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Using Technology-Driven Patient Communication Appointment Reminders to Improve Uniform Data System Measures in a Federally Qualified Health Center

Ana Torres
Grand Valley State University

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Using Technology-Driven Patient Communication Appointment Reminders to Improve Uniform

Data System Measures in a Federally Qualified Health Center

Ana Torres

Kirkhof College of Nursing

Grand Valley State University

Advisor: Tricia Thomas PhD, RN

Advisory Team: Karen Burritt PhD, RN, David Jasperse MD

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Abstract

Background: Process of meeting Uniform Data System (UDS) measures in a west Michigan Federally Qualified Health Center (FQHC) has several components with different team members sharing responsibility in the process and workflow to document preventative screenings. An evidence-based technology-enhanced patient communication intervention was developed to meet benchmarks for the FQHCs UDS reporting metrics. The purpose of this quality improvement project was to answer the clinical question: Will technology-enhanced communication appointment reminders using automated telephone communication increase rates of screening follow-up visits to improve data reported to UDS at a west Michigan FQHC organization?

Objectives: Increase percentage of screening visits after the implementation of technology-driven patient communication appointment reminders to meet UDS metrics for the FQHC organization.

Methods: The design for this evidenced-based quality improvement initiative was translation of evidence into practice. Use of quality and process improvement tools facilitated discussion and workflow redesign.

Setting: The setting for this project was a FQHC clinic in west Michigan. The outcomes were measured using manual data collection.

Results: Twenty-seven (n=27) automated phone call reminders were successfully arranged and delivered. Through the generation of automated phone call reminders 44% of patients scheduled appointments (n=12) and 56% of patients did not (n=15). Of the twelve who have scheduled, 8 (66.7%) have completed the appointment, 4 (33.3%) have not.

Conclusions: Technology-enhanced patient communication workflow process workflow and activation of existing in the EMR functionality to increase rates of screening follow up visits in

efforts to improve data reported to UDS were effective in setting an appointment 44% of the time and execution of the visit occurred in one third (33%) of those patients.

Clinical Implications: While appointment setting and return visits occurred in less than half of the patients, the technology-driven automated phone calls did demonstrate an improvement in appointments set and completed. Therefore, technology-enhanced patient communication workflow process should be expanded to remaining clinical teams.

Keywords: Automated telephone OR automated phone AND reminders AND communication AND attendance

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Introduction

Electronic medical records (EMRs) are the central component of the health information

technology infrastructure (Health IT, 2018). EMRs have been adopted widely in the US health

care system and significant attention has been focused how this technology can help improve

quality, efficiency, and effectiveness of healthcare delivery (Banger & Graber, 2015). EMRs

contain patient's medical records, diagnoses, medications, laboratory, test results, and treatment

plans that allow clinical team members to focus on the delivery of quality, safety, and efficiency

of medical care (Health IT, 2018). However, these advantages cannot be ensured in isolation.

The American Academy of Family Physicians (AAFP) (n.d.) state that, "achieving the true

benefits of EMR systems requires transformation of practices, based on quality improvement

methodologies, system and team-based care and evidence-based medicine" (para. 1). Therefore,

EMRs can serve as a tool to improve efficiency, standardization, and effectiveness through the

use of technology when integrated into care delivery workflow processes.

One of the functional capabilities of EMRs is to support standard care plans, guidelines,

and protocols by arranging automated phone calls or reminders to notify patients of preventative

services and tests that are due or overdue (AAFP, n.d.). Arranged automated phone calls and

reminders can be set up in patient's native or preferred language. Using technology-driven

communication reminders can facilitate timely contact with providers that foster safer and higher

quality care to patients and the community (AAFP, n.d.).

Federally Qualified Health Centers (FQHC) offer comprehensive health services

including primary care, behavioral health, chronic disease management, preventative care, and

other patient support services (Health Resources and Services Administration [HRSA], 2017).

Health centers that receive grant funding from the HRSA Bureau of Primary Health Care, under the Health Center Program authorized by Section 330 of the Public Health Services (PHS) Act qualify for specific funding from reimbursement systems under Medicare and Medicaid (Rural Health Info, 2018). HRSA (2017) argues that FQHCs, "reduce health disparities by emphasizing care management of patients with multiple health care needs and the use of key quality improvement practices, including health information technology" (para. 1).

To maintain FQHC status and continue to receive federal grant funding, organizations must meet HRSA annual quality measures reported to the Uniform Data System (UDS). UDS is a standardized set of data reported by health centers each year. It contains a core set of information including patient demographics, services provided, clinical processes and outcomes, staffing, patient's use of services, costs and revenues appropriate for documenting the operation and performance of health centers (HRSA, n.d.). HRSA tracks and analyzes the data annually to improve health centers performance and operations (HRSA, n.d.).

The process of meeting the UDS measures in a west Michigan FQHC has several components with different team members sharing responsibility in the process. Gaps have been identified in the office processes and workflow to document preventative screenings. The documentation to identify the need for preventative screening and follow up is gathered during an office visit by the provider. Providers are held responsible to determine if a patient is current with preventative screenings. This requires providers to remember to look for the screening test and the date it was last completed. Depending on the reason for the visit, time may not permit the screening requirements to be completed.

The west Michigan FQHC uses AthenaHealth® and Cerner® EMRs. Currently AthenaHealth® has the functionality to run UDS quality measure reports and program automated phone call reminders. Features of AthenaHealth® are not being used to their full capabilities in

this FQHC. Engaging the technology functionality and features can assist this FQHC improve UDS measure and develop a workflow for office staff. Eleven of the twenty-five UDS measures fall under benchmark metrics. Therefore, UDS clinical metric(s) improvement can allow to increase grant funding for the FQHC clinic. Additionally, it can allow to expand access, address health disparities, improve quality, and reducing the costs of health care.

Assessment of the Organization

An organizational assessment helps identify readiness for change and whether a project meets a need within the organization. Feasibility is determined through an appreciation of organizational priorities and the availability of resources to support the change. An organization assessment is systematic approach guided by a framework to ensure the relevant components of an organization are considered in a comprehensive manner (with a systems lens) so facilitators and barriers that are obvious and subtle can be identified and considered before initiating a change in order to be successful in implementing and sustaining a quality improvement project.

Learning about the organization, employees, culture, and what is important to the people within the organization. Building rapport with staff and keeping them informed improves the likelihood that staff will participate in the change process and sustain the change in workflow. The organizational assessment also helps identify facilitators and barriers of implementing a quality improvement project. Assessing these components of an organization can be complex, therefore, using a framework to guide the assessment is important. The Burke-Litwin Model of Organizational Performance and Change was used to analyze the state of a FQHC clinic in west Michigan. A strength, weakness, opportunities and threats (SWOT) analysis was used to establish the current state of the FQHC and guide decisions about interventions based on facilitators and barriers to the practice change.

Framework for Assessment: Burke-Litwin Causal Model

The Burke-Litwin Organizational Performance and Change Model was used to guide the organizational assessment for practice change at the FQHC clinic (Appendix A) (Burke & Litwin, 1992). The Burke-Litwin model describes how the relationship between various environmental factors are the driving forces of change and performance within an organization (Stone, 2015). This model provides a link between organizational context, practice, and process of change within an organization.

Burke-Litwin incorporated 12 organizational variables into their model. The model identifies how elements with the system are intertwined and how alignment or change in different variables within the model create the desired impact within an organization (Burke & Litwin, 1992). The 12 variables are external environment, mission and strategy, leadership, organizational culture, structure, work unit climate, management practices, systems including policies and procedures, task and individual skills and abilities, individual needs and values, motivation, and individual and organizational performance as drivers of change (Burke & Litwin, 1992).

Burke-Litwin's 12 organizational variables interact and affect one another (Stone, 2015). However, not all 12 variables impact an organization equally. There are transformational and transactional factors in the model. Transformational change happens in response to the external environment which directly affects mission, strategy, leadership, and culture of the organization. The transactional factors are leadership-based and organizational performance (Burke & Litwin, 1992).

Transactional Factors. Transactional factors include structure, systems, management practices, and work climate, as these factors are more operational in focus and derive incremental change with respect to organizational change (Stone, 2015). Transactional factors affect and are affected by a greater variety of variables than transformational factors. Being able to understand

the relationship between these 12 key organizational dimensions is key to effective and smoother change (Stone, 2015).

Transactional factors within the west Michigan FQHC organization served as facilitators to positively impact a change within the practice. From a structure and system perspective, standards of practice and policy and procedures guide daily activities for patient care. To carry out a quality improvement project, there has to be open communication and team work. The providers, nurses, and medical assistants (MAs) are divided into four teams. Each team contains two to three providers, each with two MAs. Among the teams, collaboration and communication is evident. If there are any questions regarding a patient's case, MA's must report to their primary provider.

Additionally, front office staff also served as an important asset to the structure of the organization. Patient registration, coordination of appointments, and clerical responsibilities are done by the front office staff. As observed in the clinic, all personnel practice within their scope of practice and as issues arise, they follow the chain of command.

In regard to individual tasks and skills, staff within the organization all work within their scope of practice to deliver safe and efficient care. FQHC providers feel valued for the care and service they are able to provide in patient's native language. It is evident from observation that the organization staff hold specific knowledge, behavior, and skills that are conducive for a quality improvement project.

Transformational Factors. The external environment impacts transformational factors including mission, strategy, leadership, and culture of the organization. The transformational factors are leadership-based and organizational performance (Burke & Litwin, 1992). According to the mission and values, FQHC clinics articulate its mission as, "Serving together in the spirit of the Gospel as a compassionate and transforming healing presence within the community"

(XXX, 2018b). The organization has delineated core values and guiding behaviors as strategic levers to fulfil its mission. The culture, behavior, values, and attitudes have the capability to affect the phenomenon of interest and the organization. The FQHC clinic had effective collaboration and communication among staff.

Outside conditions can include political or governmental circumstances, financial conditions, and the marketplace. Several external influences exist that have the ability to affect the FQHC clinic. The FQHC clinic offers comprehensive health services including primary care, behavioral health, chronic disease management, preventative care, and other patient support services (Health Resources and Services Administration [HRSA], 2017). The organizational assessment identified strong context and strong facilitation within the organization.

Ethics and Protection of Human Subjects

Prior to beginning a quality improvement initiative within the organization, the DNP student submitted an Institutional Review Board (IRB) application for quality improvement exception and GVSU's Human Research Review Committee. Project implementation did not begin until both institutions granted formal IRB approval as not human subjects research.

No identifiable patient information was collected including patient demographics such as, name, address, race, ethnicity or date of birth. All actions to protect patient health information aligned with regulations of the organization as well as the Health Insurance Portability and Accountability Act (HIPAA). Within the scope of the quality improvement project, there were no identifiable social, economic, legal information included in the quality improvement project. To ensure all components of the project aim to project patient information, the DNP student participated in collaborative institutional training initiative (CITI) program for research ethics and compliance training.

Stakeholders

Stakeholders are individuals or groups that have an interest in and outcomes of the identified phenomenon, therefore, stakeholders are vital assets to the success of quality improvement initiatives (Moran, Burson, & Conrad, 2017). Stakeholders provide guidance on project implementation, identify options and/or solutions to identified issues, provide input, and identify resources available for the quality improvement projects (Moran et al., 2017).

Primary stakeholders identified within the FQHC clinic was staff including the physicians, physician assistants, nurse practitioners, nurses, medical assistants, front office staff, and administrative staff who were accountable for change implementation strategies and outcomes. The director of operations, practice lead manager, and ambulatory informatics personnel were important secondary stakeholders of this quality improvement project as they allocate resources, set direction for the clinic, and support the care providers in the provision of care.

