

Utilization of a Transitional Care Team for Medication Reconciliation in Geriatric Primary Care

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Abstract

Background and Significance: According to the Institute of Medicine (IOM), medication-related errors lead to mortality and adverse effects such as allergic reactions, avoidable side effects, drug interactions, and unnecessary cost (IOM, 2000). Even with the predominant use of computerized provider order entry (CPOE) and clinical decision support systems (CDSS), medication discrepancies are still problematic today. There is substantial evidence available to demonstrate the benefits of using a transition of care (TOC) team for timely, appropriate medication reconciliation (MR) utilizing multiple intervention modalities.

Purpose: This quality improvement (QI) project attempted to determine if the implementation of a TOC team utilizing a telephone-based MR system in a geriatric primary care setting improved identification of medication discrepancies and improved seven-day follow-up (FU) appointments following an inpatient admission.

Methods: The TOC team at the geriatric primary care clinic was educated about the improved MR intervention tool and data collection process via a PowerPoint presentation. The data was collected via an Excel spreadsheet and analyzed for improvement upon identified medication errors and follow-through with timely FU appointments. The plan-do-study-act (PDSA) cycle was utilized for implementation.

Results: A QI project was implemented in a geriatric primary care setting including 74 patients, 18 of which received the intervention. The implementation was carried out over a total of 12 weeks. Error identification increased from 0.71 errors per patient in the control group to 1.22 in the intervention group. Of the patients contacted via MR phone calls, 88.8% scheduled FU

appointments; only 38.8% were within the goal time frame of seven days. The average time to FU during the implementation period was 9.1 days.

Conclusion: The TOC team utilizing a telephonic MR improved identification of medication errors and overall FU rates. However, the TOC team did not positively impact the seven-day FU during MR from an inpatient hospitalization visit back to the outpatient setting. Results also indicated an improvement in the time spent per phone call.

Keywords: care transition, transition of care team, medication reconciliation, seven-day follow-up, outpatient/ambulatory primary care

Background and Significance

Two decades have passed since the IOM released *To Err is Human* (2000) which focused on the chasms in healthcare regarding medication safety; however, the effort to improve upon safe medication administration continues today. When the IOM report was released, 98,000 Americans were dying each year due to medical errors while hospitalized; medication errors accounted for 1 in every 131 deaths occurring in the outpatient setting (IOM, 2000). Up to 56% of discrepancies occurred during the ordering phase due to illegible handwriting or inappropriate use of abbreviations (Bates et al., 1995).

While not all medication-related errors lead to patient mortality, adverse drug effects (ADE) encompass various conditions detrimental to Americans' healthcare: including allergic reactions, avoidable side effects (SE), drug interactions, and unnecessary costs with estimates as high as \$37 billion annually (IOM, 2000). At the time of the IOM publication, many healthcare providers (HCP) were still utilizing written ordering systems leading to a medication ordering error rate of 5.3%. Research demonstrated that computerized ordering and proper review would prevent over 80% of missing dose errors and ADE (IOM, 2000). A classic study focused on ADE found a rate of 6.5 per 100 inpatient admissions with an additional 5.5 potential ADE identified (Bates et al., 1995). Of the ADE recognized, 1% were determined to be fatal and unpreventable, 12% were life-threatening, and 30% were labeled as serious risk (Bates et al., 1995). Fast forward to two decades later, medication errors continue to be a costly healthcare problem. To further emphasize the importance of safe medication prescribing, The Joint Commission (2021) recently focused their efforts on safe MR as one of the 2021 National Patient Safety Goals.

Today, CPOE and CDSSs have helped to greatly reduce the incidence of medication errors throughout the healthcare system (Prgomet, Niazkhani, Georgiou, & Westbrook, 2016). CPOE refers to programs used in healthcare systems which give the provider the ability to electronically place orders which are then sent directly to the order recipient (Agency for Healthcare Research and Quality [AHRQ], 2019a). CDSSs are technology-based programs that evaluate the orders HCP enter into an electronic health record (EHR), compare the data with the patient chart, and provide feedback based on the evidence-based guidelines (Centers for Disease Control and Prevention [CDC], 2020). This feedback can be in the form of screening reminders or prompts that aid the HCP in making appropriate clinical decisions based on treatment protocols (CDC, 2020).

