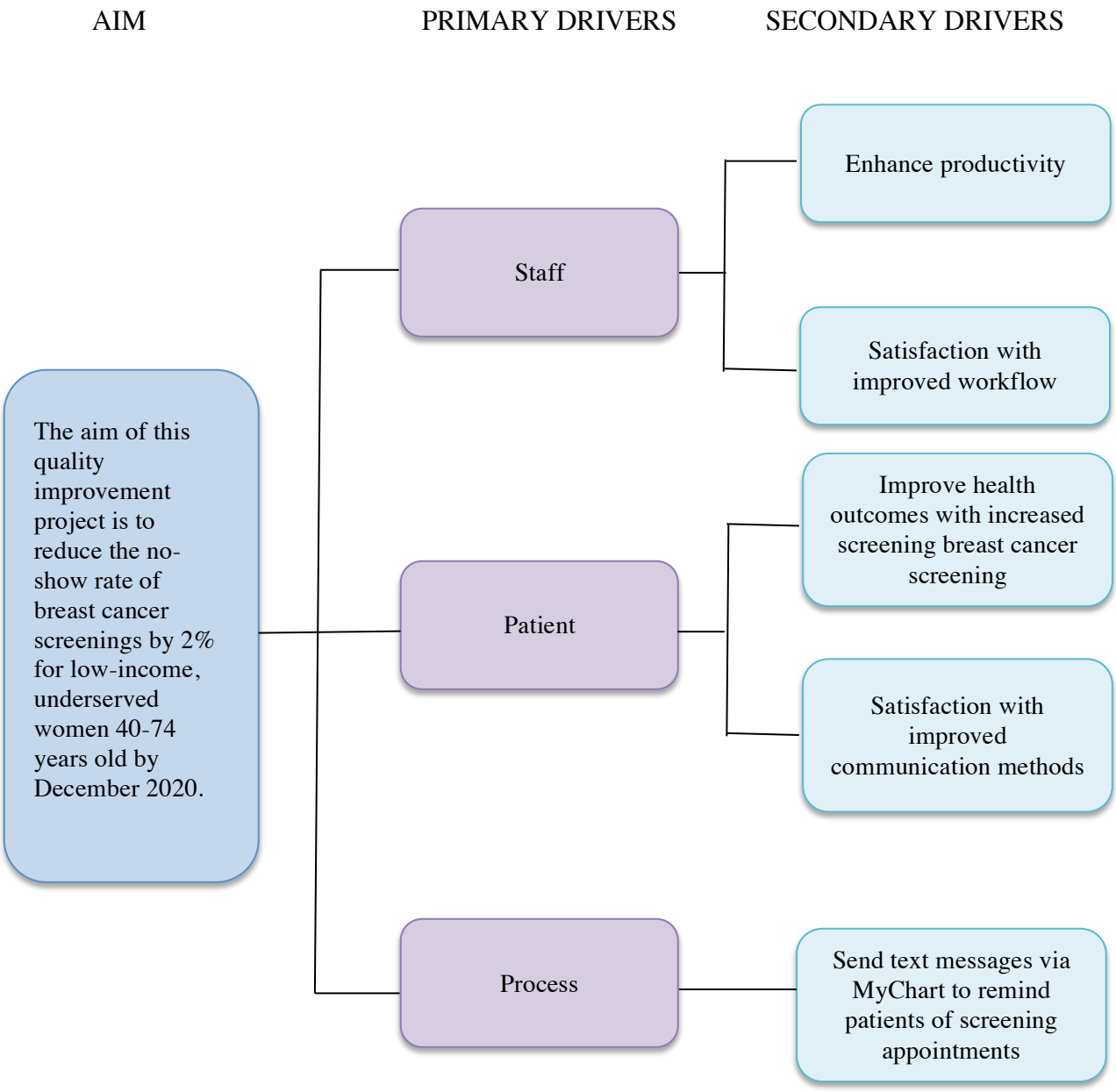
Breast cancer is the most common cancer and the leading cause of cancer mortality among women worldwide. Although mammograms are the most effective method for early detection to reduce breast cancer deaths, many women still fail to attend their appointments (Bittencourt & Scarinci, 2019). Perceived patient barriers to getting a mammogram include fear of cost, pain, and results. A lack of breast cancer screening leads to a later diagnosis of the disease and higher mortality rates, which is apparent among low-income, ethnic minority women. For instance, African American women have a breast cancer mortality rate 37% higher than the national average (Faguy, 2019). This health disparity emphasizes the need to improve breast cancer screening adherence, especially among underserved, under-screened women.

High no-show rates lead to poor patient outcomes, decreased staff productivity, and significant loss in revenue for a health care system. This issue is particularly evident in microsystems providing care to underserved populations, possibly a contributing factor to poorer health outcomes often observed among this group (Kaplan-Lewis & Percac-Lima, 2013). Data collection and analysis revealed that the average no-show rate at the breast clinic between August 2019 and February 2020 was 22.5% (see Appendix A for run charts). The highest no-show rates of 33.8% and 30.2% were observed in the months of August and February, respectively. It is important to note that the breast clinic transitioned to the Epic electronic health records system in August, while Covid-19 started becoming more prominent in February. These events could have led to the higher no-show rates observed in these two months.

MEASURES

MEASURE	DATA SOURCE	TARGET
Outcome #1: Reduction of no-show rate	- No-show data collection and analysis via Epic report - Data tables	2%
Outcome #2: Staff satisfaction	- Staff survey	100% satisfaction
Process: Number of text message reminders vs. phone call reminders	- Epic/MyChart report	> 50% of patients receiving text message reminders
Balancing: Increase in no-show rate	- No-show data collection and analysis via Epic report - Data tables	0%

DRIVER DIAGRAM



SPONSORS

Clinic Director	Annette Cull
Chief Radiologist	Dr. Bonnie Joe

TEAM

Clinic Director	Annette Cull
Chief Radiologist	Dr. Bonnie Joe
Lead Technician	Nancy Toscano
Patient Navigator	Wendy Liu
Patient Navigator	Hosana Zamora
Scheduler	Jessica Uribe
Scheduler	Rebecca Duong
Scheduler	Genell Harris
Scheduler	Sara Ibarra
Eligibility Specialist	Tamara Johnson

MEASUREMENT STRATEGY

The clinic director will generate an Epic report after each month to determine the exam volume of breast cancer screenings performed and the number of no-show appointments for both the intervention and control groups. This information will then be used to compute the no-show rate. These values will be logged into the data tables created by the CNL to monitor the progress of the intervention

$$\text{No-show Rate} = \frac{Number\ of\ No{-}show\ Appts}{(Exam\ Volume + Number\ of\ No{-}show\ Appts)} * 100$$

	BASELINE DATA	6 MONTH: CONTROL GROUP	6 MONTH: INTERVENTION GROUP	1 YEAR: CONTROL GROUP	1 YEAR: INTERVENTION GROUP
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AVG						

1 YEAR POST-INTERVENTION DATA						
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1						
2						
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12						
AVG						

After six months of implementation, a survey will also be given to the patient navigators to assess staff satisfaction.

STAFF SATISFACTION SURVEY					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have a clear understanding of my role with the new reminder process.	1	2	3	4	5
Adequate training and resources were provided to me during the transition.	1	2	3	4	5
This intervention has improved my workload.	1	2	3	4	5
I am satisfied with the new workflow.	1	2	3	4	5

TIMELINE