4-28-2023

Improving Utilization of Clinical Pharmacy Services in a Health Professional Shortage Area

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BMJ Quality & Safety

https://qualitysafety.bmj.com/

(Since a true letter of determination was not obtained due to time constraints, the student will not be publishing in this journal. However, this journal aligns with the content of this manuscript, so this journal was chosen as a model for author guidelines.)

Title of Manuscript: Improving Utilization of Clinical Pharmacy Services in a Health Professional Shortage Area

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Conflicts of Interest: The author declared no potential conflicts of interest with respect to the development, implementation, and/or authorship of the project components and this manuscript.

Key Words: interprofessional collaboration; clinical pharmacist; primary care; collaborative practice agreement; quality improvement

Abstract

Background: Integration of clinical pharmacy specialists (CPS) into primary care has increased over the last decade. CPS are highly educated advanced practice providers and specialize in chronic disease and medication management, and offer additional support to both patients and PCPs. Despite their extensive training and expertise, the role of CPS is often unknown or misunderstood amongst PCPs and results in the underutilization of CPS services. As a result, referrals to their service remain low. The purpose of this quality improvement project is to increase referrals to embedded CPS and identify encounter types by associated diagnoses.

Objectives: Develop and implement a pre-visit pharmacy services screening tool, and educate staff about the value of CPS.

Methods: Quality improvement, pre-post comparison at a single-site primary care office in a state-designated health professional shortage area. Participants are adult patients referred to pharmacy services and staff. Data was collected for six weeks after implementation and compared to the same six-week period in 2022.

Results: Referrals increased from n = 7 to n = 23 after the intervention. A 2-sample Fisher's exact test determined there was insufficient evidence to support a relationship between pre- and post-implementation rates of referrals categorized by purpose (p = 0.215).

Conclusions: Use of a pre-visit checklist and pharmacy services screening tool increased referrals compared to standard practice.

Implications: Further studies are needed to evaluate the impact on patient and organizational outcomes from the increase in patient referrals to CPS.

Keywords: interprofessional collaboration; clinical pharmacist; primary care; collaborative practice agreement; quality improvement

Background

Chronic diseases, such as hypertension, diabetes mellitus, and hyperlipidemia are linked to quality measures, many of which rely on medication adherence and individualized treatment plans for these goals to be met (Choe et al., 2018). In the United States (U.S.), 68.7% of provider office visits involved drug therapy, and 22.4% of adults aged 40-79 used five or more prescription medications within the last month (Centers for Disease Control and Prevention [CDC], 2022; Hales et al., 2019). Patients with chronic diseases are often managed by their primary care providers (PCPs) and require regular office visits to ensure adequate control of their disease state. With the increase in chronic conditions and prescription medications, recent initiatives have focused on the integration of clinical pharmacist specialists (CPS) into primary care with goals of increasing access to care and medication safety for patients while also alleviating the burden on PCPs (Choe et al., 2018; Sanofi, 2016).

Clinical pharmacy specialists are highly educated advanced practice providers and specialize in chronic disease and medication management, and offer additional support to both patients and PCPs (Sanofi, 2016). As part of the interdisciplinary primary care team, CPS offer comprehensive medication management, chronic disease management, identification of medication-related problems, and individualized plans through face-to-face meetings, telephone calls, or virtual visits (Sanofi, 2016). Typically, due to payer requirements, a referral to pharmacy services from their PCP is required to involve the CPS in a patient's care (Choe et al., 2017). Unfortunately, despite their extensive training and expertise, the role of CPS is often unknown or misunderstood amongst PCPs and results in the underutilization of CPS services (Teichman & Wan, 2021). Underutilization of CPS services leads to missed opportunities to improve patient outcomes and quality measure scores for chronic conditions, as well as missed opportunities for more revenue-generating visits, leading to economic loss.

Rural and Underserved Populations

Special populations are subject to a variety of circumstances that may make optimal health more difficult to achieve. Special populations include racial minorities, veterans, refugees and immigrants, medically underserved areas where the population exceeds available health care locations or number of providers, and rural areas (Agency for Healthcare and Research Quality, 2023). Racial minority groups are often disproportionately affected by negative health outcomes as discussed in Narain et al. (2020). Studies have found barriers to the quality of care in special populations are likely due to nonadherence, reduced health literacy or language barriers, cost, and health beliefs, all of which are able to be addressed with PLIs (Dellogono et al., 2020; Higgins et al., 2020; Narain et al., 2020). For veterans, the number of comorbidities is higher than the average population and this population offers a great opportunity for CPS to participate in chronic disease management (McCullough et al., 2020). In rural areas, availability of CPS in primary care settings has been shown to increase access to care, increase acute care availability, improve health care outcomes and quality measures (McCullough et al., 2020; Stallings et al., 2020).

Collaboration between Pharmacists and PCPs

Inclusion of CPS within the primary care team has been shown to improve outcomes, increase access to care, and reduce potential patient harm. Various pharmacist-led interventions, or PLIs, have been the focus of recent studies in outpatient populations throughout the world (Balsom et al., 2020; Cardwell et al., 2020; Darnell et al., 2020; Dellogono et al., 2020; Higgins et al., 2020; Koprivnik et al., 2020; Narain et al., 2020; Peek et al., 2020; Stallings et al., 2021). Interventions included identification of medication-related problems (Cardwell et al., 2020; Darnell et al., 2020; Dellogono et al., 2020; Koprovnik et al., 2020; Peek et al., 2020), identifying and addressing issues with medication safety (Balsom et al., 2020; Peek et al., 2020), as well as overall medication management (Dellogono et al., 2020; Higgins et al., 2020; Koprovnik et al., 2020; Stallings et al., 2020). Many PLIs involved a pharmacist

providing direct patient care with telephone or face-to-face (FTF) interviews (Balsom et al., 2020; Cardwell et al., 2020; Dellogono et al., 2020; Higgins et al., 2020; Koprovnik et al., 2020; Narain et al., 2020; Stallings et al., 2021). Through PLIs, improvements were noted in hemoglobin A1C levels in patients with diabetes (Higgins et al., 2020; Narain et al., 2021) and blood pressure in patients with hypertension (Stallings et al., 2020), as well as a reduction in medication-related problems and subsequent risk of potential adverse drug events (Dellogono et al., 2020; Koprivnik et al., 2020).

Barriers to interprofessional collaboration include lack of awareness of professional roles, lack of team integration, and perception of value and contribution (Khaira et al., 2020; McCullough et al., 2021). By identifying perceptions through a mixed methods quality improvement project, McCullough et al. (2021) were able to address these barriers and improve team functioning using staff education and team integration. Clarification of the pharmacist role and identification of the pharmacists' contributions to the patient care team were crucial areas to improve interprofessional collaboration within primary care teams (Khaira et al., 2020; McCullough et al., 2021).

Use of collaborative practice agreements (CPAs) between CPS and PCPs provides a way for the pharmacist to be included within the patient care team while avoiding potential reimbursement and policy barriers (CDC, 2013). A CPA is "a formal agreement in which a licensed provider makes a diagnosis, supervises patient care, and refers patients to a pharmacist under a protocol that allows the pharmacist to perform specific patient care functions" (CDC, 2013, p. 1). At the project site, CPAs are already in place for the existing CPS staff. Despite these standardized agreements which describe the scope of practice for the CPS in a patient's care, referrals to and utilization of billable clinical pharmacy services remain low.

The purpose of this quality improvement project is to increase referrals to embedded clinical pharmacy services, identify clinical pharmacist interventions, and measure the impact on chronic care visits. As mentioned previously, underutilization of CPS negatively affects the organization financially and

could lead to missed opportunities for PCPs and patients. The opportunity to improve utilization of CPS through increasing referral rates serves as the rationale to support this project. This article describes the development and implementation of a pre-visit pharmacy services screening tool, as well as the methods used to improve interprofessional collaboration and ensure sustainability in the practice setting.

Conceptual Frameworks

The National Interprofessional Competency Framework (NICF) was designed to guide professionals in the development of "effective interprofessional collaboration" by highlighting "the knowledge, skills, attitudes and values that shape the judgments essential for interprofessional collaborative practice" (Canadian Interprofessional Health Collaborative [CIHC], 2010, p. 9). The six major competencies described by the NICF are role clarification, team functioning, collaborative leadership, interprofessional conflict resolution, person-centered care, and interprofessional communication (CIHC, 2010). This framework was used to evaluate the phenomenon of underutilization of embedded CPS and, in combination with the DMAIC method, identify areas for improvement (see Figure 1).

The DMAIC method, which is an acronym for 'define,' 'measure,' 'analyze', 'improve,' and 'control,' is an approach from within the Lean Six Sigma framework that aims to streamline processes while reducing waste and inefficiencies (GoLeanSixSigma, 2019). This model was used during project implementation and offered guidance for sustainability of the project through the adjustment of workflow processes with the screening tool, increased utilization and productivity of the existing pharmacists, and continued evaluation and auditing of the intervention and implementation strategies (see Figure 2).

Methods

Since the project met the organization's criteria for a quality improvement project, it was deemed exempt and did not require review by the institutional review board. The project used a

pre-post design comparing the rates of CPS referrals over six weeks in February and March 2022 after implementation. Through retrospective chart review, this data was compared to the same six week period in 2022. The setting is a primary care office within a state-designated health professional shortage area in the Midwest. The primary care practice is affiliated with a larger integrated health care system. Approximately 60% of the patient population is aged 60 years or older, and 46% are insured with Medicare and/or Medicaid. At least 12% of encounters in June of 2022 were with PCPs for chronic disease follow up. Staff include eight PCPs, five CPS, as well as medical assistants, registered nurses, and other support staff. Pre-visit planning occurs prior to each patient visit with a PCP and is completed by medical assistants. This process includes completion of a one page paper form using chart review to collect information such as dates of most recent preventative screenings, vaccinations, identified care gaps, as well as chronic care visit status (see Figure 3). The CPS practice in collaboration with the PCPs through existing CPAs. Specifically, our CPAs describe the CPS scope of practice for interventions such as medication therapy management and chronic disease management, which is a focus of this project.

Increasing Referrals to Clinical Pharmacy Services

The first step in the project was to assess the organization to identify current provider perceptions and behaviors, as well as barriers to CPS referrals. As mentioned in NICF, for successful interprofessional collaboration, roles of team members must be clarified to ensure proper team functioning and an understanding of their value-added benefit. One important part of team functioning is the ability to develop a relationship with colleagues, and since the site is without a dedicated office space for CPS, this was identified as a barrier. Secondly, a decision tree for referrals to CPS was developed to guide clinical decision making and to serve as a visual aid and reminder during the sustainability phase, and is titled Pharmacy Services Screening Tool (see Figure 4). This visual aid is for both providers and medical assistants, and considers diagnoses included in the CPAs, certain high-risk medications, and other criteria identified as increasing the risk for MRPs. Using the components of the

Pharmacy Services Screening Tool as a guide, the pre-visit checklist was then modified to include screening patients for conditions or situations in which a clinical pharmacy referral would be appropriate as a second page (see Figure 5). Next, these components were introduced at the monthly meetings specific to medical assistants and to providers. For the medical assistants, an informal presentation was conducted and laminated screening tools and modified pre-visit checklists were provided for reference, and any questions were answered. The providers attended a 25-minute slideshow presentation which included a voluntary and anonymous pre- and posttest survey of knowledge, perceptions, and barriers to referral practices, in addition to referencing the laminated tools (see Figures 6 and 7). Finally, based on the survey responses and feedback from the initial provider meeting, additional information and education meant to improve referral practices was provided biweekly through email and dispersed by the office manager.

Measures

Based on implementation strategies identified by Powell et al. (2015) and the Improve phase of the DMAIC method, the following measures were developed and utilized throughout the project: pre- and posttest surveys; educational sessions; tools for quality monitoring; and educational materials. These measures were primarily chosen based on their acceptability, appropriateness, feasibility, implementation cost, and sustainability, as defined in Shepherd et al. (2019). Additional implementation strategies are outlined in Table 1 and measures are summarized in Table 2.

Prior to implementation, surveys were given to PCP attendees before and after an educational meeting conducted by the author to assess knowledge, readiness to change, and barriers to interprofessional collaboration between pharmacists and PCPs. These surveys used a Likert scale and were created by the author; therefore, reliability was low. However, validity was increased through consultation with site mentor, faculty advisor, project team, and DNP student nursing professionals. Based on the feedback obtained during the educational session, reference materials and reminders were

tailored to meet the needs of the site and dispersed through monthly emails during the implementation period. The reference materials and reminders developed by the author were adapted from the NICF concept of role clarification and awareness since lack of visibility was identified as a barrier to referring to pharmacy services.

Referrals to CPS are ordered either as “Ambulatory Referral to Pharmacy Services” or as “Ambulatory Referral to Medication Management Services” and are categorized in this project as ‘chronic disease management’ or ‘medication management,’ respectively. Identification of reason for referrals can imply adherence and utilization of the collaborative practice agreement (CPA), as the CPA outlines the pharmacist’s role in the management of chronic diseases. Conditions included in the CPA are as follows: hypertension, dyslipidemia, diabetes mellitus, heart failure, asthma, chronic obstructive pulmonary disease, infectious disease treatment and prevention, anticoagulation, chronic kidney disease, osteoporosis, nicotine dependence, obesity, polypharmacy/deprescribing, pharmacogenomics/pharmacokinetic testing, and medication utilization stewardship. CPS interventions are measured by billing code and are obtained via chart review. Currently monitored billing codes and/or visit types include initial visits, coumadin visits, subsequent visits, team conference, and telephone visits. Referral rates and CPS productivity are typically monitored by the organization on a monthly basis.