The development of these systems focused on improving medication safety by including a multi-step check process where discrepancies could be addressed by a variety of members of the interdisciplinary team (IDT) (AHRQ, 2019a). Since CPOE systems do not use written orders, transcribing errors are kept to a minimum (AHRQ, 2019a). Both CPOE and CDSSs can be used for quick and easy ordering of testing, medical procedures, and additional consultations (AHRQ, 2019a).

Even with the predominant use of CPOE and CDSSs, medication discrepancies are still problematic today. Approximately 38% of patient charts reviewed had some form of discrepancy, contributing the majority of errors to accidental additions (Caleres, Modig, Midlov, Chalmers, & Bondesson, 2020). Similarly, a study conducted by Breuker et al. (2017) determined that nearly 30% of patients admitted to the hospital had at least one medication error either during admission or discharge; however, the study concluded that 59.3% of errors were related to omissions. Up to 50% of medication errors were determined to occur during TOC with

30% of errors containing the potential to cause harm (Elbeddini et al., 2021). Additionally, Weir et al. (2019) recognized that several discrepancies could be directly related to medications that were never filled or were filled at an incorrect dosage. The risk of patients failing to follow through with prescribed medication dosages positively correlated with higher out-of-pocket costs, medications not dispensed at inpatient discharge, and discharges to long-term care (LTC) facilities (Weir et al., 2019).

Clinical Problem Statement

Within the Rosa Parks Geriatric Center (RPGC) in Detroit, Michigan, currently there is not an effective TOC model in place to aid with MR for patients transitioning from an inpatient to outpatient setting. Will the implementation of a TOC team utilizing a telephone-based MR system within the RPGC improve identification of medication discrepancies and seven-day FU appointments following an inpatient admission?

Description of Clinic

RPGC is a senior-centered, hospital-associated healthcare facility that utilizes interdisciplinary care throughout the clinic to provide specialty care to older adults (OA) in the community. Geriatricians, nurse practitioners (NP), social workers (SW), registered nurses (RN), medical fellows, pharmacists, and pharmacy students work collaboratively to ensure high-quality care among their patient population, consisting of a majority of African American patients over the age of 65 who reside within the city limits. The clinic sees approximately 2,500 patients divided between four geriatricians and one NP. The average age of patients is 78 years old, majority female, and 90% enrolled in Medicare. More than two chronic illnesses are seen in 85% of the patient population with an average of 8-10 prescription medications per patient.

Organizational Assessment

Prior to the coronavirus (COVID-19) pandemic, the clinic had adopted a TOC model to improve MR and patient FU appointments in the time following discharge from hospital admission, this model employed a phone call-based program that began with pharmacy staff reaching out to patients (Liu et al., 2019). The goal was to connect with patients within two days of discharge to review medications, provide education, update medication lists, and assist patients with maintaining their supply (Liu et al., 2019). While logical, the model adopted by the clinic was not without barriers and limitations that included:

- (1) difficulty reaching patients over the phone due to disconnected lines and wrong numbers in 40% of cases,
- (2) staff and time restraints that limited the number of calls made (Liu et al., 2019).

Once pandemic was declared, changes occurred in the clinic, staff focus turned to prevention of COVID-19, and efforts toward improving current TOC processes were abandoned.

Setting facilitators and barriers.

Modifying a practice procedure in an IDT organization requires a strategy that identifies and builds on strengths while minimizing weaknesses and threats of the proposed change. A strengths, weaknesses, opportunities, and threats (SWOT) table is a commonly used audit and analysis tool that helps to identify barriers and facilitators when implementing a new project. Using a SWOT table identifies and organizes these issues to guide the development of a MR QI proposal (Management Study Guide, 2021). After shared group analysis of articles selected from the literature review, and discussion with the stakeholder providing insight into the organization's method of operation, organizational goals and culture, specific barriers and facilitators to the project were identified. These are summarized in Appendix A, Table 1.