SWOT Analysis

A strength, weakness, opportunity, and threat (SWOT) analysis was performed in the FQHC clinic to assess the culture, attitude, and readiness around technology-driven patient communication (Appendix B). A SWOT analysis examines internal and external attributes and threats that could have a positive or harmful influence on the phenomenon of interest (Moran et at., 2017). The analysis of the internal strength and weaknesses along with the external opportunities and threats can provide a general view of the current situation and organizations ability to change within the context of the phenomenon of interest (Moran et al., 2017).

Strengths. Strengths were identified within the FQHC clinic. Stakeholders at the clinic had different roles and obligations that allowed them to serve and focus on collaborative and coordinated care. The staff at the clinic genuinely cared about their patients and focused on

quality improvement projects. AthenaHealth® and Cerner® EMRs are intuitive technology

systems that are easy to navigate. Stakeholders were familiar with these EMRs. Additionally,

outcome measures could be easily tracked and trended.

Weaknesses. Just like strengths, there are weaknesses aligned to the phenomenon of

interest. Interfaces between the AthenaHealth® and Cerner® EMRs create potential for loss of

information. Information not properly scanned in or preventative measures flagged as being

complete due to interface communication. Furthermore, having inaccurate information such as a

phone number or address have the potential to hinder quality improvement project. Inconsistent

charting and recording of preventive care measures can weaken the projects outcome.

Additionally, there is a new EMR system to go live in January 2020; this has the potential

to threaten the sustainability of the project if new EMR does not have feature of a technology

enhanced patient communication. Lastly, if automated messages are unable to produce in

patient's native language, messages will not be delivered appropriately, and project and/or

outcome measures can be threatened.

Opportunities. There are many opportunities that exist for the FQHC clinic if quality

improvement project is successful. The organization can be a model for other community

ministry practices to replicate the technology-driven patient communication in efforts to improve

UDS results. Improvement in UDS measures could improve health center quartile rankings for

outcomes measures leading to increased grant funding and maintaining FQHC status. This can

also serve as an opportunity to increase quality preventative care and in turn decrease costs and

maximize reimbursement.

Threats. There are always potential threats to a newly implemented quality

improvement project. If quality reports provided for the UDS reporting are not meeting

benchmark measures, there could be a reduction in grant and incentive payments provided to the

organization. Another major threat involves potential changes in policy at the federal and state level related to FQHC reimbursement. Additionally, insurance policy changes, and cost in the horizon could threaten the sustainability of the FQHC.

Clinical Practice Question

An evidence-based project to answer the following practice or clinical question was: Will technology-enhanced communications using automated telephone communication increase adherence in screening visits to improve data reported in UDS measures at a west Michigan FQHC?

Review of the Literature

The aim of the literature review was to report evidence focused on EMR generated communication and reminders as technology-driven process improvement strategies to increase follow-up in screening visits. Findings of the review were used to implement existing technology in the AthenaHealth® EMR supported by the Cerner® database to develop and implement workflow process with members of the clinics team. The literature review aimed to answer the following questions:

1. In current practice, how is technology-driven communication used to improve patient visits?

2. Do automated alerts or reminders improve contact rates to communicate with patients for appointment reminders and needed appointments?

3. Do automated reminders increase visit rates for screening appointments?

Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline served as the framework for this review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). A comprehensive electronic search was conducted in the Cochrane

Library database, CINAHL, and PubMed limited to 2008 to 2018. Search was limited to academic journals. Keywords were automated telephone OR automated phone AND reminders AND communication AND attendance.

Population. Included were samples of all ages regardless of age, gender, education, marital status, employment status, or income. Study characteristics included those in primary care practices, Veterans Administration clinics, and homeless patients. Patient race included African American and Hispanic American patients. Samples with comorbid clinical and mental health diagnoses. Included were those in primary care settings.

Intervention. Interventions comprised of an automated approach (alert, phone call, text or reminder) that were programmed using technology and sent to the recipient. Electronic alerts or reminders that were interventions (implemented) and had an evaluation metric.

Comparison. Articles for this review compared results of electronic interventions in the form of alerts and reminders targeted specifically for patients and practices that did not utilize automated reminders.

Outcome. Included were outcomes on the efficiency of automated technologies to help patients achieve improved patient outcomes through the use of automated alerts.

Exclusion Criteria. Studies with alerts or reminders directed towards clinicians, assessing patient preferences, or evaluating willingness to receive electronic alerts or reminders. Studies also excluded were those with an intervention as an automated telephone monitoring system, automated telephone for refill reminder and automated telephone queries to assess medication adherence. Additional exclusion were studies not available in full text.

Summary of Results

The search yielded 7 Cochrane review articles, 311 CINAHL articles and 13 PubMed articles. One additional article was included that was identified through review of references.

Each article was screened using inclusion and exclusion criteria according to PRISMA criteria (Appendix C) (Moher et al., 2009). Removal of duplicates and review of titles and abstracts resulted in removal of 287 articles that did not meet the inclusion criteria. In addition, 29 articles were excluded after in-depth examination of content, as they did not meet inclusion criteria. The remaining 7 articles were included in this review (Appendix D).

Evidence to be used for Project

A key finding of the review was that there is evidence of automated technology alerts and reminders can assist to communicate with patients for appointments. Attendance for healthcare appointments is reported to increase for those with mobile phone messaging reminders and phone calls according to Gurol-Urganci et al., (2013). The attendance to appointment rates were 67.8% for the no reminders group, 78.6% for the mobile phone messaging reminders group and 80.3% for the phone call reminders group (Gurol-Urganci et al., 2013).

It is evident that alerts and reminders can improve contact rates to communicate with patient for appointment reminders and needed appointments. Additionally, findings of this review were that reminder and recall systems were effective form of communication for children, adolescents, and adults. Therefore, reminder and recall system can be an effective form in all types of medical or health settings (Jacobson Vann et al., 2018).

The literature supports there is benefit in having alerts and reminders as adherence rates for preventive screening (mammograms) increase by 17.8% for women that were assigned to automated telephone reminders (DeFrank et al., 2009). Automated voice reminders in this study demonstrates to be the most effective and lowest in cost and could increase proportions of patients who receive mammograms at annual or biennial intervals (DeFrank et al., 2009). Additionally, EMR linked communication (automated 50.8% assisted 57.5%; and navigated 64.7%) demonstrated rates for colorectal screening program led to patients being current for

screening compared to usual care 26.3%. EMR communication reminders have demonstrated the benefits to increase preventive screenings appointments.

The benefits of automated patient communication can allow for the incorporation of this intervention into practice to increase preventative screenings. However, it is imperative to examine the sustainability of a technology enhanced patient communication. The articles reviewed shows positive effects of automated patient reminder post intervention. However, no studies have addressed sustainability of the intervention.

Phenomenon Conceptual Model

In order to view the phenomenon of interest in a structured approach, a conceptual model was utilized. The Donabedian Model was utilized to view the various aspects of the phenomenon of interest including EMR capabilities, patient communication, staff responsibility in processes, and quality metrics outcomes.

Donabedian Model. The Donabedian's quality of care model was initially developed in 1966 by Avedis Donabedian and was described as a framework for examining health services and evaluating quality of care (McDonald, 2007). The model consists of a three-part approach: structure, process, and outcomes from which information regarding quality of care can be evaluated (Donabedian, 1988). Through the application of the model, the structure, process and outcomes are examined and established to achieve improved outcomes. It is imperative that all three factors are considered when working towards an impact on quality care (Appendix E).

Structure. The structural components include factors that affect the context in which care is delivered (Donabedian, 1988). This includes the attributes of material resources (facilities, equipment and money), human resources (number and qualification of personnel) and organizational structure (medical staff organization, peer review, methods of reimbursement)

(Donabedian, 1988). Appraisal of the structural aspects of the organization highlighted an

opportunity for improvement in technology-enhanced patient communication.

The west Michigan FQHC clinic is one of five community ministry clinics that are part of

a larger organization in west Michigan and a national health system. The FQHC has a practice

manager that oversees five physicians, three physician assistants, one nurse practitioner, the front

office staff, medical assistants, LPNs, RNs and client service coordinators. The practice

manager reports to the director of operations, who reports to the operations and outreach VP,

who then reports to the chief medical office and lastly to the president of the company. The

organizational leadership and hierarchy expand to a regional and national health system, but the

focus of this project will be specific to this west Michigan FQHC. There is also a medical

director for all of the community benefit clinics.

Process. The process contains the acts of healthcare delivery and patient activities in

seeking care and carrying it out (Donabedian, 1988). Quality based reimbursement or value-

based program has been incentivized to drive quality of care and has drifted away from quantity

of care. Quality-based incentives are associated with patient's insurance as well as FQHC grants

and incentives available. Additionally, CMS rewards health care providers with incentive

payments for the quality of care they give to people with Medicare (Centers for Medicare &

Medicaid Services [CMS], 2018). The shift in care was to provide better healthcare to

individuals at a lower cost (CMS, 2018).

UDS quality indicators are a standardized set of data elements reported by FQHC health

centers each year. It contains a core set of information, including patient demographics, services

provided, clinical processes and outcomes, staffing, patient's use of services, costs and revenues

appropriate for documenting the operation and performance of health centers (HRSA, n.d.).

However, the documentation to identify the need for preventative screening and follow up is gathered during an office visit by the provider. Often, the reason for the office visits is unrelated to the preventative care screening requirements. Therefore, each provider must individually determine if a patient is up to date with preventative screenings. This is dependent on providers remembering to check the preventative screening requirements for a patient and whether time permits. If time permits, preventative screenings might be done at the time of service. If time is an issue, patients are scheduled for a future appointment.

Follow up and scheduling of preventative screening measures is dependent on office staff identifying the need and communicating the need for a screening intervention to the patient to ensure follow up appointments are scheduled. The responsibility for documentation of the communication related to screening interventions and communication to the patient have not been consistent and the process flow and policies within this FQHC are not consistently followed. The receptionists, providers, and care managers share responsibility in communicating and scheduling screening visits for UDS reporting yet none are solely responsible for the process. Therefore, improving patient communication was an area of opportunity to provide quality care for the organization.

Outcomes. The outcomes focus on the impact of the healthcare service on all effects of patient's healthcare including health status, behavior, knowledge and satisfaction and health related quality of life (AHRQ, 2011). Quality care that is provided and documented can result in grants and incentive payments based on UDS quality indicators reported. However, a systematic flow and process to effectively deliver quality care services needs take place.

Two quality measures tied to workflow and process effectiveness are cervical cancer screening and colorectal cancer screenings. In the first quarter of 2018, the UDS cervical cancer and colorectal screening compliance rates were 64% and 44% respectively for this FQHC clinic.

These two clinical metrics require improvement to meet the UDS requirement benchmark of 80% respective to increase grant funding for the FQHC clinic. A technology-enhanced communication can serve as a useful tool for patient communication. Utilization of automated telephone communication through AthenaHealth® EMR can change patients' health behaviors, improve clinical outcomes and increase healthcare uptake.

Project Plan

Purpose of Project and Objectives

The purpose of this DNP scholarly project was to implement a technology-driven intervention at a Federally Qualified Health Center in west Michigan. This was accomplished by answering the clinical question: Will technology-enhanced communication using automated telephone communication increase rates of screening follow up visits to improve data reported to UDS at a west Michigan FQHC organization?