Evaluation & Analysis

Data collection occurred over 6 weeks in early 2023. Pre-implementation data included a retrospective review of CPS referrals as well as CPS productivity. Survey responses were obtained, recorded, and analyzed prior to implementation. Barriers identified by some PCPs through open-ended feedback were concerns for patient acceptance of the referral as well as potential out-of-pocket costs to the patient, though a majority of PCPs indicated there were no other barriers beyond lack of visibility preventing them from referring to pharmacy services. Referral rates, reasons for referral, and associated diagnoses were obtained through chart audit. Referral rates were monitored bi-weekly and preliminary

results were reported to stakeholders throughout the implementation period during meetings and through email. Pharmacist productivity was obtained through a financial report request from the site's quality improvement specialist for the pre- and post-intervention periods. An exploratory data analysis was performed for the reason for referral to CPS and associated diagnoses.

Results

The study population consisted of all patients referred to CPS during the specified six-week periods. During the pre-intervention there were seven referrals made to CPS. One referral was made for chronic disease management, while six referrals were made for medication management (see Figure 8). Post-intervention, there were 23 referrals made to CPS. Ten of the 23 referrals were for chronic disease management (see Figure 9). Statistical analysis was completed for the purpose of referral (i.e., chronic disease management or medication management) using a 2-sample Fisher's exact test. Although there was clinical significance, the increase in referrals by purpose was not statistically significant ($p = 0.215 > 0.05$).

Exploratory data analysis was completed for the associated diagnoses codes with the referral order (see Figures 10 and 11). It is important to note that some referrals included more than one diagnosis code. There were six unique diagnoses associated with the seven pre-intervention referrals (n = 8) and 13 unique diagnoses associated with the 23 post-intervention referrals (n = 34). A majority of pre-intervention referrals were related to anticoagulation therapy (n = 3). Other pre-intervention referrals were made for narcolepsy (n = 1), anxiety (n = 1), and polypharmacy (n = 1). Post-intervention, the majority of referrals were associated with diabetes mellitus (n = 15). Obesity was the second most common diagnosis associated with post-intervention referrals (n = 4). Other post-intervention referrals were associated with anticoagulation (n = 3), mental health (n = 3), hypertension (n = 1), hyperlipidemia (n = 1), asthma (n = 1), and financial difficulties (n = 1).

Due to time constraints for this DNP project, data for some secondary outcomes were unable to be obtained. These include pharmacist interventions measured by billing codes and pharmacist productivity obtained from the quality improvement specialists. Since the study period was recent, a majority of referrals have yet to have resulted in a patient encounter. However, during chart review, two referrals were completed the week after the study ended and the CPS ordered diabetic medications and discussed the need for disease-related screenings (i.e., urine microalbumin and diabetic retinopathy screening). Despite these actions being within the CPA scope of practice for the pharmacist, the orders for such screenings were not placed and were instead deferred to the PCP.

Discussion

The rates of referrals to CPS were higher during the post-implementation period compared to the pre-implementation period (23 referrals and 7 referrals, respectively). Though rates for chronic disease management were lower than medication management in both study periods, there was a 10-fold increase in referrals for chronic disease management compared to a 2-fold increase for medication management in the post-implementation period. One strength of this project was the appropriateness and feasibility of the intervention through modifications to the existing workflow, which was estimated to take less than a minute per patient to complete with minimal cost of implementation. The modified pre-visit checklist was compatible with current practice as it did not disrupt the workflow and was successfully integrated during the study period by replacing all of the printed paper checklists with the modified versions. Unfortunately, this study was unable to complete all specified measures within the time frame of the DNP program which will be discussed in more detail in limitations.

Despite the increase in total referrals, there was no statistically significant difference between the purpose of the referral and the points in time of implementation. However, this increase within a short time frame likely represents a positive impact of the intervention on financial outcomes within the site, and offers a foundation for future studies to assess the impact of CPS involvement on patient

outcomes. The assumption of increased role awareness of CPS and improved interprofessional collaboration within this project aligns with the improvement in interprofessional collaboration as discussed in Khaira et al. (2020) and McCullough et al. (2021). Additionally, the use of CPA to support CPS involvement in patients within a primary care setting in this project aligns with the results discussed in Higgins et al. (2020) and Stallings et al. (2020).

The implementation cost associated with this intervention remained low due to in-kind donation from the author, support from clinical faculty, the site mentor and office manager, the QI specialist, as well as staff at the site. It is important to note that CPS services were already embedded within the site, therefore was not a major expense for this project. The biggest resource required for the implementation was human investment in the form of time spent during educational sessions and reviewing patient information for referral consideration.

Though not yet available at the current site, another important resource is the necessary physical space to increase CPS visibility and further support interprofessional collaboration. The site has been waiting to expand into a new office space for the last few years. Due to space constraints, a dedicated space for CPS is not available in the office. This reduces visibility and is a barrier to interprofessional collaboration. Additionally, it prevents completion of team conference visits between PCPs and CPS as this visit type requires face-to-face communication. For now, staff are able to communicate via telephone or secure messaging.

Limitations

There are a few limitations to report in this quality improvement project. First, a major limitation of this project is the lack of post-implementation data, specifically the lack of financial information and billing codes indicative of pharmacist productivity and interventions. Through analysis of billing codes, an increase in the team conference billing code could offer support to infer an improvement in interprofessional collaboration. Potentially, it could be assumed the increase in chronic disease referrals

is due to the increase in awareness of the role of the pharmacist and the scope of practice as identified by the CPA, though future study is required to support this assumption.

Second, the role of CPS as well as their impact on patient outcomes has yet to be measured in a standardized way. There was a lack of standardized definitions for MRPs and the role of CPS was inconsistently defined, if defined at all, which negatively affects successful team integration (Cardwell et al., 2020; Higgins et al., 2020; McCullough et al., 2020). In a white paper by King et al. (2021), the authors propose five areas of quality measures specific to pharmacy services to improve patient outcomes, reduce health care costs, and improve organizational outcomes, though adoption of these measures is not yet widespread.

Third, single-site studies as well as quality improvement projects may reduce the ability to generalize the findings. However, implementation science supports tailoring interventions to a specific site in order to encourage successful integration (Powell et al., 2015; Shepherd et al., 2019). By identifying the barriers applicable to this site's staff, interventions were adapted to address such barriers. Additionally, though this project involves referrals to pharmacy services, it could be generalized to any underutilized service which requires referrals.

Another limitation was the timeframe for data collection was only six weeks. A quality improvement project should have at least three cycles of improvement (BMJ Quality & Safety, 2023). When measuring referral rates and the impact of pharmacist interventions, a longer collection period is desirable to ensure this change in referral rates leads to a meaningful change in organizational and patient outcomes. Further, the surveys and screening tools were developed by the author, which reduces reliability and validity.

Lastly, in September of 2022, the organization implemented their own quality improvement project specifically related to uncontrolled diabetes and integration of pharmacists in patient care through automatic referrals. Though the referrals included in this study were all placed by PCPs after an

office visit using the pre-visit screening tool, there may be some cross contamination of the post-intervention phase.

Recommendations for Sustainability

Originally, one objective of this project was to measure Chronic Care Visit completion rates. Chronic Care Visit completion requires specific components to be addressed during patient visits. After chart review of two patient encounters with CPS after the study period, it became apparent that efforts should be targeted at improving collaborative practice agreement (CPA) adherence by the pharmacists in the form of ordering necessary disease-related screening tests and referrals to appropriate specialists (i.e., ophthalmologist) instead of deferring to PCPs. For this reason, Chronic Care Visit completion should not be an expectation of this project intervention at this time. Instead, an educational session with a visible reminder tool, possibly a pocket card or pre-visit checklist, should be developed specifically for CPS to use during patient encounters to ensure CPA utilization to the full extent. By doing so, this could add value in the form of decreasing the workload for PCPs by helping to consistently manage diseases that are tied to reimbursement and often require frequent follow up.

In order to sustain the intervention of screening for CPS referrals, visual reminders (Pharmacy Services Screening Tool; the modifications to the pre-visit checklist) were laminated and posted at the desks of medical assistants, PCPs, and near the breakroom at the end of the DNP project. Additionally, a smartphrase was created after the study period to be used by PCPs to introduce the CPS team to patients when either a referral is offered or placed during a patient encounter to increase awareness of their role and services. It can also be used when offering CPS services to patients via electronic message to ensure efficient and consistent introduction of CPS. The office manager will continue to provide copies of the modified checklist for use during pre-visit planning. It is recommended that the quality improvement specialist and office manager continue to review referrals to pharmacy services on a monthly basis and monitor for a reduction in referral rates. The office manager will discuss the results of

these monthly audits with PCPs at the monthly provider meeting, and discuss adherence to the pre-visit checklist process on an as-needed basis during the monthly medical assistant meetings. In the future, once the organization provides a newer office space, it is recommended that the CPS have a designated space which is visible and highly accessible to PCPs to improve utilization of CPS as well as interprofessional collaboration.

Conclusion and Implications for Practice

Health care has shifted to a patient-centered approach within the last two decades. This approach requires an interdisciplinary team and is the norm in the inpatient setting. However, in the primary care setting, expanding patient care responsibilities to other team members beyond the PCP has only begun to occur within the last five years (Choe et al., 2018; Sanofi, 2016). The inclusion of CPS in the primary care setting has become increasingly popular; though, there are gaps in the available literature that measures patient outcomes in response to CPS integration beyond medication-related problems. By increasing referrals to CPS within the clinical site with the assumption of an improvement in patient and organizational outcomes to incentivize sustainability, this project can offer support for future research to measure the impact of CPS. Additionally, future studies focusing on the involvement of CPS in patient care through interprofessional collaboration will be particularly helpful in elevating the scope and role of the CPS, especially in rural areas and underserved populations. Though preliminary, this quality improvement DNP project, which embraces the role of the CPS as a valuable and effective part of the primary care team, provides a foundation contributing to the knowledge gap surrounding the role and impact of the clinical pharmacist on organizational and patient care outcomes within the primary care setting.

Declaration of Conflicting Interest

The author declared no potential conflicts of interest with respect to the development, implementation, and/or authorship of the project components and this manuscript.

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Tables

Table 1

Implementation Strategies

Implementation Strategies (Powell et al., 2015)	How to Accomplish	Framework Alignment	Literature Alignment
Assess for readiness and identify barriers and facilitators	Student to complete organizational assessment, attend provider meetings, meet with stakeholders, complete a literature review	Define, Measure	Balsom et al. (2020), Khaira et al. (2020), McCullough et al. (2021)
Conduct educational meetings	Pre-intervention meeting with clinicians, meeting with medical assistants to educate on use of screening tool and benefits for patients/clinicians/organization	Define, Improve	Balsom et al. (2020), Cardwell et al. (2020), McCullough et al. (2021)
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Facilitate relay of clinical data to providers	Highlight monthly referral rates by provider at monthly provider meeting	Analyze, Improve, Control	Balsom et al. (2020), Cardwell et al. (2020), Darnell et al. (2020), Koprivnik et al. (2020), Peek et al. (2020)
Identify change champions	Determine who is motivated and dedicated to driving change	Improve, Control	Khaira et al. (2020)
Obtain and use feedback	Pre- and post-meeting surveys to attendees to assess knowledge, identify barriers, evaluate effectiveness	Measure, Analyze, Improve, Control	Balsom et al. (2020), Cardwell et al. (2020), McCullough et al. (2021)
Promote adaptability	Tailor reminders to meet local needs	Improve, Control	Dellogono et al. (2020)
Purposely reexamine the implementation	Student to monitor referral rates weekly throughout implementation to monitor progress; adjust workflow process	Measure, Analyze, Improve, Control	Cardwell et al. (2020), Darnell et al. (2020), Koprivnik et al. (2020), McCullough et al. (2021)
Remind clinicians	Student to use visual aids, email reminders, verbal huddle reminders about benefits of pharmacy services	Improve, Control	Khaira et al. (2020), McCullough et al. (2021)
Use data experts	Use of site data expert for assistance with data compilation, GVSU student statistician to analyze data	Measure, Analyze	All articles