Gap analysis.

The RPGC does not have a consistent TOC process to appropriately address MR and FU procedures. The clinic conducted their own research evaluation based on the implementation of a post-discharge reconciliation team and concluded there were several clinic-specific barriers to an effective TOC. These barriers included:

- lack of communication with patients,
- limited transportation availability,
- staff time constraints (Liu et al., 2019).

A preferred approach during TOC addresses all barriers to a smooth transition from inpatient facilities to the RPGC to reduce medication errors and increase timely patient FU. Although there was a procedural TOC practice in place prior to the beginning of this project, efforts to improve upon it were halted due to COVID-19. A thorough evaluation of additional cause and effect aspects to identify care gaps leading to beneficial and properly functioning TOC team for the RPGC can be found in Appendix B, Figure 1.

Goals and Outcome Measures

The goal of this project was to create and implement an improved and concise medication management data process within the clinic. This process would ensure medications were addressed when transitioning back into the outpatient setting to prevent possible transcription errors, duplications, omissions, and ensure the appropriate FU appointments were being scheduled in a timely manner. This was accomplished by reviewing the limitations of the current system in place, discussing preferences with the facility staff, and designing innovative solutions to better the MR process.

The primary outcome measure for this project was the MR completion rate. MR completion was defined as the successful fulfillment of all key categories for review. These

categories focused on medication additions, omissions, dosage adjustments, drug interactions, and medication obtainment. Scheduling of FU appointments to the RPGC was measured as a secondary outcome. The appointments had to occur within seven days of discharge from an inpatient facility to meet the project goal.

Evidence-Based Practice Model

Lewin's Change Model

A variety of models can be used to help formulate the basis of any QI project. One common model was created by Lewin in 1947 and is considered to be a highly influential theory (Wojciechowski, Pearsall, Murphy, & French, 2016). Lewin's Change Theory (LCT) is based on a three-step model known as the unfreezing-change-refreeze model (Wojciechowski et al., 2016). The **unfreezing stage** focuses on past procedures, which were determined to be less productive methods, and helps to visualize the possible improvement opportunities. Once areas of opportunity are identified, the **change stage** begins. The change process involves altering a combination of patterns of thoughts, behaviors, or emotions leading to prolific beneficial outcomes. A crucial step at this stage is the proper education and understanding of how change will be beneficial in the end (Mind Tools, n.d.). Finally, the **refreezing stage** solidifies the new change in procedure or process as a new standard of practice (Wojciechowski et al., 2016). Theoretically, this final stage prevents the reversion back to old habits.

By implementing LCT into practice, one can expect to establish sustainable methods of process improvement. This QI project sought to improve upon an outdated and underutilized TOC process. LCT was implemented to guide the identification of counterproductive processes within the practice, provide education as to why it was imperative to necessitate change, reformulate procedures, and ensure the successful execution of a new and improved TOC process.

PDSA Tool

The PDSA process is an important tool used for QI or to test change on a small scale (Institute for Healthcare Improvement [IHI], 2021a). The PDSA tool helps determine if a change or improvement has occurred (IHI, 2021b). The planning process is where the **plan** is established, including the proposed question or change, predicted outcomes, the who, what, when, and where of the plan, and determines what data will need to be collected to include in the plan (IHI, 2021c). Step two, or **do**, requires the implementation of a change on a small scale in order to identify issues with the executed plan and begin to analyze effective and ineffective aspects of the project plan. This then moves into the **study** phase of the process (IHI, 2021c). Analysts must compare and disseminate data retrieved from the enacted project to determine modifications that should be made to current methods to improve upon outcomes to reach predicted project goals (IHI, 2021c). After examining the beneficial segments of a plan, step four, or the **act** phase, is initiated. Changes are made to disadvantageous project aspects and a plan is prepared for beginning an implementation of a new round of testing (IHI, 2021c).