Objectives. Collaborating with a west Michigan FQHC team, technology-enhanced communication using automated telephone communication will be evaluated to ascertain whether screening visit rates increase based on the following activities:

1. Identified current state of patient communication.

2. Collected baseline data to establish current state of screening visits.

3. Collaborate with key stakeholders and interprofessional team members to develop care flow and team member responsibility for technology-enhanced communication using automated telephone communication based on best practice evidence in the literature.

4. Established process flow and technology requirements to automate telephone communication in a patient's native or preferred language.

5. Utilize rapid cycle Plan, Do, Study, and Act (PDSA) cycles, facilitate practice change, and support staff during implementation of automated phone calls.

6. Collect results of both organizational and patient outcomes.

7. Monitored changes in UDS reporting.

8. Create a sustainability plan for delivery of technology-enhanced patient communication.

Design for the Evidence-based Initiative

The DNP student led a west Michigan FQHC team in the evaluation of process changes in a technology-enhanced patient communication quality improvement project. Utilizing rapid cycle PDSA cycles, the team will enact specified process changes to achieve automated reminder phone calls to patients requiring follow up appointments for UDS screening visits. HRSA (2011), argues that a quality improvement consists of a systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups. The technology-enhanced patient communication will include outcome-based performance measures to assess the change within the practice (Moran et al., 2017). From a sustainability perspective, existing organizations quality tools and processes will be utilized to implement the quality improvement initiative. Rapid cycle PDSA cycles will generate new workflow processes that will be documented. The evidence-based technology-enhanced patient communication can therefore be replicated in the other four FQHCs.

Setting

The setting for this DNP scholarly project was in one of five community ministry clinics that are part of a larger health care organization in West Michigan that is part of a national health system. The FQHC clinic offers comprehensive health services including primary care, behavioral health, chronic disease management, preventative care, and other patient support

services to patients across the lifespan. Services are available to the underserved, homeless, migrants, and uninsured throughout the community (XXX, 2018a).

Participants

The participants in the quality improvement project was primarily clinic staff. The key stakeholders include the physicians, PAs, RNs, LPNs and MAs. Additionally, front office staff and ambulatory informatics clinical specialist served as an important asset to the structure of the organization as patient registration, coordination of appointment and clerical responsibilities are performed by them.

Implementation Model: Plan, Do, Study, and Act.

The Plan, Do, Study, and Act (PDSA) Cycle provided a framework for developing and testing small changes through implementation of change resulting in measurement that cyclically leads to an improvement. PDSA focuses on learning as quickly as possible whether an intervention works in a particular setting (Reed & Card, 2016). It allows for adjustment according to the results thereby increasing the chances of delivering and sustaining the desired improvement (Reed & Card, 2016). There are four steps to a PDSA cycle (Appendix F). First, an evidence-based plan is developed to test the change (the P or plan step). Next, the plan or change is carried out, data is collected and analyzed (the D or Do step). In the S step, data is analyzed and plans for the next phase of action (the A step) are determined.

A quality improvement framework is necessary when implementing change in practice to assess what is effective (Moran et al, 2017, p. 352). The DNP scholarly project applied PDSA cycles to guide implementation change. This quality improvement project focused on working in collaboration with the key stakeholders to establish what steps were needed for each team member and in what sequence to establish technology-enhanced patient communication. The

PDSA cycle was essential for this scholarly DNP project, as the quality improvement project introduced new standard work for several team members.

Implementation Steps, Strategies, and Timeline

The implementation steps and strategies review how the DNP student would develop a technology-enhanced patient communication process using automated telephone communication to increase adherence in screening visits (Appendix G). The steps included:

1. Completing the defense proposal and approval process at GVSU by October 29, 2018.

2. Obtained IRB approval from GVSU and organization by October 29, 2018

3. Gathered and analyzed retrospective deidentified baseline data for UDS measures January 2018 through September 30, 2018.

4. Highlighted current workflow and developed current state in a process flow including the setting, staff, and patients as well as the equipment by November 5, 2018.

5. Established AthenaHealth® EMR capabilities and outlined necessary steps to turn on the automated calls.

6. Collaborated with key stakeholders to develop process flow that included workflow and EMR capabilities November 1, 2018 through December 1, 2018.

7. Implemented rapid cycle PDSA pilot with 15 automated phone call appointment reminders by December 10, 2018.

8. Collected pilot data from process change by December 30, 2018 including number of automated phone calls sent to patients and number of follow-up screening appointments made as a result of automated phone calls.

9. Collected pilot data of number of patients that came in for a screening appointment through the generation of automated phone call by January 10, 2018.

10. Utilized PDSA cycles to refine the automated phone call process based on pilot results and practice team member feedback by February 1, 2019.

11. Analyzed UDS metric reports and team feedback through February 28, 2019.

12. Continued PDSA cycle to refine automated appointment reminder process through March 2019 as needed based on practice team feedback.

13. Created sustainability plan for practice team by April 5, 2019.

14. Presented work to key stakeholders within west Michigan FQHC organization by April 30th, 2019

15. Completed project defense for technology-enhanced patient communication using automated telephone communication project at Grand Valley State University by April 30th, 2019.

Measures and Analysis

Quality measure baseline data for screening visits were collected by the DNP student project facilitator through a quality reporting program. Reports were collected through the EMR. The variables for quality measures included identification of needed follow-up screening visits. Baseline data was extracted from UDS monthly reports generated through September 2018. The reports included all providers in this west Michigan FQHC. The retrospective data that is collected for the providers will reflect three weeks, six weeks and nine weeks post implementation of the process changes at this FQHC. The focus will be on the percentage screening visits scheduled and completed after an automated phone communication from each provider and within the entire FQHC organization. Data will be collected to further evaluate both provider and organization outcomes with the assistance of the statistician. Pie charts and bar graphs will be utilized to display the frequencies and percentage data. A descriptive analysis will be utilized to examine proportion among outcome metrics.

Data Collection Procedures

The DNP student conducting the scholarly project collected de-identified data from the AthenaHealth® and Cerner® EMRs related to the automation process via the EMR. Data collection sheets were generated October 26, 2018 based on the new workflow processes with the help of statistician. Data was collected at weekly intervals and organized based on the designed excel codebook. Data collection took place only at the organization. Clinical data was gathered through the EMR including Cerner® and AthenaHealth® databases.

Data Management

The DNP student project manager was responsible for management of the data. The DNP student was granted access to the EMR for the organization for the duration of the project implementation and kept all information on the secured network provided by the organization. De-identified data was logged into a password protected excel codebook. The excel codebook assisted the DNP student in analyzing independent and dependent variables. DNP student gathered data through chart audits and recorded it in the data collection excel codebook.

The statistician received de-identified clinical data to provide additional analysis. Providers and identifiable data were de-identified and coded numerically into the deidentified excel. Data will be stored until May of 2019. At the end of May 2019, data will be completely cleared, and all files will be deleted to ensure protection of confidentiality of all participants.

Resources & Budget

Valuable resources included in the west Michigan FQHC are key stakeholders and the physician site mentor for the project. The DNP student was given AthenaHealth® and Cerner® EMRs login access data and a password protected laptop to use within the organization to evaluate the delivery of proposed project.

There was no budget for this project. The DNP student, site mentor, clinic staff, and

EMR support, time were donated in-kind as part of the normal work of the FQHC because the organization had identified the need for this project. Time was spent with key stakeholders and there was not a clear mechanism to quantify hours to perform the data analysis or gathering content for the technology-enhanced patient communication workflow process. The organization members integrated workflow process as a part of their roles. The potential return in incentives and grants counter are not unable to be specifically calculated until reporting occurs (Appendix H).

Results

The project aimed to answer the following clinical question: "Will technology-enhanced communication using automated telephone communication increase rates of screening follow up visits to improve data reported to UDS at a west Michigan FQHC organization?" The DNP student evaluated both process and outcome metrics to determine the impact of workflow process changes and implications for future practice.

Process Metrics

Donabedian (1988) highlights through the application of the model that structure, process, and outcomes are key elements to achieve improved outcomes. Incorporating a technology-enhanced workflow process into current practice required process change in the clinical setting (Appendix I). The implementation strategy of this project was heavily focused on establishing technology-enhanced patient communication workflow process that incorporated existing EMR technology (Appendix J). Data measurements were chosen from the PDSA cycle to evaluate small scale changes and implementation of changes leading to an improvement (Reed & Card, 2016). This allowed to adjust accordingly and increase the chances of delivering and sustaining the desired quality improvement (Reed & Card, 2016). Results were obtained through the manual collection of number of automated phone reminders, appointments scheduled, and

visits completed after the generation of automated phone call reminders.

Appointment Reminders

In the west Michigan FQHC clinic, identification for the need of follow-up in screening visits was performed by the clinical team provider and office MA. A total of fifteen (n=15) patients were recognized in the initial pilot of this DNP project as needing a screening(s) to fulfill UDS measure(s). A total of fifteen (n=15) automated phone call reminders were arranged. Two (n=2) automated phone call reminders were unable to be delivered in the initial pilot due to the phone number in the EMR being disconnected, busy, or no voicemail setup. Thirteen (n=13) automated phone call reminders were successfully delivered for the initial pilot of this DNP project initiative.

An additional sixteen (n=16) automated phone call reminders were arranged in three separate phases. The different phases were established by refining elements of the PDSA cycles and evaluating small scale changes for revisions aimed at improvement in workflow processes. An additional two (n=2) automated phone call reminders were undeliverable because the phone number in the EMR were disconnected, busy, or no voicemail being setup. Therefore, a total of twenty-seven (n=27) automated phone call reminders were successfully arranged and delivered in this quality improvement initiative (Appendix K).

Appointments Scheduled

Appointments scheduled through the automated phone call reminders was a measure of interest for this quality improvement initiative. Of the twenty-seven (n=27) patients who successfully received an automated phone call reminder, 44% (n=12) scheduled appointments 56% (n=15) have not (Appendix L).

Those patients who have scheduled an appointment have arranged visits for the following UDS measures: five cervical cancer screening (n=5), three cervical and colorectal cancer

screening (n=3), two cervical cancer and diabetes control (n=2), two colorectal cancer screening

(n=2), one hypertension control (n=1) and one colorectal cancer screening and diabetic control

(one=1)(Appendix M).

Visits Completed

Of the twelve who have scheduled appointments, eight (66.7%) have had the

appointment, 4 (33.3%) have not had the appointment yet (Appendix N). Due to the completion

of the nine-week implementation period and EMR limitations, data for those who have arranged

screening appointment but have not completed the visits was unable to be obtained.

CPT Codes

The clinic charges a fee per CPT code recognizing payors differ on the amount paid

between an FQHC vs a non-FQHC organization. Charges represent the highest reimbursement

fee in a practices fee schedule. The two CPT codes (99395 or 99396) can be used to bill for

cervical cancer screening or cervical and colorectal cancer screening with a cost range of $171-

$191. The difference in cost is due to the preventative visit age 18-39 (CPT 99395) or

preventative visit age 40-64 (CPT 99396). The CPT code (99396) can be utilized to bill for a

UDS measure: colorectal cancer screening. This service can be billed for an estimated cost of

$191. Additionally, the CPT code (99213) can be utilized for UDS measure: hypertension-

controlling. An estimated cost of $110 for this service can be projected. The UDS measure:

colorectal cancer screening and diabetic control can be billed with CPT codes (83036, 82962,

92044, 36416 and 99236) for an anticipated revenue of $284. Lastly, the UDS measure: cervical

cancer screening and diabetic control can be billed with CPT codes (83036, 82962, 92044, 36416

and 99395/99396).