Table 2

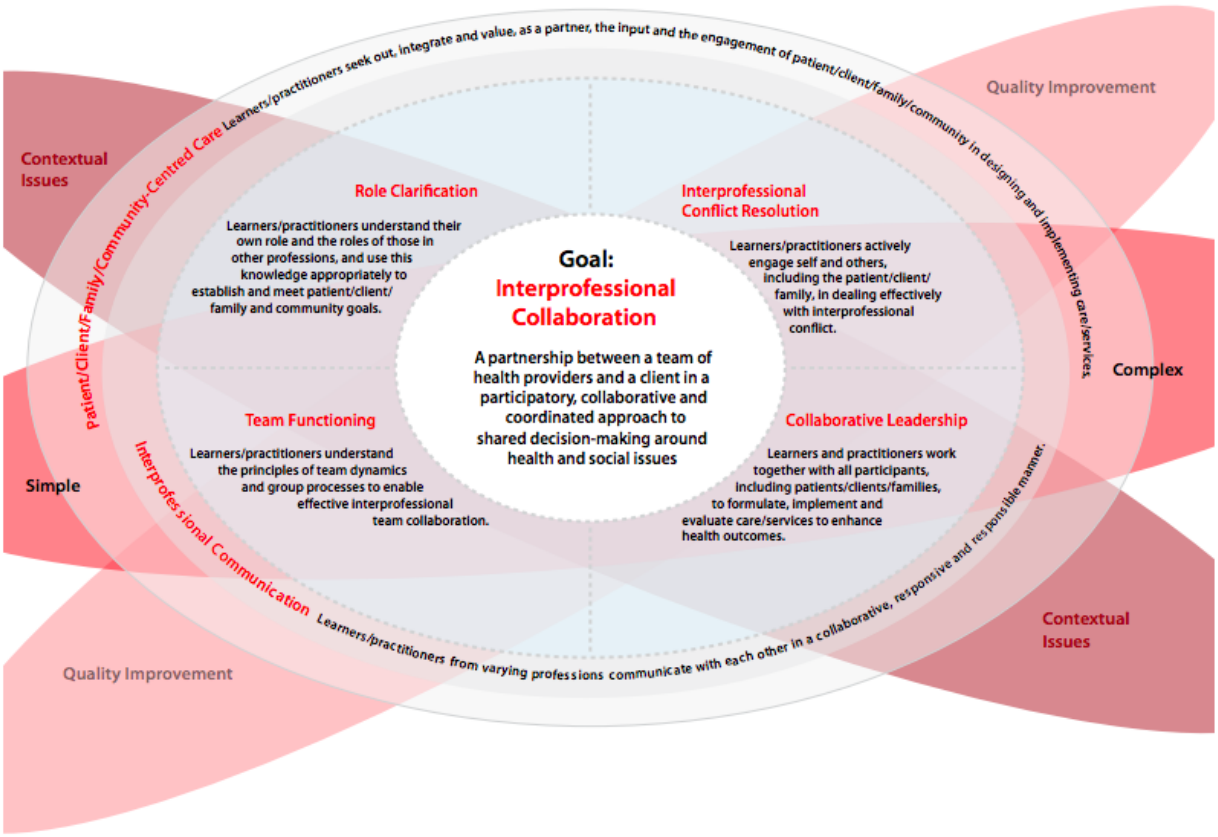
Evaluation and Measures

Data Collected	How Measured	What Measured	When Measured	Who Measured
Knowledge, perceptions, and barriers to interprofessional collaboration with pharmacy services	Survey	Provider Response	Pre implementation (February 2023)	Student
Referrals to clinical pharmacy services	EHR audit	# referrals	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, office manager, QI data expert
Encounter diagnoses associated with referral order	EHR audit	Type & frequency of diagnoses	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, QI data expert
Common billing codes used by pharmacy services	EHR audit	CPT codes	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, QI data expert

Figures

Figure 1

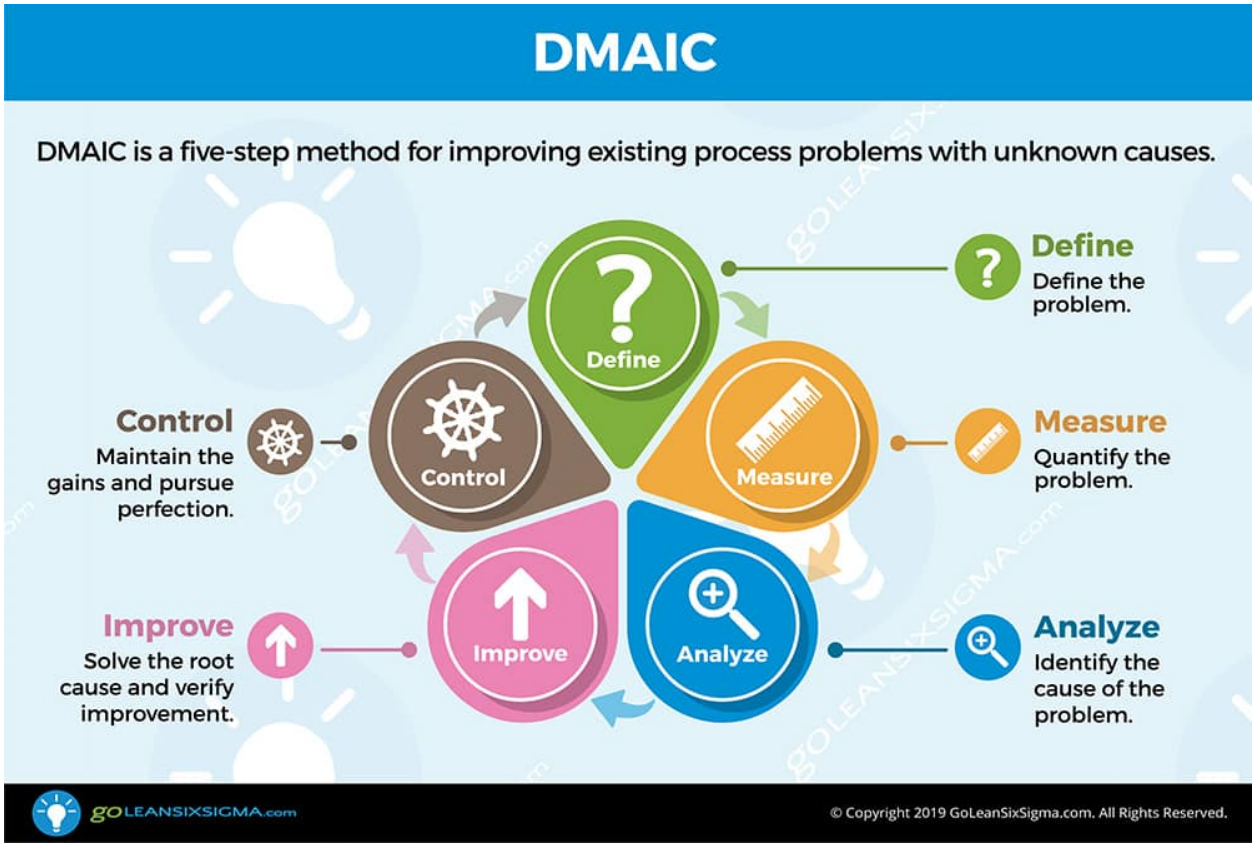
National Interprofessional Competency Framework



Note. From *A National Interprofessional Competency Framework* by the Canadian Interprofessional Health Collaborative (2010). Copyright 2010 Her Majesty the Queen of Canada. Used with permission.

Figure 2

DMAIC Method



Note. The DMAIC Method is an approach utilized within the Lean Six Sigma framework. It is important to note that this project did not utilize Lean Six Sigma in its entirety; rather, the DMAIC Method was used to guide the development of implementation strategies for this project. Copyright 2019 GoLeanSixSigma.com. Used with permission.

Figure 3

Pre-Visit Checklist

Patient Name:

DOB:

Pre-Visit Planning Checklist

Date: _____ Room # _____

RFV: Sick visit PE Follow-up

Pre-op AWV CCV

Other: _____

_____

Notes:

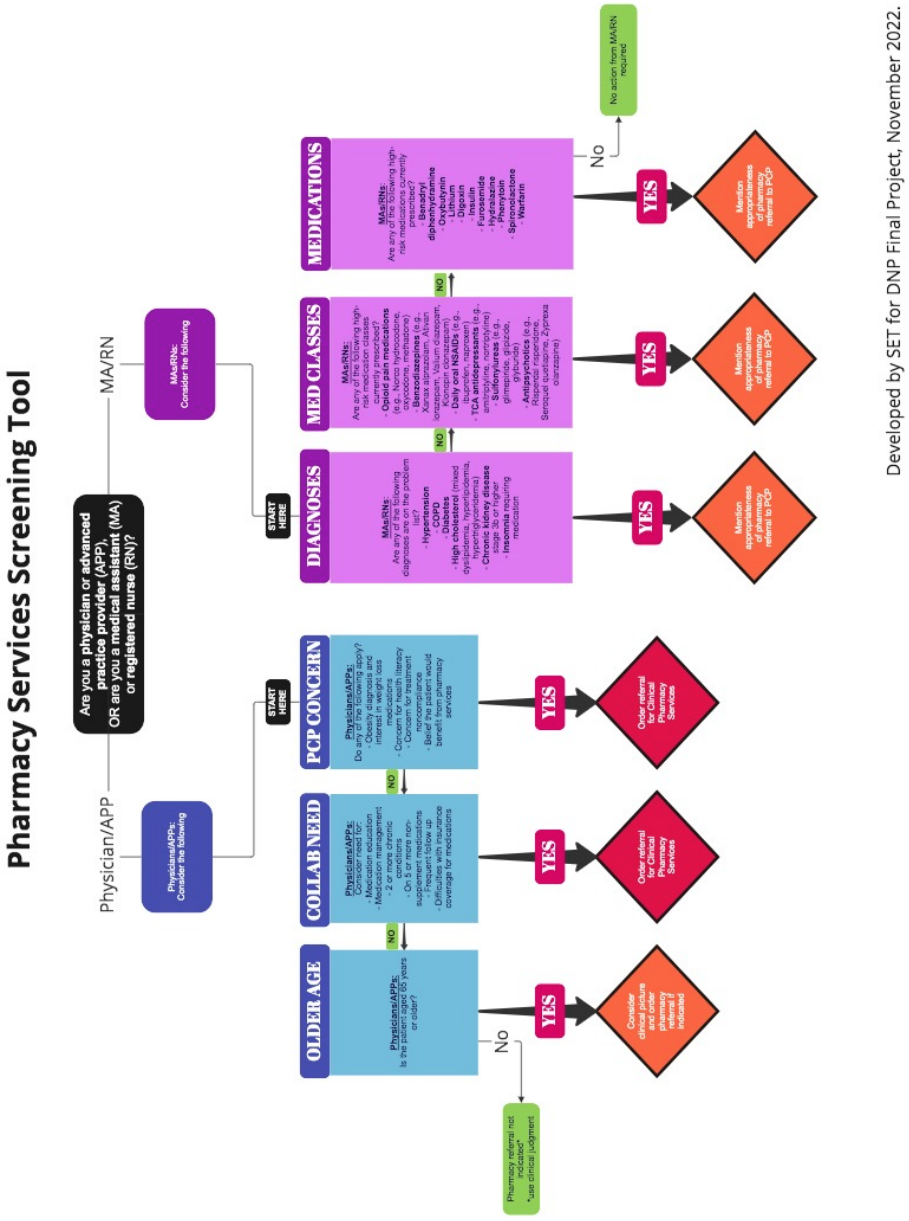
My Chart Needed: □yes

All Visits	Controlled Substance
Future Appointments	CSA
Last Physical	Urine Drug Screen
Last Annual Wellness Visit	
Last CCV	
Female Physical Exam / Well Visit	**Male Physical Exam / Well Visit**
Mammogram – every 1-2 years from ages 40-74	**PSA Test** – yearly for men age 55-70
PAP Smear/HPV – every 3-5 years from ages 21-64	**AAA Screening** – once for 65-75 w/ ANY smoking history
G/C Screening – once for sexually active women ages 16-24	
DEXA Scan – q 2 years aged 65+	
Colonoscopy – every 10 years from ages 45-74	**Colonoscopy** – every 10 years from ages 45-74
Cologuard – every 3 years from ages 45-74	**Cologuard** – every 3 years from ages 45-74
FOBT	**FOBT**
Low Dose CT – yearly from 50-80 with ≥ 20 pack year	**Low Dose CT** – yearly from 50-80 with ≥ 20 pack year
HIV Screening – once from ages 15-65	**HIV Screening** – once from ages 15-65
Hepatitis C Screening – once from ages 18-79	**Hep C Screening –** once from ages 18-79
Diabetic	**Last One**
A1c – every 3 months (every 6 months if Hgb A1c <7)	
Microalbumin – yearly	
Eye Exam - yearly	
Foot Exam – yearly	

Note. This pre-visit checklist was a one-sided paper form filled out by medical assistants prior to every visit during the pre-implementation period. This was modified to include a second page (See Figure 5).

Figure 4

Pharmacy Services Screening Tool



Note. This visual aid helped guide the development of the modified pre-visit checklist. It is used by medical assistants and providers, and was developed by the author.

Figure 5

Modified Pre-Visit Checklist

MAs/RNs: ALL PATIENTS	CIRCLE APPLICABLE ANSWER.
What is the patient's age?	**Younger than 65** **65-79** **80+**
Eligible for Chronic Care Visit (CCV)?	**YES** **NO** **UNSURE** **N/A**
Taking 5 or more medications? (NOT vitamins or supplements)	**YES** **NO** **UNSURE** **N/A**
Any of the following diagnoses? Circle all that apply. **Hypertension** (high blood pressure) **Diabetes** **COPD** requiring medication **High cholesterol** (mixed dyslipidemia, hyperlipidemia, hypertriglyceridemia) **Chronic kidney disease** (Stage 3b or higher) **Insomnia** requiring medication **Polypharmacy**	**YES** **NO** **UNSURE** **N/A**

PROVIDERS ONLY: If any of the following apply to the patient, consider referral to pharmacy services.	
EDUCATION: medication, treatment plan, tobacco cessation	Difficulties with **insurance coverage** for medications or requiring **prior authorizations**
CONCERN FOR: nonadherence, polypharmacy, health illiteracy	**2 or more chronic conditions**
Patient/Family has **medication-related questions**	Requiring **frequent follow up**
Recent hospitalization - to consider need for med rec, refills, med-related problems like post-op constipation	Need for medication **management / reconciliation**
On multiple **HIGH-RISK** medications	**Obesity diagnosis** and interest in weight loss medications
The patient would benefit from pharmacy services	The patient would benefit from additional office visits

---

Note. This modification was added to **Figure 3** as a second page to identify patients that might benefit from a referral to pharmacy services and was used during the post-implementation period. This modification was used by medical assistants and providers prior to each office visit. It is site-specific.