Since the PDSA tool involves continually analyzing and adjusting the enacted plan to meet project goals, it was chosen to help guide measures when beginning this QI project (see Appendix C). Utilizing this tool incentivized members involved to be open to change by aiding in the identification of areas of opportunity. The plan step was carried out by completing a thorough review of current, evidence-based literature, as well as meeting with stakeholder leaders and creating examination tools, such as the SWOT table and Fishbone Analysis. After a proper evaluation of current trends and the examination of clinical barriers, the QI team, with the cooperation of pharmacy members, instituted a new method of TOC FU that improved upon previous models used in the RPGC.

Literature Review

Search Methods

A systematic literature search was conducted May through July 2021 to examine current literature standards and data regarding MR benefits transitioning from the inpatient setting back to outpatient care. The search focused on evidence-based publications derived from database searches using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library, Google Scholar, and PubMed. Key search terms included, but were not limited to, the following: *medication reconciliation, medication errors, telephone/telephonic intervention, transitions of care, transitions of care team, outpatient/ambulatory, primary care, discharge, and care transition.*

Selection Criteria

Due to the abundance of information, the search was limited to publications within five years (2016-2021). Additional eligibility for inclusion were peer-reviewed articles written in English with research based within the United States (US), Canada, Australia, or the United Kingdom, as well as their relevance to the beneficial patient outcomes related to MR programs. Studies were initially screened using the title and abstract of the article to determine overall relevance to the project. Additionally, two landmark studies were incorporated to provide key background information (Bates et al., 1995; IOM, 2000). Exclusion criteria included sample sizes under 100, research published prior to 2016, articles written in a language other than English, and inconclusive data. Each selected study was analyzed for sample size, design, aspects of intervention, and overall outcome with a focus on medication discrepancy improvement and benefits of a TOC team. Articles reviewed can be found in Appendix C, Table 2.

Throughout hospital admissions and stays within other inpatient facilities, OA are susceptible to medical errors which result from MR miscommunications between their inpatient and outpatient HCP. Within the US, an average of 100,000 hospitalizations per year in patients

65 and older can be directly related to medication ADEs (Pellegrin et al., 2016). Due to this increase in acute care needs, it is imperative that communication between facilities and systems remains as cohesive and clear as possible. Creating an interdisciplinary TOC team is an effective way to ensure patients inpatient to outpatient medications have been reconciled properly to promote patient safety and decrease the risk of adverse patient outcomes (Liu et al., 2019; Neu et al., 2020; Xuan et al., 2021).

Transitions of Care

The TOC from hospital to primary care can be challenging as patients and caregivers start to bear the responsibility of care coordination. During TOC, patients are bombarded with new information, medications, and FU responsibilities including setting up appointments with HCP (Bajorek & McElroy, 2020). Transitions between HCP have been identified as the time when the patient is most vulnerable and timely FU with the HCP is required to optimize the TOC.

Past research on TOC has demonstrated a large gap with patient continuity of care. Landmark studies continue to confirm that OA are at an increased risk for adverse events due to medication errors (Corbett, Setter, Daratha, Neumiller, & Wood, 2010). These patients are particularly at risk due to the complexities of medication regimens, polypharmacy, frequent changes of medication treatment during hospitalization, multiple HCP prescribing medication without collaboration, and chronic comorbidities (Corbett et al., 2010). The gaps in continuity of care during transitions have prompted the development and implementation of TOC protocols. The timeliness of proper FU requires seamless integration of services to reduce the risk of adverse events, including hospital readmissions (Lowthian, 2017). Programs focusing on providing support to patients, improving skills of HCP, enhancing health information technologies, implementing system-level interventions, developing performance measures,

influencing health policies, and improving public reporting mechanisms are part of TOC strategies (Khalil et al., 2017; Redmond et al., 2018).