Revenue. A total of $ 2,358-$2,490 revenue is predicted to be generated if all twelve

(n=12) patients that have scheduled an appointment through the generation of an automated

phone call reminder actually complete their appointment (Appendix O). However, an estimated revenue we can account for is for those patients that had completed their appointment by the end of the nine-week implementation period. It is estimated that a total of $1,301- $1,413 was generated for those eight (n=8) patients that had completed their appointment (Appendix P).

Outcome Metrics

The overall purpose of the quality improvement initiative was to establish a technology-enhanced patient communication workflow process that incorporated existing EMR technology to increase rates of screening follow up visits in efforts to improve data reported to UDS. Through the generation of automated phone call reminders with a technology-enhanced workflow process twenty-seven (n=27) automated phone call reminders were successfully arranged and delivered. Twelve (44.44%) patients have scheduled appointments and fifteen (55.56%) patients have not. Of these twelve (n=12) who have scheduled, 8 (66.7%) have completed the appointment, 4 (33.3%) have not. Of the twelve (n=12) who have scheduled, their average number of automated phone call reminder was three calls.

Discussion

To evaluate the preceding data, it is essential to determine if the clinical question was answered. "Will technology-enhanced communication using automated telephone communication increase rates of screening follow up visits to improve data reported to UDS at a west Michigan FQHC organization?" In order to answer this question, it is imperative to evaluate this clinical question through the numerous factors that represent this measure such as structure, process and outcome measures (AHRQ, 2011).

The technology-enhanced patient communication relied heavily on the *structural* process of the existing EMR. Expanding existing structural measures by activating the technology

functionality allowed the generation of automated phone call reminders to successfully be arranged and delivered to patients identified as needing a follow-up screening(s).

In addition to structural measures, process measures include what a provider does to maintain or improve health (AHRQ, 2011). Therefore, *process* measures incorporate evidenced-based guidelines. The designed technology-enhanced workflow process aligns with evidenced-based recommendations for technology-enhanced patient communication supported by evidence in the literature. Integrating a technology-enhanced patient communication workflow process required changing the current *process* in order to impact care outcomes and UDS metrics. A total of twenty-seven (n=27) automated phone call reminders were successfully arranged and delivered in this quality improvement initiative.

Outcome measures reflect the impact of intervention of health status of patients (AHRQ, 2011). Through the generation of automated phone call reminders with a technology-enhanced workflow process twelve patients scheduled appointments and fifteen patients have not. Of these twelve, eight completed the office visit for screening and four have not yet had a visit. Therefore, through descriptive analysis of the structure, process, and outcomes to determine if technology-enhanced patient communication using automated telephone communication would increase rates of screening follow up visits can be reported by the west Michigan FQHC organization to the UDS.

Limitations

There were several limitations to this project. One major limitation was the short implementation period and small sample size. The sample size consisted primarily of the twenty-seven (n=27) automated phone call appointment reminders that were included in the initial pilot. As the implementation period evolved, it was learned that in order for the EMR to trigger an automated phone call, an appointment reminder had to be set for greater than six weeks from the

day arranging the automated phone call reminder. The EMR would generate a date. Once the patient called back to arrange an appointment anytime within the nine-week implementation period, the appointment would be scheduled around the EMR generated date or next available appointment. The additional sixteen (n=16) automated phone call reminders that were arranged in three separate phases that had an arranged phone call reminder could not be included in final outcome data due EMR limitations and short implementation period.

Incorrect or disconnected phone numbers listed in the EMR limit automated phone call reminders to be delivered, limiting outcome measures. In efforts to have most accurate data, phone verification at the time of registration must be reviewed.

An additional limitation identified was the language of the automated phone call message that was delivered to the patient. The default language of the automated phone call messages was English. The EMR contained a different primary language on file, therefore, the EMR should have triggered an automated phone call messages in the primary language on file but failed to do so. This hindered clear delivery of the message if patient was non-English speaking.

While HRSA funding provides additional financial incentives to organizations designated as FQHCs, the organization was not able to provide information to differentiate reimbursement levels for primary care clinics designated as FQHCs and those not designated as FQHS. With appreciation that loss of HRSA funding would be detrimental to the clinical, the ability to quantify the financial impact of losing HRSA grant funded status could not be ascertained in this quality improvement project.

In this quality improvement project, the focus was on screening follow up visits for seven measures for one provider. The FQHC organization had a macro report for all providers and all UDS measures that was not provided to the DNP student. This limited the analysis for financial

impact of automated phone call follow up and warrants analysis if expansion of the project
ensues.

Lastly, the DNP student was not able to obtain information about how much the FQHC
organization gets *paid* for CPT codes (99213, 99395, 99396, 83036, 82962, 82044, 36416).
Different members of the practice team were unable to locate this information for DNP student.
Future replication of this quality improvement project would need to investigate how much the
FQHC organization gets *paid* for billable CPT codes (not what payors are billed for services) for
a comprehensive cost-benefit analysis generated through automation of a technology-enhanced
patient communication intervention.

Implications for Practice and Further Study

Using technology-driven patient communication reminders can facilitate timely contact
with providers that foster safer, more efficient high-quality care to patients and the community
(AAFP, n.d.). Additionally, maintaining FQHC status and meeting HRSA annual quality
measures reported to the UDS allows an FQHC clinic to achieve the highest standards of care for
patients and the community it serves. The literature also supports the use of EMR generated
communication and reminders as a technology-driven process improvement strategy to increase
follow-up in screening visits and attendance.

This DNP project had various practice implications. The purpose of this project was to
implement a technology-driven intervention at a FQHC in west Michigan. This was done by
activating existing EMR capabilities and creating a technology-enhanced patient communication
workflow processes for the FQHC team members. After developing the workflow process, the
process was evaluated by key stakeholders. The technology-enhanced patient communication
workflow process provided evidenced-based resources and recommendations to its users for each
UDS measure. The result of this workflow process revealed strengths in providing insight of

UDS measures that needed improvement, step-by-step action for the various UDS measures and necessary action(s) to be taken using existing EMR technology.

As this project entailed a quality improvement intervention that incorporated the current EMR for this organization, it is difficult to determine the degree of impact and technology-enhanced workflow process with the new EMR coming in January 2020. Implications for future practice involves optimizing the new EMR and technology-enhanced patient communication, however a new workflow process will need to be established at that time. Additionally, only one clinical team received training on the new technology-enhanced workflow process that incorporated existing technology. For complete optimization of a technology-enhanced communication strategy, all staff teams in a clinic would need to train for implementation. A lack of knowledge and skills among the other clinical teams could make it difficult to analyze the degree of impact on UDS measures through this quality improvement initiative.

Within the pilot study an appreciation on completions of preventative screenings, UDS measures outcomes and projected revenue through an evidence-based technology-enhanced patient communication. Implementing this quality improvement intervention to the remaining FQHC organization, limitations of his study would need to be addressed for the replication of this quality improvement project.

Conclusion

In conclusion, electronic medical records (EMRs) are the central component of the health information technology infrastructure (Health It, 2018). Significant attention has been focused how this technology can help improve quality, efficiency, and effectiveness of healthcare delivery (Banger & Graber, 2015). The designed workflow process utilized the organizations existing technology to embed a technology-enhanced patient communication workflow process. Ultimately, twenty-seven (n=27) automated phone call reminders were successfully arranged and

delivered. Of the twenty-seven (n=27) patients who successfully received an automated phone call reminder, 44% (n=12) scheduled appointments 56% (n=15) have not. Of these twelve, eight completed the office visit for screening and four have not yet had a visit. The average number of automated phone call reminder to arrange an appointment was three (n=3) automated reminder calls.

Therefore, EMRs can serve as a tool to improve efficiency, standardization, and effectiveness through the use of technology when integrated into care delivery workflow processes. Future recommendations include automated phone call reminders to be arranged in patients preferred language and new technology-enhanced patient communication workflow process to be created with new EMR system to go live in January 2020.

Dissemination of Results

Dissemination of this technology-enhanced patient communication DNP project occurred with the stakeholders of the West Michigan FQHC clinic. The final product of this quality improvement was presented at Mercy Health Saint Mary's in front of the DNP's student project team and other members of the college who choose to attend the presentation on April 30, 2019. The final draft of the scholarly project paper will be uploaded to GVSU ScholarWorks.

Sustainability Plan

The sustainability plan is the "Technology-Driven Patient Communication Appointment Reminder" workflow process (Appendix J). To ensure sustainability of the efforts made, the results of this project will inform a plan to support an ongoing quality improvement initiative at the West Michigan FQHC clinic.

Multiple deliverables from this project were left with the organization representative and are part of the final report. These included the proposed technology-enhanced patient communication workflow process titled "Technology-driven Patient Communication

Appointment Reminder" created by the doctoral student and stepwise instructions for the

generation of automated phone calls. The proposed workflow process was left for the

organization to manage registries and identify the need for the generation of an automated phone

call with the implementation of the new EMR in 2020. The organization has leadership support

by the site mentor to continue beyond the time of April 2019.

As the implemented quality improvement project evolves the "Act" phase of the PDSA

cycle, this includes making revisions and implementing changes. This can serve to modify and

revise the existing proposed workflow process. The organization and more specifically the

clinical team served as a pilot for this quality improvement initiate. A quality board containing

each clinical teams UDS measures will be tracked quarterly and displayed on organizations

quality board. Proposed technology-enhanced workflow process can become a standard

organizational process if piloted clinical teams UDS measures are meeting benchmark measures.

Reflection on DNP Essentials

The American Association of Colleges of Nursing requires that all DNP students meet the

eight *DNP Essential* competencies as a fundamental foundation for graduating nursing practice

roles (AACN, 2006). The DNP essentials were met through the development, implementation, and

dissemination of this technology-enhanced patient communication project.

Essential I: Scientific Underpinnings of Practice

The DNP learns to integrate nursing science with understanding from nursing science,

use theory to guide practice and enhance health care delivery, evaluate outcomes, and develop

new practice approaches (AACN, 2006). This essential was achieved through this project by

performing a literature search on automated technology alerts and reminders to communicate

with patients for appointments. In addition, theories such as the Donabedian model and PDSA

cycle, use of evidence to change practice, and, implementation were used as frameworks for

guiding change.

Essential II: Organizational and Systems Leadership

Leadership within an organizations and systems is a fundamental key feature to improve healthcare outcomes and patient safety. This essential focuses on assessing organizations, identifying system issues, and working to facilitate changes in practice delivery to improve patient and health outcomes (AACN, 2006). The DNP student demonstrated organizational and systems leadership by meeting with leaders, management and key stakeholder throughout the organization and additionally performing an organizational needs assessment of the West Michigan FQHC facility. The information gathered was applied in the development of an intervention to develop a workflow process by incorporating technology-enhanced patient communication using automated telephone communication. Leadership and communication skills were used to assess barriers and facilitators, listen to staff and stakeholder ideas, educate on proposed workflow process and work with staff to encourage implementation. Communication mostly occurred through one-on-one and emails. The needs of the clinic, key stakeholders, and patients were considered during project development and implementation. The student demonstrated ethical and cultural sensitivity during the project. The project was submitted to the organization and university HRCC committee which deemed it a non-research, quality improvement project.