Figure 6

Pretest Survey

PRETEST: Baseline Knowledge & Perceptions - DNP Project

1. *[Not including anticoagulation monitoring or pandemic-related treatment]:* How **frequently do you refer** patients to clinical pharmacy?
    a. Never
    b. Rarely, in 10-30% of the chances when I could have
    c. Sometimes, in about 40-60% of the chances when I could have
    d. Frequently, in about 70-90% of the chances I could have
    e. Every time

2. Patients with diagnoses included in the Collaborative Practice Agreement are identified by the clinical pharmacy team so a referral from the PCP is not necessary.
    Circle **one**: TRUE or FALSE

3. *[Not including anticoagulation monitoring or pandemic-related treatment]*: Referrals to clinical **pharmacy services are highly beneficial** to the patient. **Mark your selection below.**

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

4. *[Not including anticoagulation monitoring or pandemic-related treatment]:* Referrals to clinical pharmacy services **reduce my workload** in one or more of the following ways: chronic disease management, medication management, medication adherence, medication education, medical equipment education. **Mark your selection below.**

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

5. The clinical **pharmacist is a valuable member** of the patient-care team. **Mark your selection below.**

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

6. What **barriers prevent you from referring** to clinical pharmacy services? Circle **all** that apply.
    a. Concern for patient safety
    b. Concern for quality of care
    c. Concern for liability
    d. Lack of value-added benefit
    e. No time to refer
    f. I don't know what to refer for / what services they provide
    g. Nothing prevents me from referring to clinical pharmacy services
    h. Other:
    _____
    _____
    _____

Figure 7

Posttest Survey

POSTTEST: Knowledge & Perceptions - DNP Project

1. **After the intervention**, how likely are you to refer patients to clinical pharmacy?
    a. Much less likely
    b. Less likely
    c. About the same
    d. More likely
    e. Much more likely

2. How do you think the information you received on clinical pharmacy services will **influence your referral practices**?
    a. Not at all influential
    b. Slightly influential
    c. Somewhat influential
    d. Very influential
    e. Extremely influential

3. Compared to your knowledge before the informational session, how aware were you of the role/scope of the clinical pharmacist?
    a. Not at all aware
    b. Slightly aware
    c. Somewhat aware
    d. Moderately aware
    e. Extremely aware

4. Patients with diagnoses included in the Collaborative Practice Agreement are identified by the clinical pharmacy team so a referral from the PCP is not necessary.
    Circle one: TRUE or FALSE

5. *[Not including anticoagulation monitoring or pandemic-related treatment]*: Referrals to clinical **pharmacy services are highly beneficial** to the patient. **Mark your selection below.**

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

6. *[Not including anticoagulation monitoring or pandemic-related treatment]:* Referrals to clinical pharmacy services **reduce my workload** in one or more of the following ways: chronic disease management, medication management, medication adherence, medication education, medical equipment education. **Mark your selection below.**

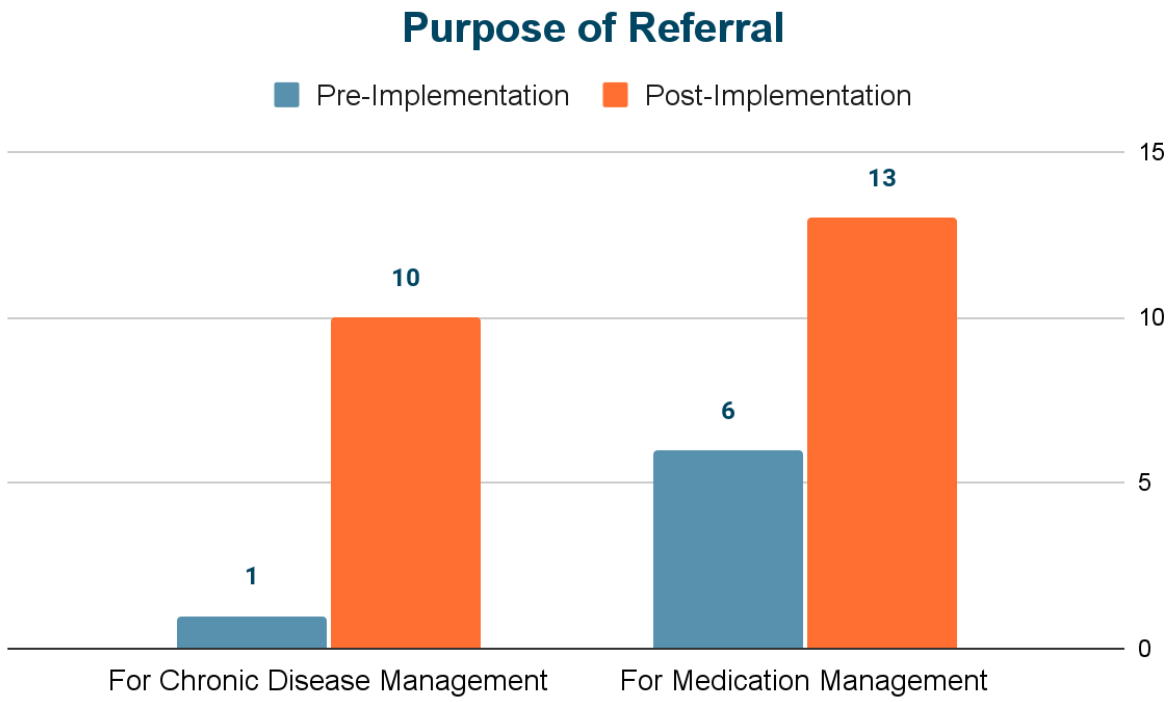
☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

7. The clinical **pharmacist is a valuable member** of the patient-care team. **Mark your selection below.**

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

Figure 8

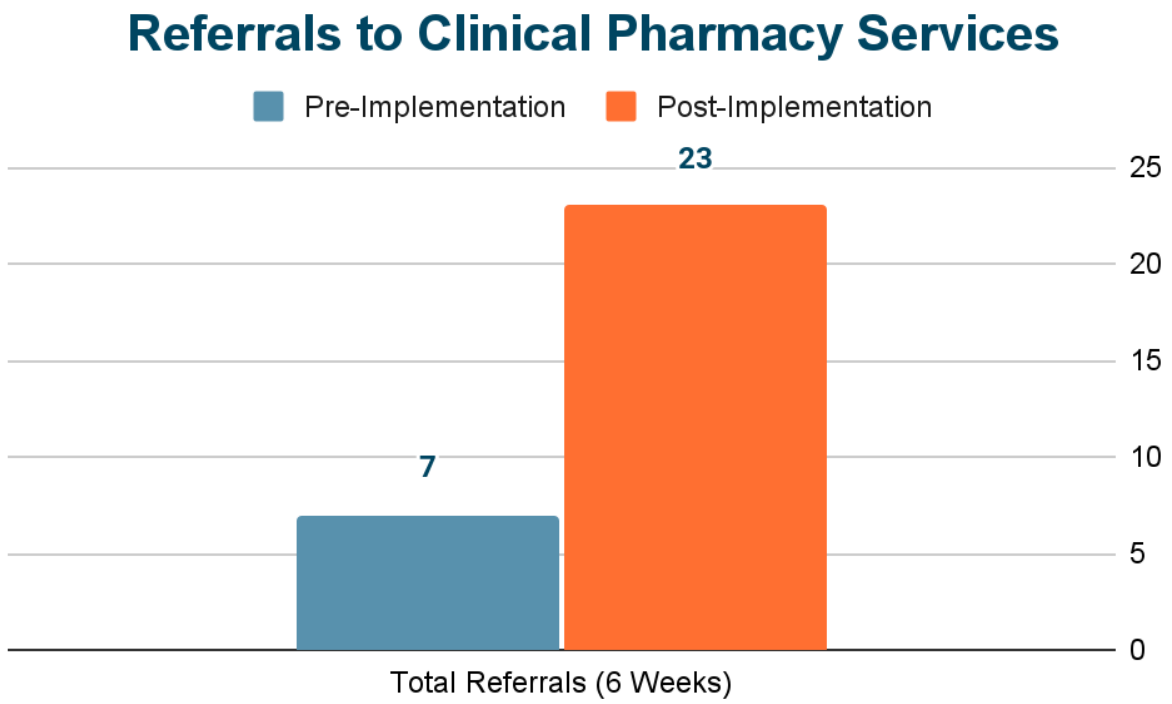
Purpose of Referral



Note. Referrals to CPS are ordered either as "Ambulatory Referral to Pharmacy Services" or as "Ambulatory Referral to Medication Management Services" and are categorized in this project as 'chronic disease management' or 'medication management,' respectively. Data was statistically analyzed using 2-sample Fisher's Exact test ($p = 0.215$). Since $p > 0.05$, there is insufficient evidence to support a relationship between time point and binary purpose of referral.

Figure 9

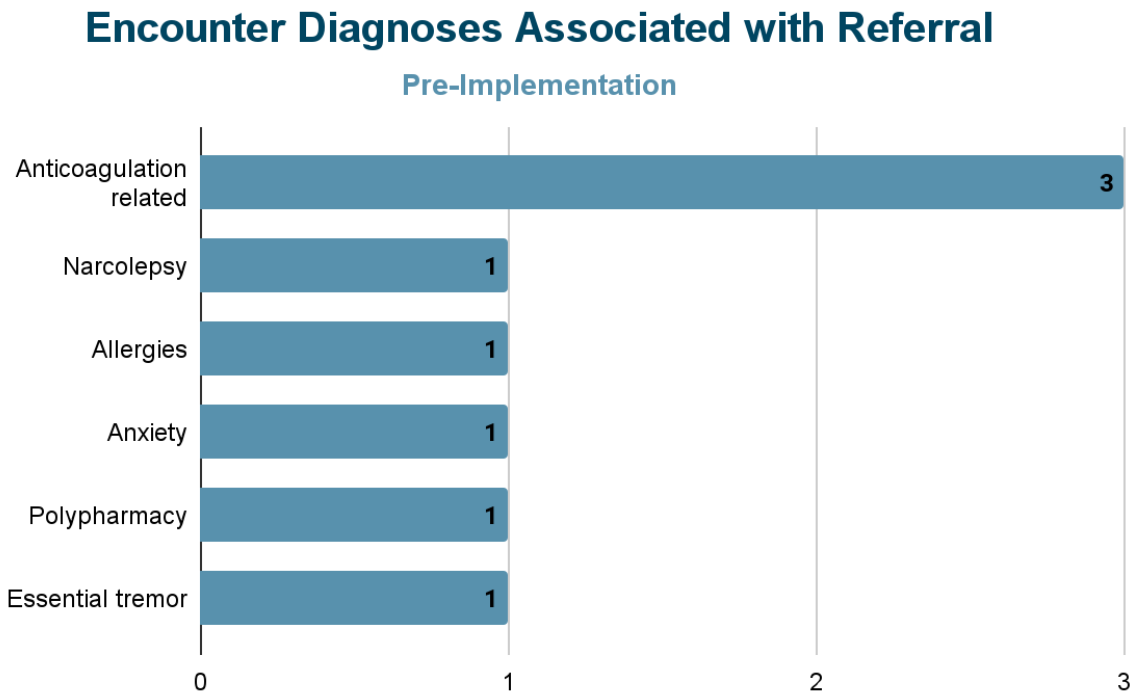
Referrals to Clinical Pharmacy Services



Note. There was an increase in referrals from n = 7 to n = 23 after the intervention. Meaningful statistical analysis was unable to be completed for this data, as determination of referral eligibility was based ultimately on provider discretion and should not be measured against total patient encounters.