OA have more complex health concerns and are more vulnerable during TOC (Naylor & Keating, 2008). Due to complexities of multiple health challenges, including cognitive deficits often seen in dementia, persuading patients and caregivers to participate in TOC is difficult (Prusaczyk et al., 2020). This deficiency in OA patient participation is due in part by the reluctance of patients to initiate active participation in the process (Rustad, Furnes, Cronfalk, & Dysvik, 2016). When coordinating TOC with OA greater than 65 years of age, HCP are encouraged to formally invite patients to participate in the transition of their care (Rustad et al., 2016). Studies have shown that OA accustomed to the patriarchal nature of the healthcare system in the past are less likely to take an active role in their health without a specific request to participate (Rustad et al., 2016). Strategies to encourage engagement and empower OA include communication and education focused to inform and educate older patients while keeping in mind their level of healthcare literacy (Rustad et al., 2016).

Medication errors and discrepancies during TOC is a significant problem that requires person-centered care. It has been identified that MR is a high priority for decreasing medication errors occurring during the post-discharge TOC (Corbett et al., 2010). The World Health Organization (2016) describes the key components of MR as the

- identification of current medications,
- creation of a medication list as prescribed,
- comparison of current medications to make clinical decisions,
- education of patients and caregivers about the medications on the list, and
- providing access to this information to other HCP.

Involving patients and their caregivers, maintaining up-to-date medications, and the embracement of accountability by HCP at all levels of care can reduce medication error rates (Wheeler et al., 2018).

Benefits of Interdisciplinary Medication Reconciliation Teams

There is a substantial amount of evidence available to demonstrate the advantages and beneficial outcomes of using a TOC team for timely, appropriate MR utilizing multiple intervention modalities. Most TOC teams adopt interdisciplinary models that include pharmacy staff members (Liu et al., 2019; Neu et al., 2020; Xuan et al., 2021). These members have played significant roles in identifying and limiting the number of discrepancies found in patient charts (Liu et al., 2019; Neu et al., 2020). The utilization of such teams illustrates the positive impact collaborating healthcare personnel can have on patient outcomes, which include reducing 30-day adverse medication events and hospital readmissions (Liu et al., 2019; Neu et al., 2020; Xuan et al., 2021).

Effects on healthcare costs and patient outcomes.

Numerous studies have found that over 80% of charts audited by a TOC team have at least one medication discrepancy, which included dosage errors, duration issues, and documentation inconsistencies (Albano et al., 2018; Surbhi et al., 2016). These studies demonstrate the cost-effectiveness and other benefits of post-discharge FU by HCP (Liu et al., 2019; Neu et al., 2021; Tomlinson et al., 2020). The potential ADEs identified using MR programs avoided over an estimated \$370,000 in physician visits, hospitalizations, emergency department (ED) utilization, and prescription costs with an average of \$293.30 saved per medication claim (Surbhi et al., 2016). Not only do medication discrepancies lead to increased healthcare costs, they also affect patient well-being. By preventing drug therapy related

inconsistencies, quality of care improved an approximated 43% due to an increase in medication adherence and the recognition of gaps in care through medication counseling and review (Surbhi et al., 2016).

Medication errors.

Throughout the literature reviewed, medication discrepancies were abundant in charts audited by a TOC team (Albano et al., 2018; Liu et al., 2019; Surbhi et al., 2016). Liu et al. (2019) identified medication-related inconsistencies in 89.8% of charts reviewed with an average of 3.6 errors per telephone call. Another study found 1416 discrepancies throughout 438 charts reviewed over the course of 18 months (Albano et al., 2018). Medication additions and deletions accounted for the majority of discrepancies (77.5%) with 22.5% attributed to incorrect frequency or dosage strengths (Albano et al., 2018). Medication supply and prescription access are also key problematic areas for TOC teams that affect patient continuity of care (Albano et al., 2018; Liu et al., 2019). Albano et al. (2018) found that 33.4% of participants in their study did not receive their prescribed medications upon discharge from an inpatient facility. However, some studies found little statistically significant evidence that TOC team usage was associated with better medication discrepancy outcomes (Khalil et al., 2017; Redmond et al., 2018). The use of a timely TOC intervention has the potential to aid in preventing diverse forms of medication errors from occurring until the patient presents for an office visit.

Hospital readmissions.