Essential III: Clinical Scholarship and Analytical Methods

As noted in the AACN (2006) DNP graduates is prepared to translate research into evidence-based practice, evaluate practice outcomes, and improve healthcare outcomes. The student used analytic methods in the review of literature regarding the best evidence for patient communication to determine the best evidenced-based interventions. The project included the design and implementation process of a technology-driven process improvement strategies to increase follow-up in screening visits. Information technology was used to collect EMR data and

implement DNP evidenced-based project. Information was then utilized to determine patterns and outcomes of intervention. Results were disseminated from this evidenced-based practice quality improvement project in order to improve patient health outcomes.

Essential IV: Information Systems Technology

DNP graduates must be proficient in the use of, selection of, and evaluation of information systems technology to support practice and improve healthcare outcomes (AACN, 2006). This entails the ethical, regulatory, and legal issues that comes with the use of information systems and patient care technology (AACN, 2006). For this project the student used the organization's EMR to gather data pre and post implementation. E-mail was used for communication between student and organization members. Excel was used for organizing and analyzing data. The student was careful to follow all ethical guidelines and maintain strict confidentiality of any identifiable patient data.

Essential V: Advocacy for Health Care Policy

Engagement in health care policy development and advocacy is an expectation of the advanced practice nurse. Policy influences multiple care delivery issues of healthcare and DNP's are prepared to influence, design, and implement policy (AACN, 2006). During this project the student took into account the organization's current policy on preventative screenings, patient communication and workflow processes. This project did not include a policy change, but rather working to develop process improvement strategies to increase follow-up in screening visits.

Essential VI: Interprofessional Collaboration

This essential emphasizes the importance of collaborative practice between multi-tiered healthcare specialties in today's complex healthcare delivery system (AACN, 2006). DNP must be able to work in and lead collaborative teams of professionals in order to develop, create

change and deliver excellent patient centered-care. For this project the DNP student participated

in collaboration and communication with key stakeholders from the organization, providers, staff

members, and faculty members during the development and implementation of the project.

Collaboration with team members was essential for the success of the project. The student

worked closely with staff members to educate on workflow process, arrangement of automated

phone calls, and answer questions during the project implementation.

Essential VII: Clinical Prevention Population Health

The DNP has a foundation of risk reduction/illness prevention, health promotion, and

health maintenance to develop, implement and evaluate care delivery models and or strategies

for clinical prevention and population health (AACN, 2006). The student analyzed specific

FQHC data related to UDS measure and attempted to improve the health status of patients

through the implementation of a technology-driven process improvement strategies to increase

follow-up in screening visits. This project focused on UDS measures that incorporates

preventative measures for better population health.

Essential VIII: Advanced Nursing Practice

The DNP graduate has knowledge regarding clinical prevention and population health in

order to develop, implement, and evaluate care delivery models and or strategies (AACN, 2006).

This project was focused on preventative screenings for better population health. The DNP

student acted as a leader and consultant during the implementation period. Lack of routine

preventative screenings are a population health issue that that may lead to physical and emotional

disability, lead to poorer quality of life, and cost both the patient and health care system money.

Preventative screening can result in better health outcomes and care experiences.

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Appendix A

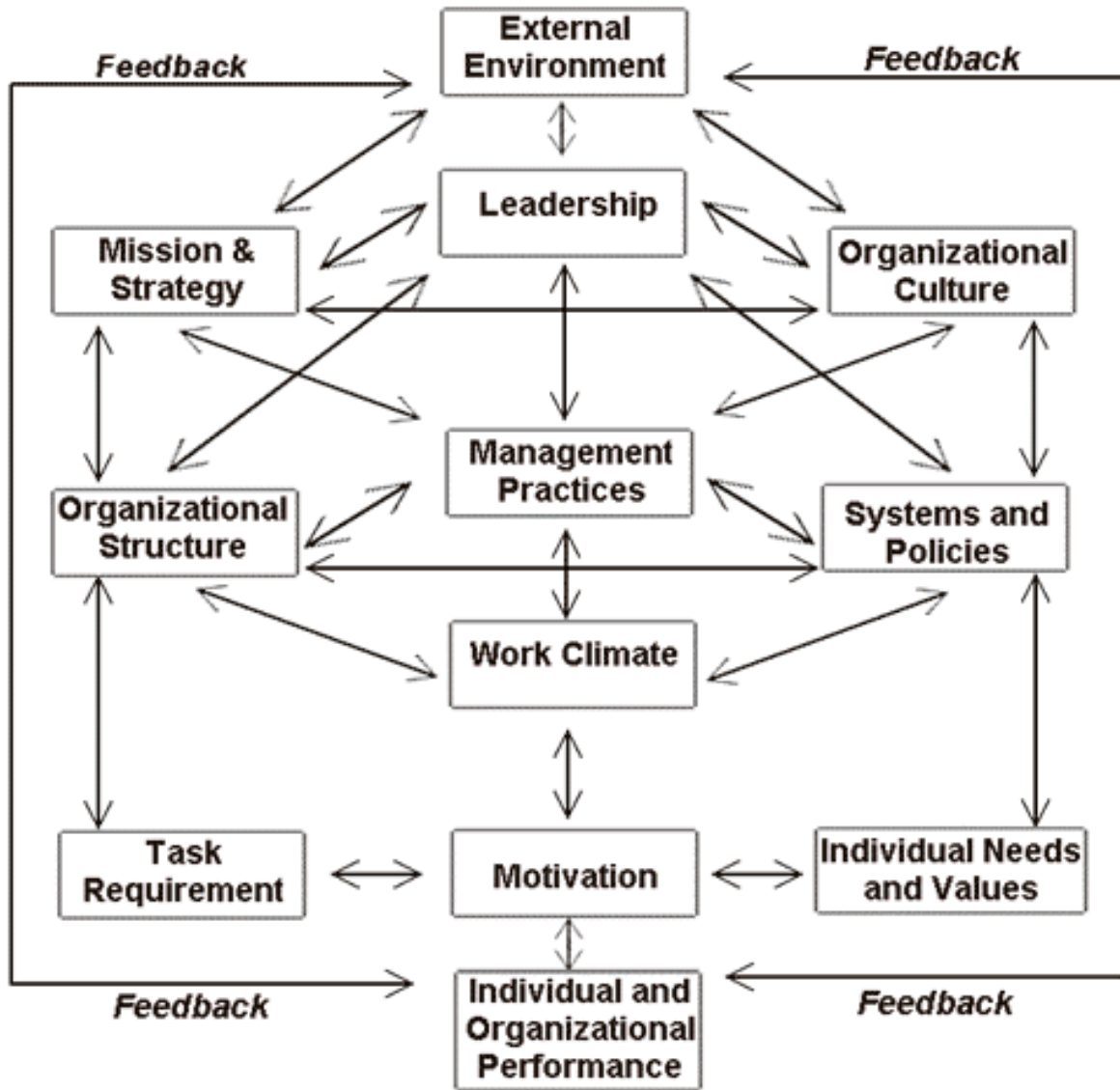The Burke-Litwin Model of Organizational Performance and Change

Figure 1. A model of organizational performance and change. Reprinted from "A Causal Model of Organizational Performance and Change," by W. W. Burke and G. H. Litwin, 1992, *Journal of Management, 18*, 528. Copyright 1992 by Southern Management Association.

Appendix B

SWOT Analysis of a west Michigan FQHC

Strengths	Weaknesses
• Clinic staff are focused on quality improvement • EHR is intuitive and easy to navigate • Metrics can be easily tracked • Sustainable organization at the system, community, and individual levels • Focus on collaboration and coordination of care	• Working with two EHR systems at the time, some data and records not crossed over from Cerner® to AthenaHealth®. • Identification of the population of patients requiring intervention is not consistent based on the transition between EMRs. • Inconsistent documentation of required elements in UDS screening. • Incorrect phone numbers or address in the AthenaHealth® EMR. • New EHR system in 2020 can threaten the sustainably of the project if new EHR does not have feature of automated phone call reminders. • Inability to produce automated recording in patient's native language. • Unclear role functions and responsibilities of team members leading to inconsistencies in documentation and care
Opportunities	Threats
• The organization can be a model for other practices that want to improve UDS measures and preventative care • Opportunity to improve quality care • Improve health outcomes of the community through early intervention • Improved clinical performance can improve health center quartile ranking leading to increased grant funding. • Maintain FQHC status and grant funding • Streamline workflow for greater efficiency • Reduce staff costs for follow-up appointment calls through automation	• Failure of the key stakeholder buy in to the quality improvement efforts will threaten the sustainability of the measures • Changes in reimbursement • HRSA Policy changes related to FQHC • Not meeting UDS measures could reduce reimbursement • Insurance reimbursement changes

Figure 2. SWOT Analysis of a west Michigan FQHC

Appendix C

PRISMA Flow Diagram of Systematic Search

Identification

Records identified through 3 databases searching 2008- 2018 (CINAHL- 311; PubMed- 13; Cochrane-8) (N=332)

Additional articles identified through review of references (N=1)

Screening

Records after duplicates removed (N=318)

Removal of duplicates and review of titles and abstracts resulted in removal of (N=287)

Records screened (N=41)

Eligibility

Full text articles assessed for eligibility N=36

Full text articles excluded for reason of intervention and comparison and outcome (N=29)
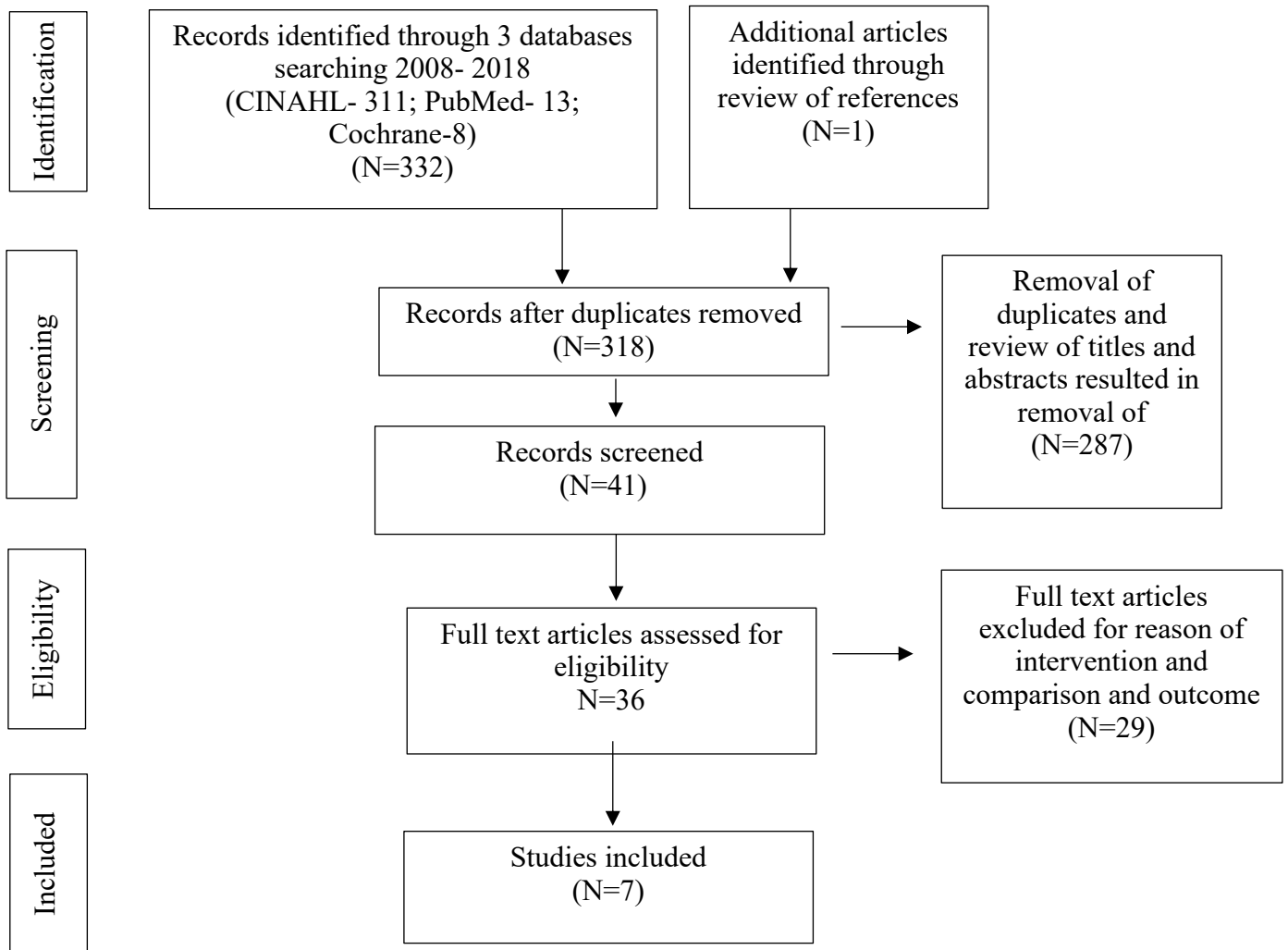
Included

Studies included (N=7)

Figure 3. Flow diagram of search selection process. Adapted from "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement" by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by PLoS Medicine.