Figure 10

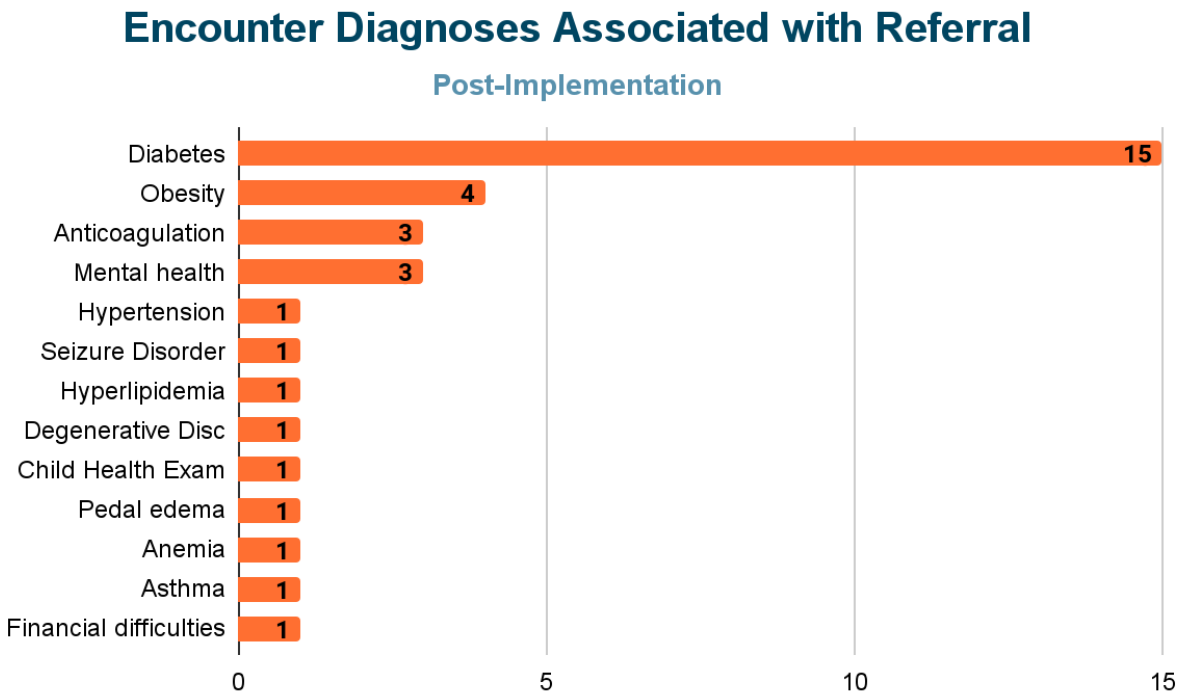
Encounter Diagnoses Associated with Referral: Pre-Implementation



Note. There were n = 7 pre-implementation referrals to pharmacy services. It is important to note that referrals could have more than one associated diagnosis. The referral for chronic disease management in the pre-implementation phase was for narcolepsy (n = 1). The rest of the referrals were related to medication management (n = 6).

Figure 11

Encounter Diagnoses Associated with Referral: Post-Implementation



Note. There were n = 23 post-implementation referrals to pharmacy services. It is important to note that referrals could have more than one associated diagnosis. A majority of diagnoses associated with CPS referrals were for diabetes management (n = 15), obesity (n = 4), anticoagulation (n = 3), and mental health (n = 3). Other CPA-relevant diagnoses were hypertension (n = 1), hyperlipidemia (n = 1), and asthma (n = 1). Financial difficulties were included on the modified pre-visit checklist as a potential consideration for referral, as adherence to treatment plans can be complicated by social determinants of health, such as socioeconomic status. CPS can offer solutions including medication coupons, assistance with prior authorizations, as well as treatment plan modification to lower the cost of medications.

Oral Defense

Presentation

Improving Utilization of Clinical Pharmacy Services in a Health Professional Shortage Area

Samantha E. Tallman
DNP Project Final Defense
April 24, 2023

Acknowledgements

- GVSU Advisors
  - Dr. Della Hughes-Carter, DNP, RN, BC-GNP
  - Dr. Amy Manderscheid, DNP, RN, AGPCNP-BC, AGNP-C, CMSRN
- Site Mentor
  - Dr. Brittany Wildgen, MD
- Graduate education funded by HRSA ANEW grant

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Objectives for Presentation

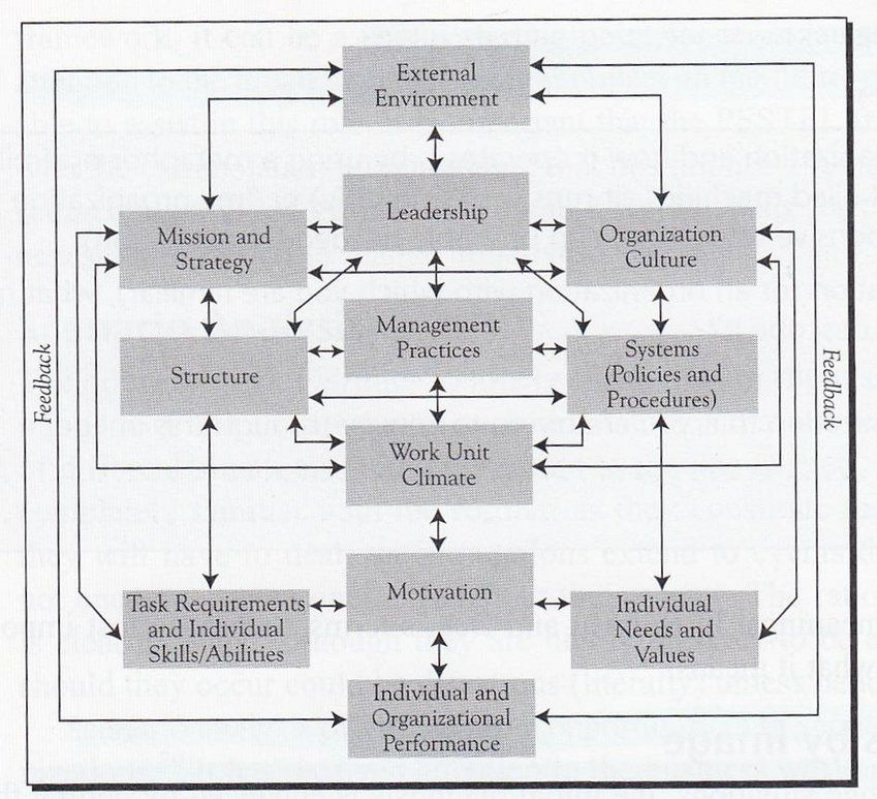
1. Recognize that underutilization of clinical pharmacy services is a site-specific problem.
2. Summarize organizational assessment and evidence supporting the project to increase referrals to pharmacy services.
3. Outline the plan to improve referrals to pharmacy services and for data collection and analysis.
4. Describe the project outcomes, implications for practice, and the sustainability plan.
5. Obtain approval from the advisory team for the completed DNP project.

Introduction

- Increase in chronic comorbid health conditions, complex pharmacological regimens (CDC, 2022; Hales et al., 2019; McCullough et al., 2021)
- Recent integration of clinical pharmacy specialists (CPS) into ambulatory settings (Choe et al., 2018; Sanofi, 2016)
- CPS are underutilized, undervalued (Choe et al., 2017; Teichman & Wan, 2021)
- No set standard quality measures of CPS (King et al., 2021)
- Patient-centered approach requires an interdisciplinary team (Davis et al., 2005; King et al., 2021)

Organizational Assessment Framework

A Model of Organizational Performance and Change



- Organizations are influenced by the culture and climate
- Feedback loops encourage continuous improvement

Figure 1. A Model of Organizational Performance and Change. (Burke & Litwin, 1992).

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Current State of the Organization

Midwest Primary Care Office

- Extension of a larger integrated health system
- State designated Health Professional Shortage Area (HPSA)
- Staff:
  - Physicians (MDs/DOs)
  - Advanced practice providers (APPs)
  - Clinical pharmacist specialists (CPS)
  - Registered nurses (RNs)
  - Medical assistants (MAs)

Patient Demographics

- Age ≥60 years: 60%
- Medicare and/or Medicaid: 46%
- Encounters:
  - Chronic conditions (12%)
  - Same day (6%)
  - Office visits (35%)

Embedded Clinical Pharmacy Services

- Three long-term clinical pharmacists (contract employees)
- Two new clinical pharmacists (employed by organization)
- Mostly anticoagulation, pandemic-related, uncontrolled diabetes
- Four separate Collaborative Practice Agreements (CPAs)

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SWOT: Strengths & Opportunities

SWOT Analysis	
Strengths	**Opportunities**
• Clinical pharmacy specialists (CPS) **already embedded** in the practice with a **Collaborative Practice Agreement (CPA)** • Part of a large healthcare system in Midwest • Mission statement and values known and visible • Providers committed to **increasing access to care, improving patient outcomes** • **Designated Health Professional Shortage Area** (HPSA) • Existing electronic health record supporting interdisciplinary communication	• **Increased access to care** improves patient outcomes and community health • **Organization savings** on overall health care costs associated with **optimized medication management** • Increased clinic and organizational revenue since **pharmacy services are billable** • Opportunity to meet **care gaps** • **Opportunity for federal grants** due to HPSA designation

Table 1. SWOT Analysis.

SWOT: Weaknesses & Threats

SWOT Analysis	
Weaknesses	**Threats**
• Providers **not utilizing** available clinical pharmacy services • CP team **mostly seeing anticoagulation patients and pandemic-related treatment questions**, all others in CPA **require referral** from primary care provider • No longer have site-specific quality improvement team • **CPS office space located outside of clinical site** (but in same building) which may impact team functioning and interprofessional communication	• **Interprofessional conflict** may arise with competing roles and perceived risk to autonomy and loss of control • Potential resistance to intervention related to **skepticism surrounding role of clinical pharmacist** • Potential resistance to intervention related to **perception of lack of value-added benefit** · Merging local hospital systems, continued changes at organizational and site levels

Table 1 (cont). SWOT Analysis.

Literature Review: Synthesis of Results

- **Pharmacist-led interventions improved**:
  - Hemoglobin A1C (Higgins et al., 2020; Narain et al., 2020)
  - Blood pressure (Narain et al., 2020; Stallings et al., 2021)
  - Transition of care (Dellogono et al., 2020; Koprivnik et al., 2020)
- **Interprofessional collaboration improved**:
  - Hazardous prescribing (Cardwell et al., 2020; Darnell et al., 2020; Peek et al., 2020)
  - Med reconciliation & polypharmacy (Balsom et al., 2020; Koprivnik et al., 2020)
  - Majority of recommendations were accepted by PCPs
  - Role perception (Khaira et al., 2020; McCullough et al., 2021)
- **Better access and outcomes for special populations**:
  - Rural (McCullough et al., 2021; Stallings et al., 2020)
  - Black patients with diabetes (Narain et al., 2020)
  - Refugees (Higgins et al., 2020)
  - Veterans (McCullough et al., 2021)

Framework to Evaluate Phenomenon

National Interprofessional Competency Framework

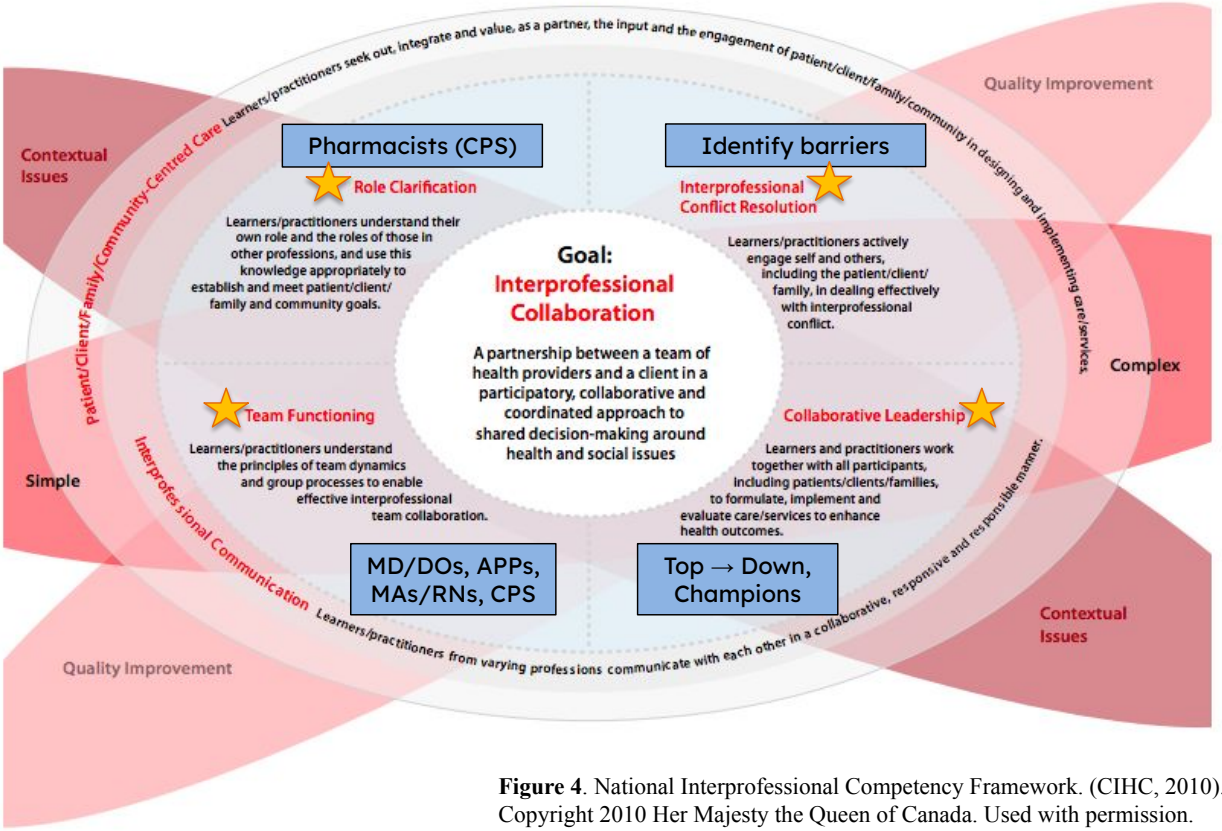


Figure 4. National Interprofessional Competency Framework. (CIHC, 2010). Copyright 2010 Her Majesty the Queen of Canada. Used with permission.