An additional area of influence on patient outcomes is the rate of 30-day hospital readmissions. The use of TOC teams to reconcile hospital medications upon discharge positively impacts readmission rates (Liu et al., 2019; Tomlinson et al., 2020). A systematic review of over 17,000 cases conducted by Tomlinson et al. (2020) concluded that thorough MR leads to a successful TOC between healthcare settings and also reduces the prevalence of hospital

readmissions related to adverse events. Various studies have also demonstrated significant statistical outcomes on readmission rates with the application of scheduled medication review FU after discharge from an inpatient setting, which were completed via either telephone calls or in-home visits (Kee et al., 2018; Xuan et al., 2021). By implementing a medication review pharmacy-based TOC team who met with patients prior to discharge from the hospital and again at a one-week FU in the office, the team continued to stay in contact with the patient or guardian for up to 30 days and noted a 34.9% decrease in likelihood of hospital readmission within a 30-day period, which helped reduce 180-day readmission rates by as much as 33.4% (Xuan et al. (2021). A 10% decrease in readmissions was also noted by Liu et al. (2019).

Barriers to Appropriate Medication Reconciliation

Obstacles to the implementation of successful TOC models were identified in a variety of studies. Historically, barriers to the implementation of efficient programs have been poor engagement with HCP, limited technologies, and insufficient resources (Stolldorf et al., 2020). While barriers specific to the literature review were met with similar impediments, they also identified limited access to patient information, the reluctance of patients to participate in MR review programs or studies, and the inability to contact patients after discharge due to a variety of telephone-related issues, as integral pieces posing threats to productive programs (Albano et al., 2018; Liu et al., 2019).

Patient information access.

Obtaining access to patient information presents a primary barrier to each patient encounter. A significant barrier can be attributed to the limitation of access to the EHR of patients admitted to healthcare systems outside RPGC which was identified in their previous version of a MR program (Liu et al., 2019). Accessing Medicare and Medicaid patients' hospitalization utilization data provided some information regarding patients that were admitted

to community hospitals (Liu et al., 2019). However, this strategy was limited to Medicare/Medicaid patients only (Liu et al., 2019). For patients who received care outside of the home healthcare network, and used private insurance, patient data was not captured in the process and consequently, those patients were not consistently included in the MR process (Liu et al., 2019). For the proposed project, the feasibility of using a similar approach to gain access to patients' records remains indeterminate.

Patient refusal or inaccessibility.

Patients' adherence rate to the TOC process, which includes MR, was recognized as a significant barrier between several studies (Albano et al., 2018; Liu et al., 2019). According to Liu et al. (2019), the inability to contact a large number of patients was directly related to problems of incorrect telephone numbers, disconnected phones, or the patients' refusal to participate in a MR telephonic interview. Due to these reasons, of a total of 275 phone calls, 40% of the patients included in the study could not be contacted (Liu et al., 2019). A majority of patient calls from pharmacists took an average of 32.3 minutes per phone call (Liu et al., 2019). This barrier was also identified by Albano et al. (2018) who then implemented a call schedule which led to higher connection rates with patients. However, some patients that were added to HCP schedules last minute did not receive a scheduled call from pharmacists prior to their initial FU appointment (Albano et al., 2018). If a call schedule cannot be formulated in advance, it is suggested that patients should be forewarned of FU calls in order to increase participation (Albano et al., 2018).

Additional barriers.

Several other barriers were briefly noted throughout the studies reviewed. Transportation to in-office visits were identified as an obstacle to meeting FU goals (Kee et al., 2018; Surbhi et al., 2016). Additionally, several studies noted higher copays and lack of prescription coverage as

a factor in increased incidence of medication error (Kee et al., 2018; Surbhi et al., 2016; Xuan et al., 2021). One note-worthy way to address this potential complication is by utilizing additional team members to perform a prescription cost analysis to identify the most affordable formulary (Xuan et al., 2021).

Facilitators

Pharmacy utilization.