Appendix D

Literature Review Table

Auth (Year) Purpose	Design (N)	Inclusion Criteria	Intervention vs Comparison	Results	Conclusion
DeFrank et al., (2009)	Randomized controlled trial (N=3,547)	All were aged 40–75 years and had a screening mammogram prior to study enrollment.	Women were assigned randomly to one of three reminder groups: (1) printed enhanced usual care reminders (EUCRs) (2) automated telephone reminders (ATRs) identical in content to EUCRs (3) enhanced letter reminders that included additional information guided by behavioral theory. Interventions were delivered 2–3 months prior to women's mammography due dates.	Each intervention produced adherence proportions that ranged from 72% to 76%. Post-intervention adherence rates increased by an absolute 17.8% from baseline. Women assigned to ATRs were significantly more likely to have had mammograms than women assigned to EUCRs (p=0.014). Comparisons of reminder efficacy did not vary across key subgroups.	Although all reminders were effective in promoting repeat mammography adherence, ATRs were the most effective and lowest in cost. Health organizations should consider using ATRs to maximize proportions of members who receive mammograms at annual intervals.
Green et al., (2013)	Randomized controlled trial (N=4,675)	Patients were identified using EHRs and were eligible if they were not current for colorectal cancer screening, Participants aged 50 to 73 years.	Usual care, EHR-linked mailings ("automated"), automated plus telephone assistance ("assisted"), or automated and assisted plus nurse navigation to testing completion or refusal ("navigated"). Interventions were repeated in year 2.	Compared with those in the usual care group, participants in the intervention groups were more likely to be current for CRC screening for both years with significant increases by intensity (usual care, 26.3% [95% CI, 23.4% to 29.2%]; automated, 50.8% [CI, 47.3% to 54.4%]; assisted, 57.5% [CI, 54.5% to 60.6%]; and	Compared with usual care, a centralized, EHR-linked, mailed CRC screening program led to twice as many persons being current for screening over 2 years. Assisted and navigated interventions led to smaller but significant stepped increases compared with the automated intervention only. The rapid growth of EHRs provides

				navigated, 64.7% [CI, 62.5% to 67.0%]; $P < 0.001$ for all pair-wise comparisons).	opportunities for spreading this model broadly
Gurol-Urganci et al., (2013)	Systematic review of RTCs (N=8)	Studies in which it was possible to assess effects of mobile phone messaging independent of other technologies or interventions.	Interventions in the eight studies was to remind the participant of their upcoming healthcare appointment.	The attendance to appointment rates were 67.8% for the no reminders group, 78.6% for the mobile phone messaging reminders group and 80.3% for the phone call reminders group. Mobile text message reminders improved the rate of attendance at healthcare appointments compared to no reminders (risk ratio (RR) 1.14 (95% confidence interval (CI) 1.03 to 1.26). There was also moderate quality evidence from three studies (2509 participants) that mobile text message reminders had a similar impact to phone call reminders (RR 0.99 (95% CI 0.95 to 1.02).	Mobile phone text messaging reminders increase attendance at healthcare appointments compared to no reminders, or postal reminders. There is evidence that mobile phone text message reminders are as effective as phone call reminders.
Henry, Goetz & Asch (2012)	Quasi-experimental design (N= 374)	HIV patients Veterans	Patients at the intervention site received an automated telephone appointment reminder 2 weeks prior to their regularly scheduled HIV clinic	Data show that the intervention did not reduce the number of no-shows overall mean percentages of no-shows among the subgroups of	Adding an automated telephone reminder to the standard set of three appointment reminders was not effective in

			appointments. Patients at both the intervention and control facilities continued to receive the standard set of three HIV clinic appointment reminders: (a) a provider-delivered verbal appointment reminder (b) a staff-delivered appointment reminder card (c) an automated telephone reminder to attend an HIV primary care appointment 3 days prior to the scheduled appointment date.	patients with different numbers of appointments scheduled in the 6-month period.	reducing HIV clinic no-shows for patients most in need of HIV primary care, including homeless patients, African Americans, Hispanic Americans, and patients with comorbid clinical or mental health conditions.
Jacobson Vann et al., (2018)	Systematic review (N=75)	The studies included a range of different groups: infants and children, adolescents and adults requiring routine vaccination, as well as adults who required the influenza vaccine. The studies were from different settings, such as rural areas, schools, private practices,	Evaluate and compare the effectiveness of various types of patient reminder and recall interventions to improve receipt of immunizations. In most of the studies reminders took the form of person-to-person telephone calls, automated calls, letters, postcard, and text messaging.	Patient reminder or recall interventions, including telephone and autodialer calls, letters, postcards, text messages, combination of mail or telephone, or a combination of patient reminder or recall with outreach increase the number of immunizations (risk ratio (RR) 1.28, 95% confidence interval (CI) 1.23 to 1.35; 55 trials; 138,625 participants). Two types of single-method reminders improve receipt of immunizations: the use of telephone calls (RR 1.75, 95%	Reminder and recall systems were effective for children, adolescents, and adults, in all types of medical or health settings, including private practices, academic medical centers, and public health department clinics, and for universally recommended vaccinations. Telephone reminders were the most effective single intervention type, followed by letter reminders, which were somewhat more effective than text message, postcard, and

		and state health department.		CI 1.20 to 2.54; seven studies; 9120 participants) and letters to patients (RR 1.29, 95% CI 1.21 to 1.38; 27 studies; 81,100 participants).	autodialer interventions.
Perri-Moore et al.., (2016)	Meta-analysis of RTC (N=51)	Automated approach to patients or caregivers alert or reminder had to be programmed to be automatically sent to recipient. -Information technology supported messaging to patient -Information communication technology – email, telephone, smart phone, short message service (SMS)/text messaging, electronic medical record, computer assisted,	Review of automated alerts and reminders directed to patients, the technology used, and their efficacy.	In 78% (n=40) of the studies reviewed, there was a positive impact resulting from the intervention studied, 15% (n=9) showed no difference, and less than 1% (n=2) of the studies reported a reduced or negative impact from the intervention compared to the control listed in the studies. Study purposes for appointment reminders (n=12), health screenings (n=8), and medication adherence (n=8) were the most common intervention purposes to have a positive impact.	Automated technology may reliably assist patients to adhere to their health regimen, increase attendance rates, supplement discharge instructions, decrease readmission rates, and potentially reduce clinic costs.

		and internet/Web			
Posadzki et al., (2016)	Systematic Review (N=4,669,689)	Included consumers who received ATCS for prevention or management of long-term conditions, regardless of age, sex, education, marital status, employment status, or income. Study included consumers who had one or more concurrent long-term condition and included consumers in all settings.	The ATCS interventions included in this review included the following. • Unidirectional ATCS: non-interactive ATCS enabling one-way voice communication. • Interactive ATCS: systems that enable two-way, real-time communication, such as interactive voice response systems or IVR. • ATCS Plus: interactive ATCS systems including additional functions.	Appointment reminders delivered through IVR or unidirectional ATCS may improve attendance rates compared with no calls. For preventive healthcare, ATCS (ATCS Plus, IVR, unidirectional) probably increase immunization uptake in children (risk ratio (RR) 1.25, 95% confidence interval (CI) 1.18 to 1.32; 5 studies, N = 10,454; moderate certainty) and to a lesser extent in adolescents (RR 1.06, 95% CI 1.02 to 1.11; 2 studies, N = 5725; moderate certainty). The effects of ATCS in adults are unclear (RR 2.18, 95% CI 0.53 to 9.02; 2 studies, N = 1743; very low certainty). For screening, multimodal ATCS increase uptake of screening for breast cancer (RR 2.17, 95% CI 1.55 to 3.04; 2 studies, N = 462; high certainty) and colorectal cancer (CRC) (RR	ATCS interventions can change patients' health behaviors, improve clinical outcomes and increase healthcare uptake with positive effects in several important areas including immunization, screening, appointment attendance, and adherence to medications or tests.

				2.19, 95% CI 1.88 to 2.55; 3 studies, N = 1013; high certainty) versus usual care.	

PROPOSAL DEFENSE

Appendix E

The Donabedian Model

Figure 4. Conceptual framework for phenomenon of interest. Adapted from "The quality of care: How can it be assessed?" by A. Donabedian, 1988, *Journal of American Medicine, 260*, p. 1743-1748. Copyright 1988 by American Medical Association.

PROPOSAL DEFENSE
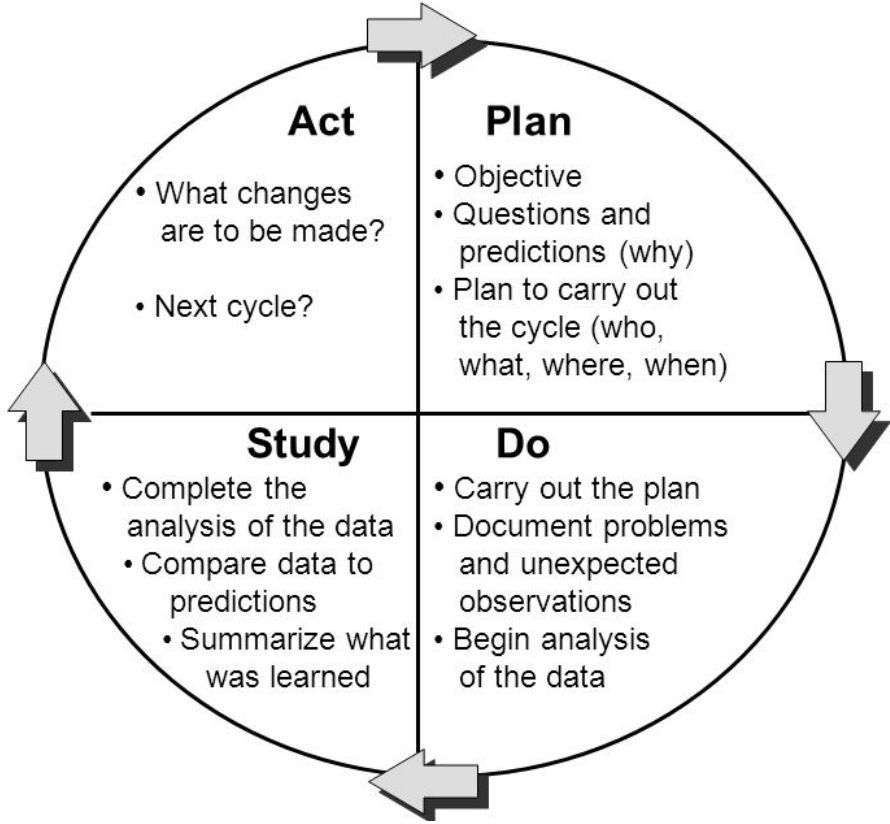
Appendix F

The Plan Do Study Act (PDSA) Cycle

Figure 5.