Clinical Practice Question

Will the implementation of a pre-visit pharmacy services screening tool for all patients increase the number of clinical pharmacy specialist referrals at a primary care site in a designated Health Professional Shortage Area?

Project Purpose & Objectives

Primary Purpose/Aim:

1. To increase number of referrals to embedded clinical pharmacy specialists.

Secondary Purposes/Aims:

2. ~~To identify clinical pharmacist interventions.~~
3. ~~To improve rates of chronic care visits (CCV).~~
4. To identify encounter type by diagnoses.

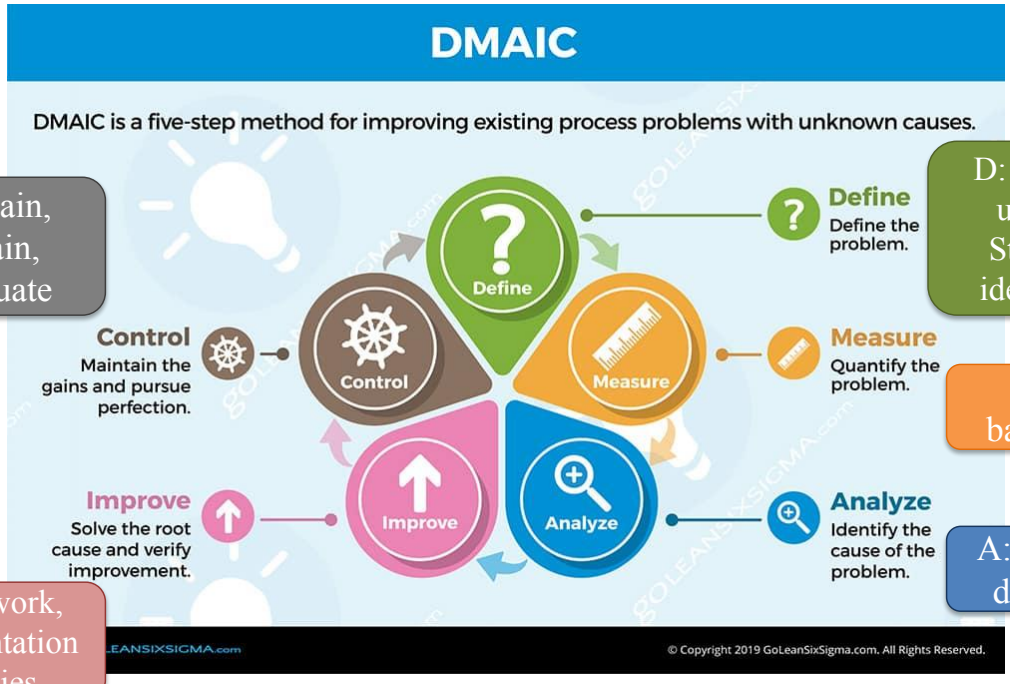
- **Objectives**:
  - *Develop* and implement pharmacy services screening tool.
  - *Educate* the health care team about embedded clinical pharmacy specialists services, the evidence supporting the benefits of interprofessional collaboration, and the modified patient screening process.
  - *Measure* referrals and associated encounter diagnoses.
  - *Disseminate* results to stakeholders and offer recommendations for sustainability

Methods

- **Type:** Quality Improvement
- **Design**: Pre-post comparison
- **Setting**: Primary care office in a state-designated HPSA
- **Participants**: Patients and health care team within primary care office
  - Adult patients referred to pharmacy services
  - PCPs, embedded CPS, MAs, RNs

Implementation Framework

Part of Lean Six Sigma: DMAIC Method



C: Sustain, maintain, re-evaluate

D: Pharmacist utilization, Stakeholder identification

M: OA, baseline data

A: Interpret & display data

I: Teamwork, implementation strategies

Figure 5. DMAIC Method. (GoLeanSixSigma, 2019). Copyright 2019 GoLeanSixSigma.com. Used with permission.

Key Stakeholders

DMAIC: DEFINE
Pharmacist utilization, Stakeholder identification

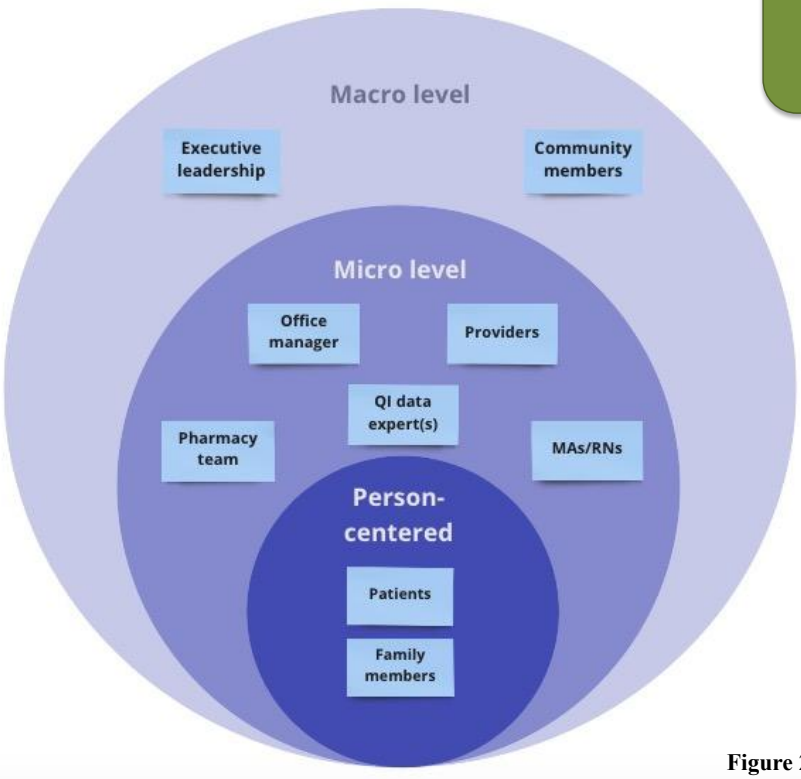


Figure 2. Key Stakeholders.

Implementation Strategies & Elements

Implementation Strategies (Powell et al., 2015)	How to Accomplish	Framework Alignment	Literature Alignment
Assess for readiness and identify barriers and facilitators	Student to complete organizational assessment, attend provider meetings, meet with stakeholders, complete a literature review	Define, Measure	Balsom et al. (2020), Khaira et al. (2020), McCullough et al. (2021)
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Conduct local needs assessment	Student to complete organizational assessment and reassess as organizational changes occur	Define, Measure	Darnell et al. (2020), Higgins et al. (2020), McCullough et al., (2021), Peek et al. (2020)
Develop and implement tools for quality monitoring	Creation of a pre-visit screening tool assessing need for clinical pharmacy referral, adjust workflow process	Define, Measure, Analyze, Improve	Balsom et al. (2020), Cardwell et al. (2020), Darnell et al. (2020), Koprivnik et al. (2020)
Develop and distribute educational materials	Creation of visual aids, email reminders, distribute articles supporting intervention to clinicians	Analyze, Improve, Control	Khaira et al. (2020)
Facilitate relay of clinical data to providers	Highlight monthly referral rates by provider at monthly provider meeting	Analyze, Improve, Control	Balsom et al. (2020), Cardwell et al. (2020), Darnell et al. (2020), Koprivnik et al. (2020), Peek et al. (2020)

DMAIC: IMPROVE
Teamwork, implementation strategies

Table 2. Implementation Strategies.

Implementation Strategies (cont.)

Implementation Strategies (Powell et al., 2015)	How to Accomplish	Framework Alignment	Literature Alignment
Identify change champions	Determine who is motivated and dedicated to driving change	Improve, Control	Khaira et al. (2020)
Obtain and use feedback	Pre- and post-meeting surveys to attendees to assess knowledge, identify barriers, evaluate effectiveness	Measure, Analyze, Improve, Control	Balsom et al. (2020), Cardwell et al. (2020), McCullough et al. (2021)
Promote adaptability	Tailor reminders to meet local needs	Improve, Control	Dellogono et al. (2020)
Purposely reexamine the implementation	Student to monitor referral rates weekly throughout implementation to monitor progress; adjust workflow process	Measure, Analyze, Improve, Control	Cardwell et al. (2020), Darnell et al. (2020), Koprivnik et al. (2020), McCullough et al. (2021)
Remind clinicians	Student to use visual aids, email reminders, verbal huddle reminders about benefits of pharmacy services	Improve, Control	Khaira et al. (2020), McCullough et al. (2021)
Use data experts	Use of site data expert for assistance with data compilation, GVSU student statistician to analyze data	Measure, Analyze	All articles

DMAIC: IMPROVE
Teamwork, implementation strategies

Table 2 (cont). Implementation Strategies.

Pretest: Baseline Knowledge & Perceptions

Behaviors — *[Not including anticoagulation monitoring or pandemic-related treatment]:* How **frequently do you refer** patients to clinical pharmacy? (5 points, Never to Every time)

Knowledge — Patients with diagnoses included in the Collaborative Practice Agreement are identified by the clinical pharmacy team so a referral from the PCP is not necessary. (True/False)

Perception — *[Not including anticoagulation monitoring or pandemic-related treatment]*: Referrals to clinical **pharmacy services are highly beneficial** to the patient. (5 points, Strongly disagree to Strongly agree)

Perception — *[Not including anticoagulation monitoring or pandemic-related treatment]:* Referrals to clinical pharmacy services **reduce my workload** in one or more of the following ways: chronic disease management, medication management, medication adherence, medication education, medical equipment education. (5 points, Strongly disagree to Strongly agree)

Perception — The clinical **pharmacist is a valuable member** of the patient-care team. (5 points, Strongly disagree to Strongly agree)

Barriers — What **barriers prevent you from referring** to clinical pharmacy services? Select all that apply. (Concern for patient safety; Concern for quality of care; Concern for liability; Lack of value-added benefit; No time to refer; I don't know what to refer for / what services they provide; Nothing prevents me from referring to clinical pharmacy services; Other: _____)

Posttest: Knowledge & Perceptions

Behaviors	**After the intervention**, how likely are you to refer patients to clinical pharmacy? (5 points, Much less likely to Much more likely)
Behaviors	How do you think the information you received on clinical pharmacy services will **influence your referral practices**? (5 points, Not at all influential to Extremely influential)
Knowledge	Compared to your knowledge before the informational session, how aware were you of the role/scope of the clinical pharmacist? (5 points, Not at all aware to Extremely aware)
Knowledge	Patients with diagnoses included in the Collaborative Practice Agreement are identified by the clinical pharmacy team so a referral from the PCP is not necessary. (True/False)
Perception	*[Not including anticoagulation monitoring or pandemic-related treatment]*: Referrals to clinical **pharmacy services are highly beneficial** to the patient. (5 points, Strongly disagree to Strongly agree)
Perception	*[Not including anticoagulation monitoring or pandemic-related treatment]:* Referrals to clinical pharmacy services **reduce my workload** in one or more of the following ways: chronic disease management, medication management, medication adherence, medication education, medical equipment education. (5 points, Strongly disagree to Strongly agree)
Perception	The clinical **pharmacist is a valuable member** of the patient-care team. (5 points, Strongly disagree to Strongly agree)

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Pre-Visit Checklist

- **Current process** = paper form for all patients
- Completed by MA, used to update provider
- Shredded by provider at end of visit

Patient Name:
DOB:

Pre-Visit Planning Checklist

Date: _____ Room # _____

RFV: Sick visit PE Follow-up
Pre-op AWV CCV
Other: _____

Notes:

My Chart Needed: □yes

All Visits	Controlled Substance
Future Appointments	CSA
Last Physical	Urine Drug Screen
Last Annual Wellness Visit	
Last CCV	
Female Physical Exam / Well Visit	**Male Physical Exam / Well Visit**
Mammogram – every 1-2 years from ages 40-74	**PSA Test** – yearly for men age 55-70
PAP Smear/HPV – every 3-5 years from ages 21-64	**AAA Screening** – once for 65-75 w/ ANY smoking history
G/C Screening – once for sexually active women ages 16-24	
DEXA Scan – q 2 years aged 65+	
Colonoscopy – every 10 years from ages 45-74	**Colonoscopy** – every 10 years from ages 45-74
Cologuard – every 3 years from ages 45-74	**Cologuard** – every 3 years from ages 45-74
FOBT	**FOBT**
Low Dose CT – yearly from 50-80 with ≥ 20 pack year	**Low Dose CT** – yearly from 50-80 with ≥ 20 pack year
HIV Screening – once from ages 15-65	**HIV Screening** – once from ages 15-65
Hepatitis C Screening – once from ages 18-79	**Hep C Screening –** once from ages 18-79
Diabetic	**Last One**
A1c – every 3 months (every 6 months if Hgb A1c <7)	
Microalbumin – yearly	
Eye Exam - yearly	
Foot Exam – yearly	

Figure 6. Pre-visit checklist.