A major benefit noted by many of the studies was that the MR process was pharmacy led. In the literature reviewed, numerous MR processes were led by pharmacy members which included licensed pharmacists, residents, and students (Albano et al., 2018; Kee et al., 2018; Liu et al., 2019; Neu et al., 2020; Surbhi et al., 2016; Tomlinson et al., 2020; Xuan et al., 2021). Among selected articles, several studies found the impact of pharmacist-led MR on medication discrepancies was uncertain due to low-quality evidence (Kee et al., 2018; Redmond et al., 2018; Tuttle et al., 2018).

Telephone reminders.

Automated telephone reminders for the patients that were successfully enrolled in the study proved to be a facilitator to not only completing a MR, but also lead to increased rates of timely office FU visits (Albano et al., 2018). However, the study also noted they obtained similar results when completing the patient MR between five to ten days prior to their scheduled appointments (Albano et al., 2018). Tomlinson et al. (2020) noted several studies that showed the benefits to phone call interviews such as empowering and improving self-management, patient engagement, and bolstering patient memory regarding medication regimen.

Interventions

Several central themes were identified toward MR. A major theme identified was telephone-based interventions conducted primarily by pharmacists (Albano et al, 2018; Liu et al.,

2019). Self-management activities, structured medication administration programs, home visits for MR, and timely FU by the HCP were among the other themes that reduced adverse events (Redmond et al., 2018; Surbhi et al., 2016; Tomlinson et al., 2020). Some articles emphasized the importance of HCP assessing medication appropriateness based on medical history, relevant medications, dosing, duplications, and interactions (Redmond et al., 2018; Tomlinson et al., 2020). Outcomes related to MR were more effective when performed during the admission to the hospital, discharge from the hospital, and post-discharge at the community level (Neu et al., 2020; Tomlinson et al., 2020; Xuan et al., 2021). However, one systematic review concluded the evidence for the effect of MR on healthcare utilization was conflicting and potentially made little difference in preventing hospitalization (Redmond et al., 2018).

Telephonic-based reconciliation.

A common theme found in recent literature is the use of telephone-based reconciliation methods (Albano et al., 2018; Kee et al., 2018; Liu et al., 2019; Surbhi et al., 2016; Tomlinson et al., 2020). By choosing to reconcile medications with patients over the phone, TOC team members were able reach patients quickly after discharge to mutually discuss their medication plan during their transition back to an outpatient care setting; this included providing patients with education or evaluating their adherence to prescribed medications (Albano et al., 2018; Liu et al., 2019; Surbhi et al., 2016). Post-hospital telephone FU appointments allow patients and HCP the opportunity to review medications again, address patients' concerns, discuss medication adherence, inconsistencies, and any barriers to the patient being successful with their medication regimen (Kee et al., 2018; Liu et al., 2019).

Structured medication reconciliation programs.

Structured MR requires medication review, concise communication, and exploring other issues that can directly impact relevant data needed for reconciliation. The structured

reconciliation process can be done in various formats through face-to-face consultations in an outpatient setting, phone interviews, or home visits (Kee et al., 2018; Surbhi et al., 2016). An HCP reviews the drug profile with the patient or caregiver to identify medication-related discrepancies and compares medications provided at discharge from an inpatient setting with the medications the patient is currently taking (Surbhi et al., 2016). The use of a structured program in a specified time frame ensures the timely identification of potential medication omissions, duplications, and interactions (Surbhi et al., 2016). The cause of medication discrepancies can be found at both the system and patient-level (Kee et al., 2018). Automated algorithms can complement MR done by HCP; however, patient-level discrepancies may go undetected (Kee et al., 2018).

Follow-up interventions.