PROPOSAL DEFENSE

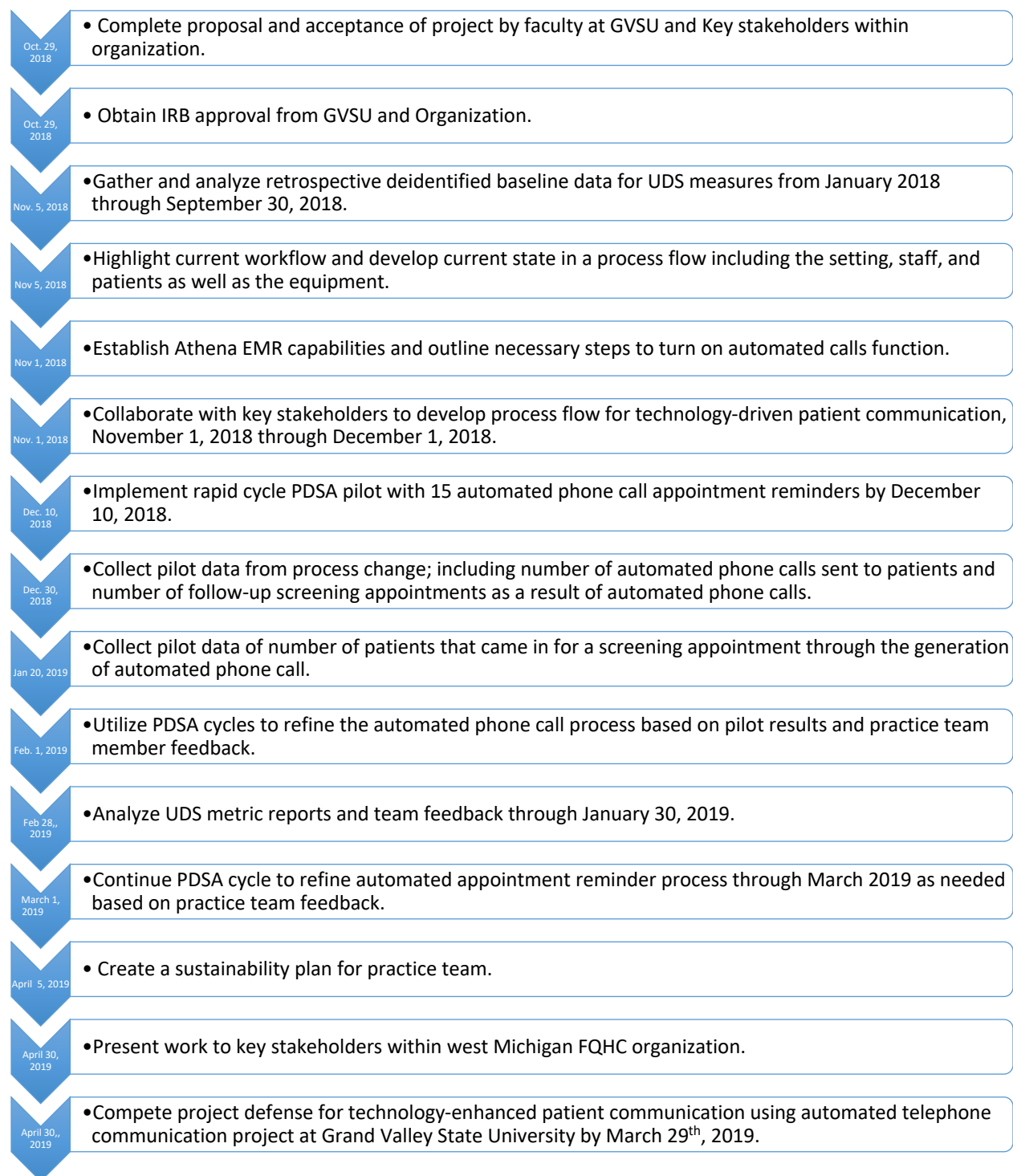Appendix G

Timeline of DNP Scholarly Project

Oct. 29, 2018	• Complete proposal and acceptance of project by faculty at GVSU and Key stakeholders within organization.
Oct. 29, 2018	• Obtain IRB approval from GVSU and Organization.
Nov. 5, 2018	•Gather and analyze retrospective deidentified baseline data for UDS measures from January 2018 through September 30, 2018.
Nov 5, 2018	•Highlight current workflow and develop current state in a process flow including the setting, staff, and patients as well as the equipment.
Nov 1, 2018	•Establish Athena EMR capabilities and outline necessary steps to turn on automated calls function.
Nov. 1, 2018	•Collaborate with key stakeholders to develop process flow for technology-driven patient communication, November 1, 2018 through December 1, 2018.
Dec. 10, 2018	•Implement rapid cycle PDSA pilot with 15 automated phone call appointment reminders by December 10, 2018.
Dec. 30, 2018	•Collect pilot data from process change; including number of automated phone calls sent to patients and number of follow-up screening appointments as a result of automated phone calls.
Jan 20, 2019	•Collect pilot data of number of patients that came in for a screening appointment through the generation of automated phone call.
Feb. 1, 2019	•Utilize PDSA cycles to refine the automated phone call process based on pilot results and practice team member feedback.
Feb 28,, 2019	•Analyze UDS metric reports and team feedback through January 30, 2019.
March 1, 2019	•Continue PDSA cycle to refine automated appointment reminder process through March 2019 as needed based on practice team feedback.
April 5, 2019	• Create a sustainability plan for practice team.
April 30, 2019	•Present work to key stakeholders within west Michigan FQHC organization.
April 30,, 2019	•Compete project defense for technology-enhanced patient communication using automated telephone communication project at Grand Valley State University by March 29th, 2019.

Figure 6.

PROPOSAL DEFENSE

Appendix H

Budget for DNP Project

Expenses

Project Manager Time (DNP Student in-kind donation)	$2,500.00
Project Manager Equipment and Materials	$250.00
Team Member Time • *Clinical Resource Director (site mentor)*	$1,500.00
Consultations • *Statistician*	$100.00
Cost of Space	$150.00
Workflow Process	$0.00
Total Expenses	$5,500

Figure 7.

PROPOSAL DEFENSE

Appendix I

Current Workflow Process
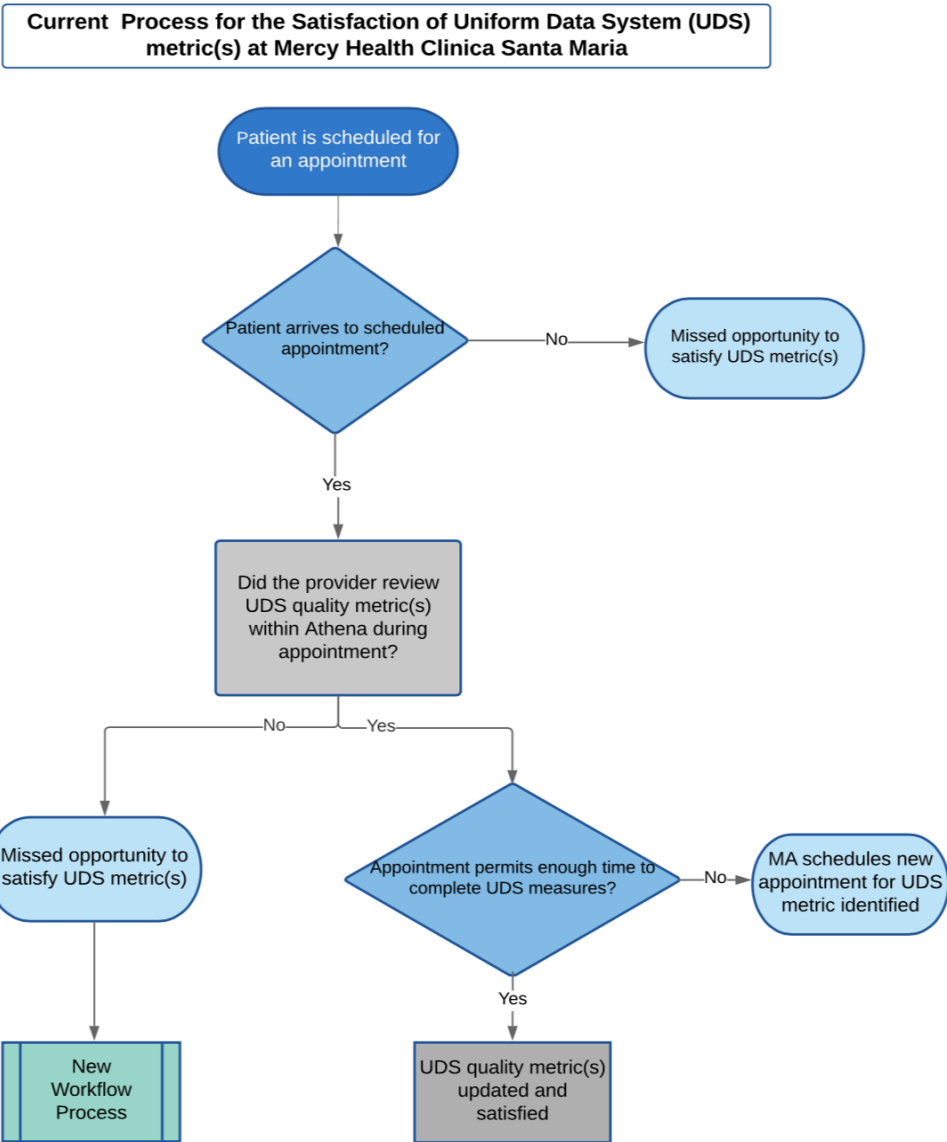
Figure 8.