Modified Pre-Visit Checklist

- **Maintain current paper process** with addition of pharmacy referral screening
- Completed by MA, used to update provider
- Shredded by provider at end of visit

MAs/RNs: ALL PATIENTS	CIRCLE APPLICABLE ANSWER.
What is the patient's age?	**Younger than 65 65-79 80+**
Eligible for Chronic Care Visit (CCV)?	**YES NO UNSURE N/A**
Taking 5 or more medications? (NOT vitamins or supplements)	**YES NO UNSURE N/A**
Any of the following diagnoses? Circle all that apply. **Hypertension** (high blood pressure) **Diabetes** **COPD** requiring medication **High cholesterol** (mixed dyslipidemia, hyperlipidemia, hypertriglyceridemia) **Chronic kidney disease** (Stage 3b or higher) **Insomnia** requiring medication **Polypharmacy**	**YES NO UNSURE N/A**

PROVIDERS ONLY: If any of the following apply to the patient, consider referral to pharmacy services.	
EDUCATION: medication, treatment plan, tobacco cessation	Difficulties with **insurance coverage** for medications or requiring **prior authorizations**
CONCERN FOR: nonadherence, polypharmacy, health illiteracy	**2 or more chronic conditions**
Patient/Family has **medication-related questions**	Requiring **frequent follow up**
Recent hospitalization - to consider need for med rec, refills, med-related problems like post-op constipation	Need for medication **management / reconciliation**
On multiple **HIGH-RISK** medications	**Obesity diagnosis** and interest in weight loss medications
The patient would benefit from pharmacy services	The patient would benefit from additional office visits

Figure 7. Pre-visit checklist (modified).

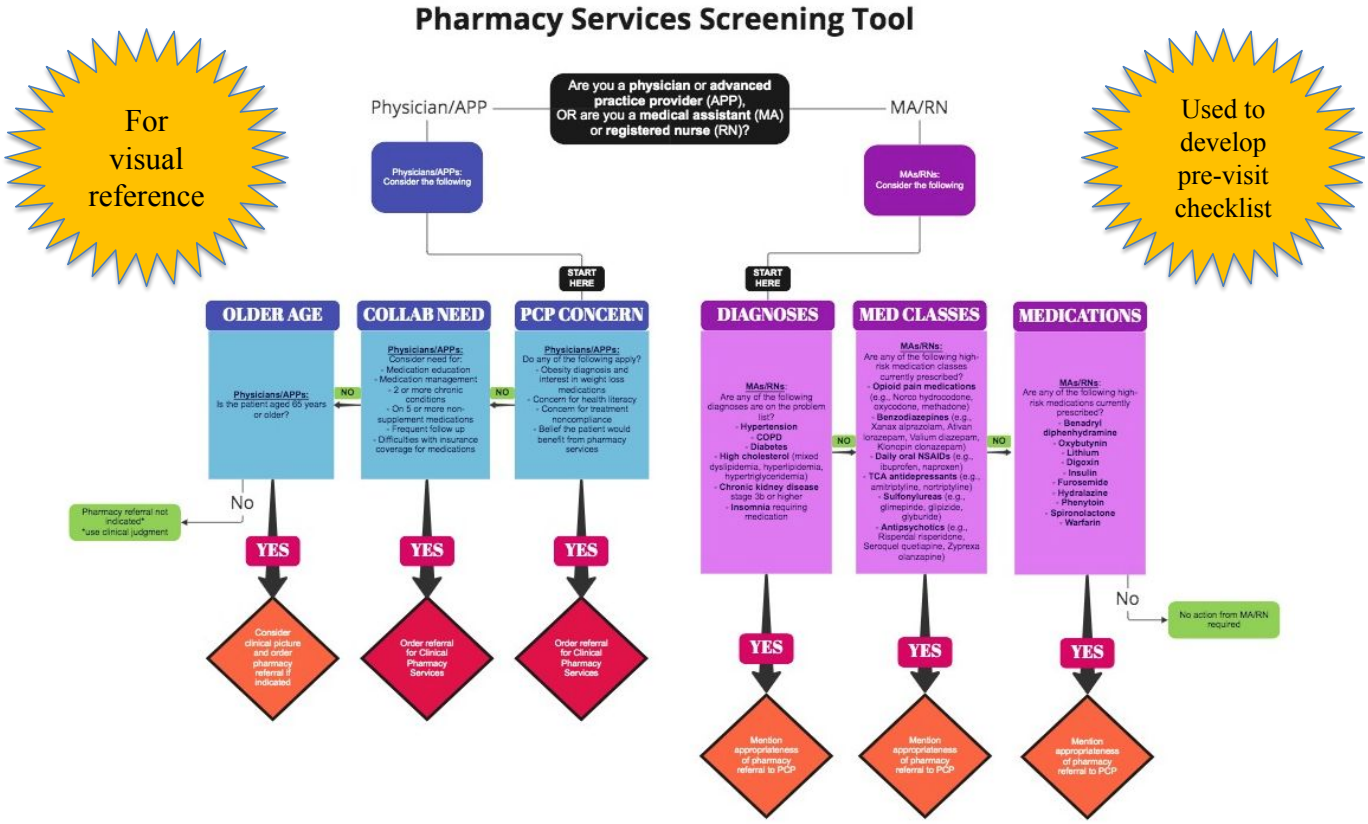

Figure 8. Pharmacy Services Screening Tool.

Developed by SET for DNP Final Project, November 2022.

Evaluation & Measures

Data Collected	How Measured	What Measured	When Measured	Who Measured
Knowledge, perceptions, and barriers to interprofessional collaboration with pharmacy services	Survey	Provider Response	Pre implementation (February 2023)	Student
Referrals to clinical pharmacy services	EHR audit	# referrals	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, office manager, QI data expert
Encounter diagnoses associated with referral order	EHR audit	Type & frequency of diagnoses	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, QI data expert
Common billing codes used by pharmacy services	EHR audit	CPT codes	Pre (02/22-03/22), Post (02/23-03/23) implementation	Student, QI data expert

Table 3. Evaluation and Measures. 23

Analysis Plan

<u>Knowledge, Perceptions, & Barriers</u>

- Provider survey pretest/posttest prior to referral process change

<u>Pre/Post-comparison data collection</u>

- Statistical software (SPSS): *2-sample Fisher's exact test*
  - **Number of referrals** to clinical pharmacy services for chronic disease and medication therapy management
- Exploratory data analysis (EDA): *Bar charts, tables*
  - **Diagnosis code associated with referral** to clinical pharmacy services
  - **Common CPT codes** used by clinical pharmacy services

M: Pre/Post data

A: Interpret & display data

Budgetary Considerations: Revenue

Doctor of Nursing Practice Project Financial Operating Plan	
Project Title	
Improving Utilization of Clinical Pharmacy Services in a Health Professional Shortage Area	
Revenue	
Project Manager Time (in-kind donation)	12,000.00
Team Member Time (in-kind donation)	
Quality Improvement Practice Transformation Manager	384.00
Site Mentor: Physician (1)	790.00
Clinical Pharmacy Specialists (5)	520.00
Physician Assistants (2)	228.00
Nurse Practitioners (2)	228.00
Other Physicians (3)	474.00
Medical Assistants (9)	76.50
Site Office Manager	248.00
Consultations	
Director of Pharmacy Services, non-employee	154.00
Statistician - Graduate Student	68.00
Potential Return on Investment	
Cost mitigation: CPT Billing Codes	
Initial visit, 4 per month for 4 months	672.00
Subsequent visit, established patient, 4 per month for 4 months	1,120.00
Medication therapy management, initial, 2 per month for 4 months	400.00
Medication therapy management, established, 2 per month for 4 mor	200.00
Medication therapy management, add'l 15 mins, 2 per month for 4 m	80.00
Telephone Visit 5-10min, 4 per month for 4 months	192.00
Telephone visit, 11-20 mins, 2 per month for 4 months	184.00
Team conference, 4 per month for 4 months	480.00
TOTAL INCOME	**18,498.50**

- *Time donation* based on **average salary** for that position in the state & time needed for education, meetings (Indeed.com, 2022)
- *Cost mitigation* based on national payment amount determined in **physician fee schedule** (CMS.gov, 2022)

$3,328 in **potential billable services** for *less than 30 hours* of CPS time

Expenses & Net Operating Plan

Expenses	
Project Manager Time (in-kind donation)	12,000.00
Team Member Time (in-kind donation)	
Quality Improvement Practice Transformation Manager	384.00
Site Mentor: Physician (1)	790.00
Clinical Pharmacy Specialists (5)	520.00
Physician Assistants (2)	228.00
Nurse Practitioners (2)	228.00
Other Physicians (3)	474.00
Medical Assistants (9)	76.50
Site Office Manager	248.00
Consultations	
Ambulatory Pharmacist Manager, non-employee	154.00
Statistician - Graduate Student	68.00
Laptop	1,000.00
Cost of Space	300.00
Cost of print/copy/fax	200.00
TOTAL EXPENSES	**16,670.50**
Net Operating Plan	1,828.00

Revenue: $18,498.50

- Expenses: $16,670.50

Net: +$1,828

- Process currently exists – **minimal financial investment** required for this process change
- Main resource required is *human time* for pre-intervention education and *paper* for printing

Results: Pretest Provider Survey

Question	Pre (n = 6)
Provider behavior: **Frequency of referrals** to pharmacy (Never (1) to Every time (5))	Median: 2.5 Range: 2 - 3
Knowledge: Patients with diagnoses included in the Collaborative Practice Agreement **do not need a referral** from PCP (True/False - correct response is false)	Correct: 4
Provider perception: **Referrals to CPS are highly beneficial** for patients (Strongly disagree (1) to Strongly agree (5))	Median: 4.5 Range: 1 - 5
Provider perception: CPS services **reduce PCP workload** (Strongly disagree (1) to Strongly agree (5))	Median: 4 Range: 1 - 5
Provider perception: the CPS is a **valuable member** of the patient care team (Strongly disagree (1) to Strongly agree (5))	Mode: 4 Range: 1 - 5
Barriers: What **barriers prevent you from referring** to clinical pharmacy services? Select all that apply with option to fill in the blank	Nothing: 4 Awareness: 2 Fill in - Patient acceptance: 1

M: Baseline data

A: Identify cause of problem

Table 4. Pretest provider survey.

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Results: Posttest Survey Comparison

Question	Post (n = 7)	Pre (n = 6)
Provider behavior: **Future referral practices** (Much less likely (1) to Much more likely (5))	Median: 4 Range: 4 - 5	N/A
Provider perception: Educational session **influence on referral practices** (Not at all influential (1) to Extremely influential (5))	Median: 3.5 Range: 2 - 4	N/A
Knowledge: Compared to *prior* knowledge, **awareness of CPS role/scope** (Not at all aware (1) to Extremely aware (5))	Median: 3 Range: 2 - 5	N/A
Knowledge: Patients with diagnoses included in the Collaborative Practice Agreement **do not need a referral** from PCP (True/False - correct response is false)	Correct: 5	Correct: 4
Provider perception: **Referrals to CPS are highly beneficial** for patients (Strongly disagree (1) to Strongly agree (5))	Median: 5 Range: 3 - 5	Median: 4.5 Range: 1 - 5
Provider perception: CPS services **reduce PCP workload** (Strongly disagree (1) to Strongly agree (5))	Median: 4 Range: 3 - 5	Median: 4 Range: 1 - 5
Provider perception: the CPS is a **valuable member** of the patient care team (Strongly disagree (1) to Strongly agree (5))	Mode: 5 Range: 4 - 5	Mode: 4 Range: 1 - 5

Table 5. Posttest provider survey.

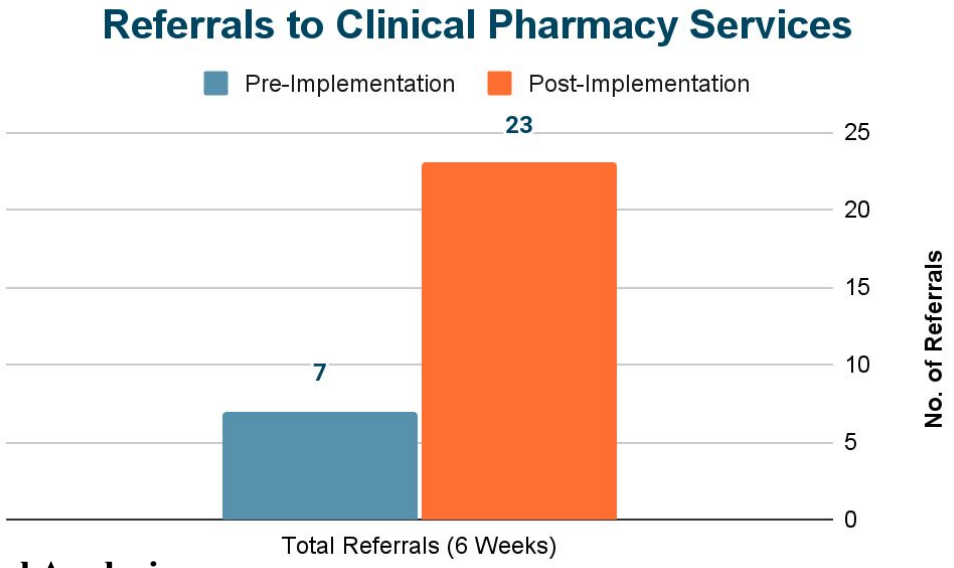
Results: Total Referrals

Total Referrals:

- Pre: **n = 7**
- Post: **n = 23**

Aim:

- Increase referrals to clinical pharmacy services



No Meaningful Statistical Analysis:

- Provider discretion on eligibility
- No true total population for comparison

A: Interpret & display data

Figure 9. Referrals to clinical pharmacy services.