PROPOSAL DEFENSE

Appendix J

Proposed Workflow Process
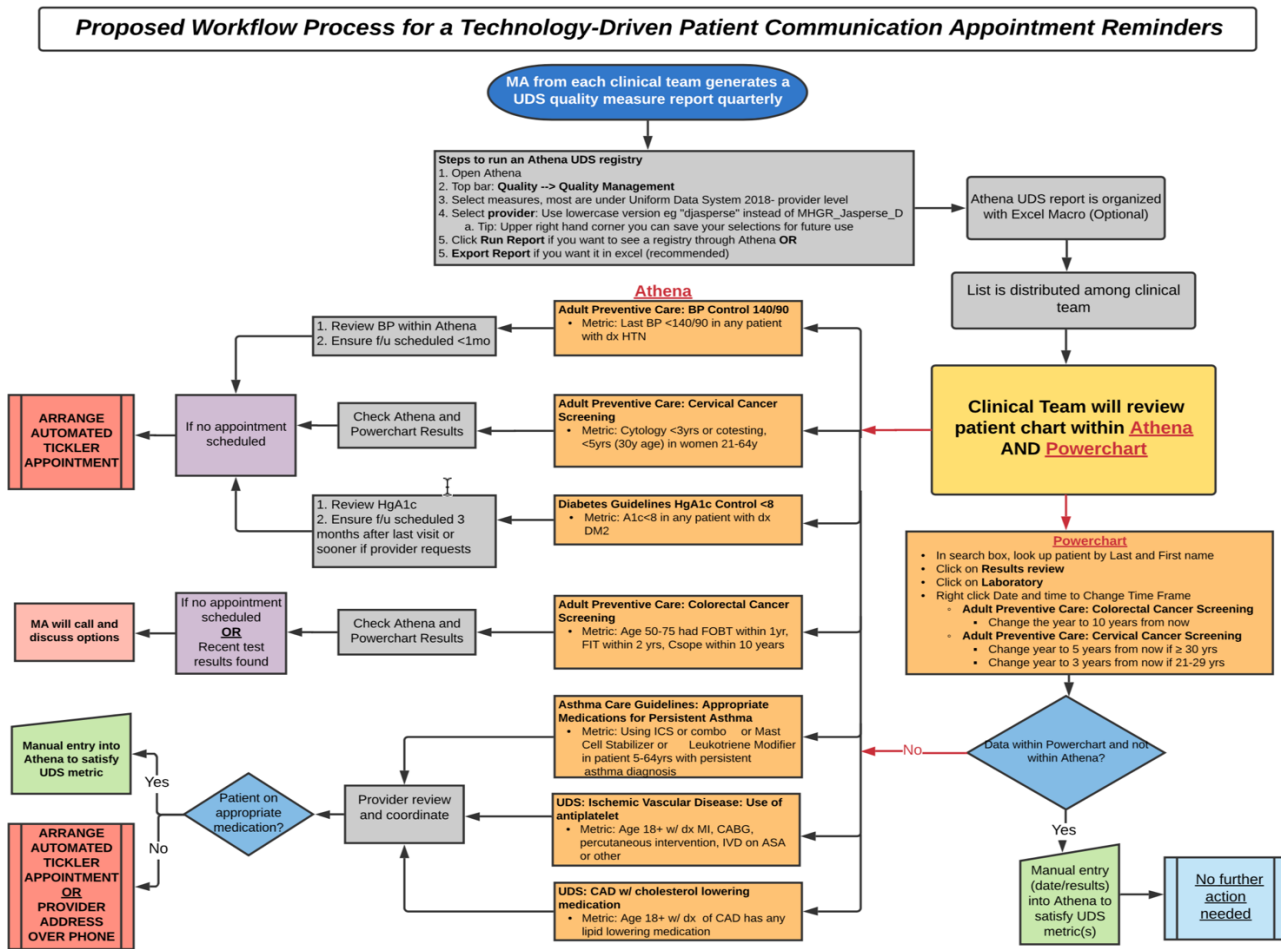
Figure 9.

PROPOSAL DEFENSE

Appendix K
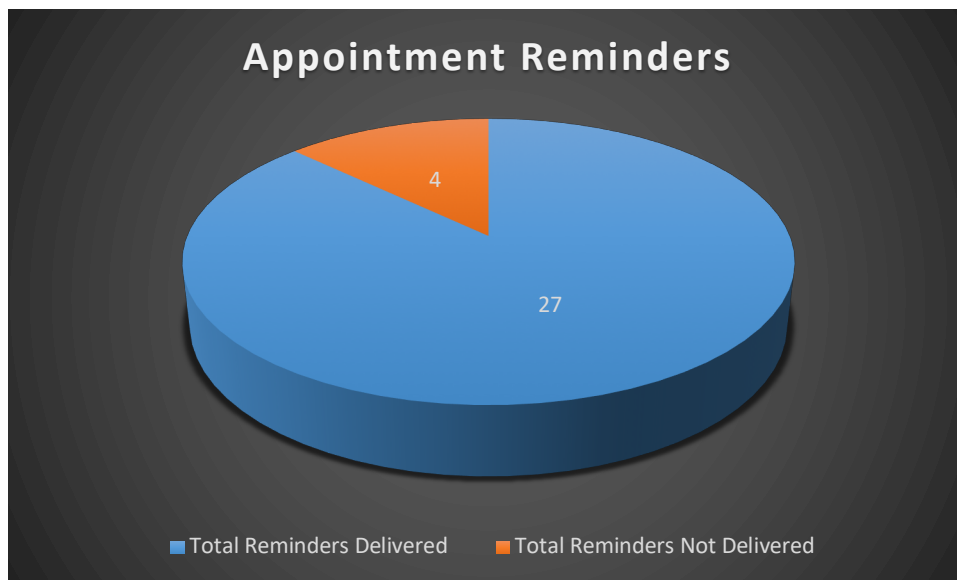
Appointment Reminders

Figure 10.

PROPOSAL DEFENSE

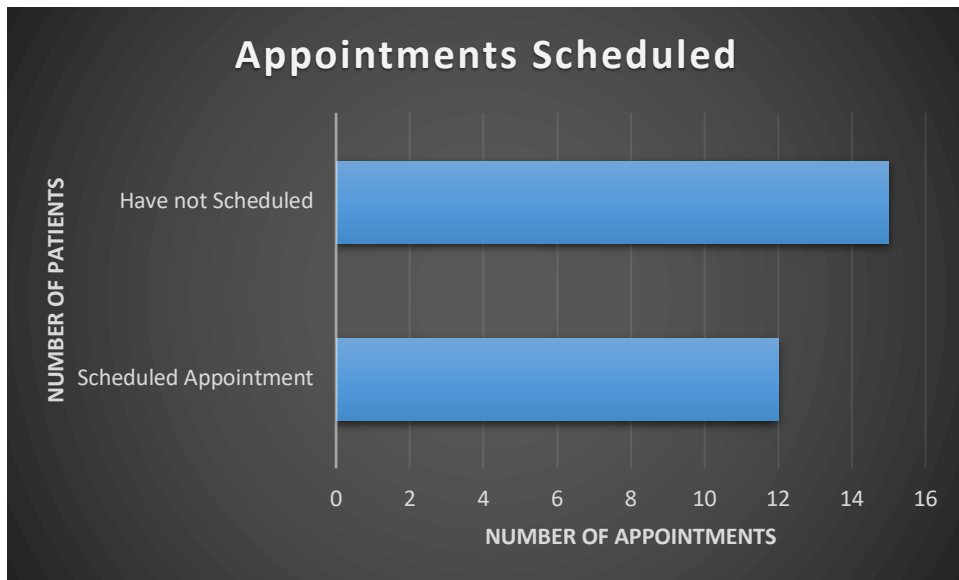Appendix L

Appointments Scheduled

Figure 11.

PROPOSAL DEFENSE

Appendix M

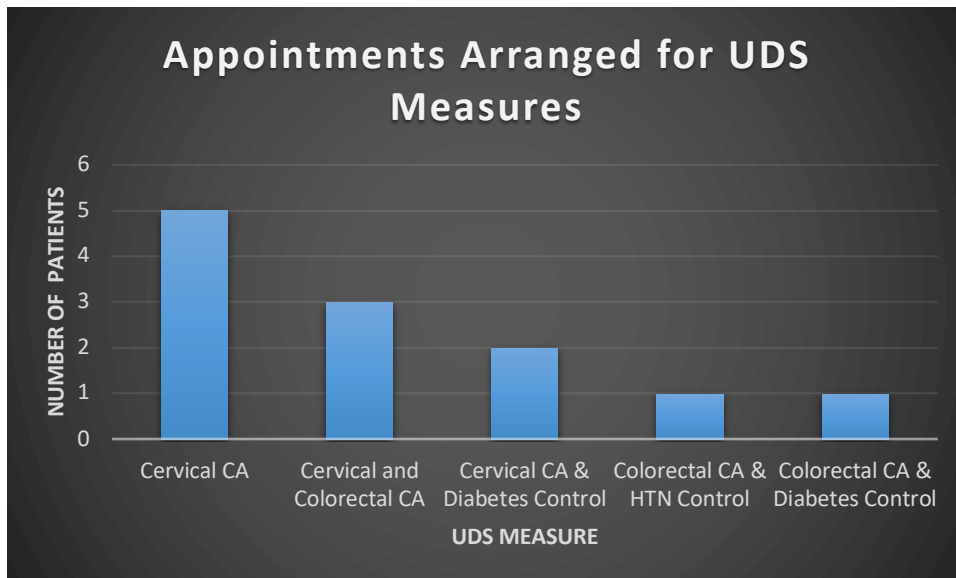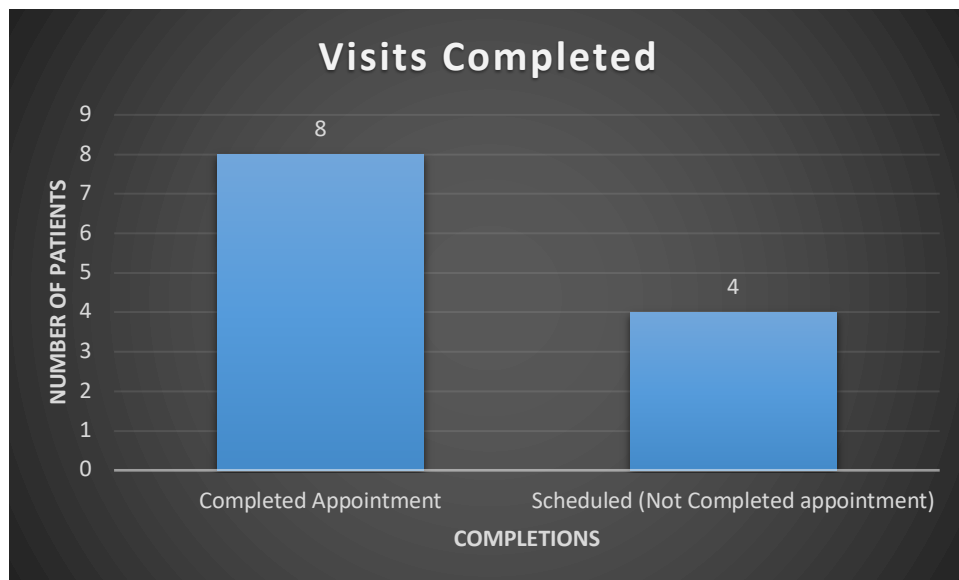UDS Measures Appointments Arranged

Figure 12.

PROPOSAL DEFENSE

Appendix N

Visits Completed

Figure 13.

PROPOSAL DEFENSE

Appendix O

Revenue for patients that have scheduled an appointment

Screening	Number of patients	Average Cost	Revenue generated
Cervical Cancer Screening	5	$179 - $191	$895- $955
Cervical and Colorectal cancer screening	3	$179 - $191	$537-$573
Cervical cancer screening and diabetic control	2	$272- $284	$544- $568
Hypertension control	1	$110	$110
Colorectal cancer screening and diabetic control	1	$272- $284	$272- $284
Total revenue for patients that have scheduled an appointment			**$ 2,358-$2,490**

Table 1.

PROPOSAL DEFENSE

Appendix P

Revenue for patients that have completed their appointment

Screening	Number of patients	Average Cost	Revenue generated
Cervical Cancer Screening	3	$179 - $191	$537- $573
Cervical and Colorectal cancer screening	1	$179 - $191	$179 - $191
Cervical cancer screening and diabetic control	1	$272- $284	$272- $284
Hypertension control	1	$110	$110
Colorectal cancer screening and diabetic control	1	$203- $255	$203- $255
Total revenue for patients that have completed their appointment			**$1,301- $1,413**

Table 2.