Results: Condition vs. Medication Mgmt

Referrals:

Chronic Disease Mgmt

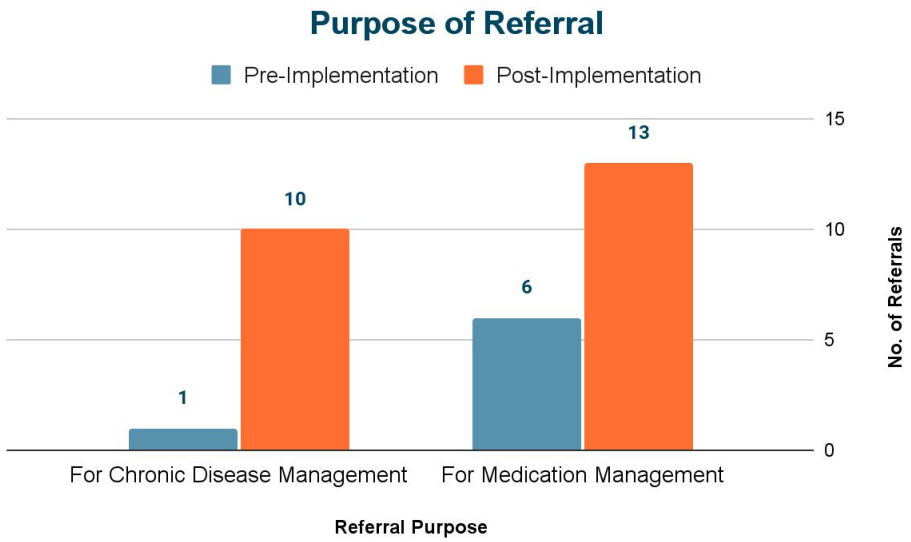
- Pre: **n = 1**
- Post: **n = 10**

Medication Mgmt

- Pre: **n = 6**
- Post: **n = 13**

Aim:

- Increase CPA utilization



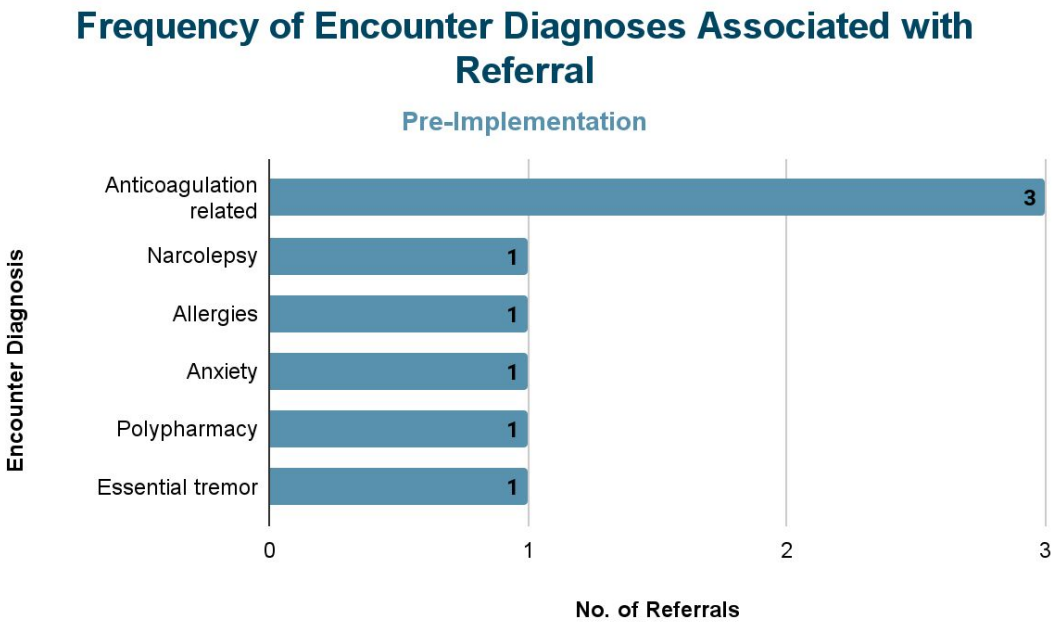
Analysis: Fisher's Exact test

- ***p*-value = 0.215 > 0.05**
- Clinically significant, but not statistically significant
- *Insufficient evidence* to support a relationship between time point and purpose of referral

A: Interpret & display data

Figure 10. Purpose of referral.

Results: Encounter Diagnoses (Pre)

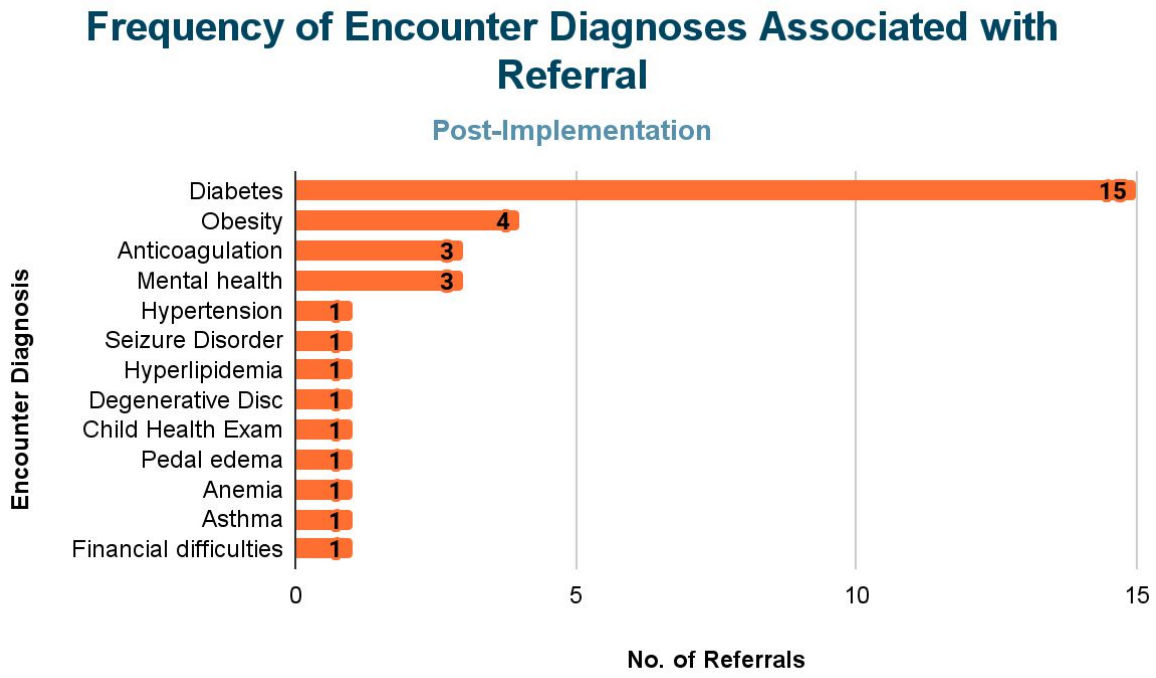


M: Baseline data

A: Interpret & display data

Figure 11. Encounter diagnoses associated with referral: Pre-implementation.

Results: Encounter Diagnoses (Post)



A: Interpret & display data

Figure 12. Encounter diagnoses associated with referral: Post-implementation.

Discussion

- Referral rates were higher after intervention, though not statistically significant
  - Chronic disease management (10x) and medication management (2x)
  - Potential for statistical significance with longer study duration
- Modification to existing process = feasible, appropriate, did not disrupt workflow
- Increased role awareness, interprofessional collaboration (Khaira et al., 2020; McCullough et al., 2021)
- CPA utilization (Higgins et al., 2020; Stallings et al., 2020)
  - CPS not ordering necessary screenings / referrals
- Minimal cost of implementation with potential for positive financial impact for organization

Limitations

- Lack of post-implementation data: billing codes with referral completion, pharmacy productivity
- Short study period
- Surveys, screening tools: low reliability, low validity
- Single-site study reduces generalizability
- Lack of CPS visibility due to limited office space may affect sustainability
- Current QI project at site involving pharmacy referrals for diabetes may influence referral behavior

C: Sustain, maintain, re-evaluate

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Implications for Practice

This QI Project:

- Offers support for interprofessional collaboration
- Embraces role of CPS as valuable and effective

Continued research:

- Role and impact of CPS in primary care

Future DNP projects at site:

- Financial impact
- Adherence to collaborative practice agreement
- CPS impact on patient outcomes

Conclusions

- A pre-visit screening tool increases referrals to CPS in a primary care setting
- Statistical significance may be possible with longer study duration
- Tailored interventions for process change: feasible, appropriate, low cost
- CPA utilization offers clarification of role and scope of practice for CPS and encourages interprofessional collaboration
- More research is needed to assess impact of CPS involvement on patient outcomes, organizational outcomes

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Sustainability Plan

A: Monitor for reduction in referral rates

C: Sustain, maintain, re-evaluate

- Visual reminders: Pharmacy Services Screening Tool posters throughout office + Smart Phrase
- Smart Phrase created for introducing patient to CPS services for efficient after-visit summaries
- **Recommendations**: *Office manager* as designated champion
  - + QI specialist to review referral rates and monitor for reduction in referrals monthly
  - Discuss pharmacy referrals during monthly provider meetings
  - Discuss adherence to pre-visit checklist utilization at monthly MA meetings
  - Designate office space to CPS when organization provides new office
  - Educational session for CPS regarding expectations of CPA adherence
  - Consider continuation of project with future DNP students to assess impact on financial outcomes / health outcomes

M: CPS interventions, billing codes, health outcomes

Dissemination

- Preliminary results emailed to providers at midpoint of study period
- Final results and sustainability plan shared at April's monthly provider meeting
- Graphical display of data, project documents given to office manager, site mentors
- Manuscript to be published in GVSU ScholarWorks

A: Interpret & display data

I: Collaboration, implementation strategies

C: Sustain, maintain, re-evaluate

DNP Essentials Reflection

Essential		Applicability to DNP Project
I	Scientific Underpinnings for Practice	- Use of Burke & Litwin (1992) to guide organizational assessment - Use of NICF (2010) framework to guide analysis of phenomenon - Use of PRISMA during systematic literature review
II	Organizational and Systems Leadership for Quality Improvement and Systems Thinking	- Use of Burke & Litwin (1992), DMAIC (2019), Powell et al. (2015) frameworks to guide the organizational assessment and project implementation - Use of Powell et al. (2015) for project proposal and implementation - Use of SQUIRE 2.0 to guide manuscript development and reporting of findings in final defense - Financial considerations with the development of a budget and proposed return on investment
III	Clinical Scholarship and Analytical Methods for Evidence-Based Practice	- Use of SWOT analysis during organizational assessment - Literature review identified three themes within the literature which guided the evidence-based development of the project intervention to translate research into practice - Integration of research from other disciplines utilized - Results were statistically analyzed and disseminated to stakeholders - Student supplied sustainability plan to identified site champion
IV	Information Systems / Technology and Patient Care Technology for the Improvement and Transformation of Health Care	- Use of EHR for data collection, data storage tools (Excel), data analysis tools (SPSS) - Use of EHR and organization-provided video services to communicate with remote colleagues - Comparison of reimbursement to federal physician fee schedule to estimate return on investment - Use of online workspace to create innovative clinical decision support tools (Pharmacy Services Screening Tool)

DNP Essentials Reflection

Essential		Applicability to DNP Project
V	Health Care Policy for Advocacy in Health Care	- Project implementation took place in a state-designated health professional shortage area (HPSA) - Project discusses health equity through potentially improving access to care through the addition of the pharmacist to the primary care team - Project offers support for the need to standardize quality measures regarding our pharmacy team colleagues
VI	Interprofessional Collaboration for Improving Patient and Population Health Outcomes	- Collaborate with interprofessional stakeholders during organizational assessment - Use of effective communication and collaborative skills among stakeholders (providers, case managers, social workers, medical assistants) - Encouraged and embraced interprofessional collaboration between providers and pharmacists
VII	Clinical Prevention and Population Health for Improving the Nation's Health	- Analysis of rural and underserved populations during organizational assessment, literature review, and proposal defense - Identified current care delivery approaches to target for improvement - Consideration of site-specific variables which impact project implementation and the community - Sustainability plan recommends measurement of patient-specific outcomes after pharmacist intervention
VIII	Advanced Nursing Practice	- Student displayed leadership and expertise during organizational assessment, evaluation of the phenomenon and problem, project development and implementation - Intervention developed based off of current evidence within the literature - Developed and sustained therapeutic relationships with site mentor, office manager, QI specialist - Educated stakeholders about project and disseminated findings during monthly provider meetings

Handouts

1. Tables/Figures: Implementation Strategies, Evaluation & Measures, Literature Review, PRISMA
2. CPT Codes for common codes & potential billable services provided by pharmacy services
3. Frameworks: NICF, DMAIC
4. Pre/posttest survey for providers
5. Pre-visit checklist and modifications
6. Pharmacy Services Screening Tool
7. References