A variety of modalities for post-hospitalization FU were utilized in the studies analyzed. The manner in which these were conducted included FU appointments in an outpatient setting, telephone calls, and use of home visits to ensure quality continuity of care was achieved and each was identified as an effective communication intervention strategy regarding MR (Albano et al., 2018; Liu et al., 2019; Surbhi et al., 2016; Tomlinson et al., 2020; Xuan et al., 2021). Post-hospital FU appointments allow patients and HCP the opportunity to review medications again, address patients' concerns, discuss medication adherence, inconsistencies, and any barriers to the patient being successful with their medication regimen (Xuan et al., 2021). Multiple studies also emphasized MR via home visits as an intervention to bridge transition and provide medication continuity (Kee et al., 2018; Surbhi et al., 2016; Tomlinson et al., 2020). Tomlinson et al. (2020) highlighted that further research was necessary to meaningfully engage patients to provide effective medication continuity. A timely FU appointment can assist HCP with identifying

patients' overall health status as well as the impact of MR on patient's health (Kee et al., 2018; Redmond et al., 2018).

Summary

The TOC from the inpatient to outpatient setting can pose challenges if the patient's MR has not been completed properly. The literature supports a collaborative approach to TOC and MR between pharmacists and other healthcare team members (RNs, physicians, pharmacy students, etc.) (Liu et al., 2019; Neu et al., 2020; Xuan et al., 2021). Collaboration with the pharmacy is imperative in preventing medication errors. Pharmacists have an expert knowledge base in medication indications, dosages, frequencies, interactions, and side effects. Their expertise makes them an integral part of the TOC team.

Employing a TOC team whose focus is on having an effective and efficient MR process to ensure patient safety by decreasing MR errors between TOC such as, from the inpatient to outpatient setting, was key for this QI project. Data gathered from the literature synthesis confirmed the importance of TOC teams and reinforced the positive outcomes that result from having them. The conclusions drawn from this data support the QI project and reinforces the importance of establishing a TOC team to oversee the MR process at the RPGC.

Methods

Ethical Considerations & Protection of Human Subjects

Conducting QI studies involving human subjects presents challenges to ethical conduct (White, 2020). When conducting a study that requires human subjects' participation to gather relevant data, maximum effort is required to protect the rights, physical and mental safety, and privacy of those human subjects. The federally mandated requirement of obtaining Internal Review Board (IRB) approval ensures the procedures and action resulting from this project involving patients met the stringent conduct requirement for IRB authorization. The QI team

additionally obtained written permission from the stakeholders to implement the MR project at the RPGC (Appendix E).

The data retrieval and handling of sensitive patient information was handled by the RPGC staff and was not disclosed to the QI team. This data was de-identified prior to submission to the QI team. All project content was safeguarded on computers with password protection and any tangible documents were kept in locked file cabinets for safekeeping. No additional QI team training was required prior to implementation of the project. Although there were no anticipated concerns with privacy issues or risk to human subjects, Michigan State University Human Research Protection Program (HRPP) and the RPGC facility IRB approval was obtained before initiating the project.

Interventions and Data Collection Procedure

The goal of this QI project was to improve MR rates and post-hospitalization FU at the RPGC. This type of project was attempted prior to the pandemic, but staff had noted a decline in participation due to changes in priorities associated with COVID-19. The QI team enhanced the original model and implemented notable changes to streamline the process and encourage staff and patient participation. The steps of the implementation process of this project utilized the PDSA cycle, which is explained in the following sections. The project's timeline can be visualized in Appendix F, Table 3 and the overall budget estimate can be found in Appendix G, Table 4. It is projected this QI project will reduce an average of two medication errors per patient. Surbhi et al. (2016) explains that an average of \$293.30 is saved from each medication error prevented by the pharmacist medication management service. The team anticipated an estimated cost saving of \$586.60 per patient.

Plan.

The QI team prepared for the execution of the project by meeting with a NP at RPGC over a series of Zoom meetings to discuss the current state of their MR process, as well as achievable goals, potential barriers, and key facilitators. The team then reviewed evidence-based literature to determine current standards of practice regarding MR and ascertain leading initiatives for strengthening patient participation and FU, while limiting medication discrepancies and ADE.

Once the gaps of care were identified, the QI team planned to initiate the project by implementing a new spreadsheet for the pharmacy team to utilize when making post-hospitalization calls. The form focused on identifying discrepancies in medications when transitioning from the inpatient setting back to the outpatient clinic. Sample forms were provided to the facility staff for approval and suggestions prior to the start of the project implementation.

Do.

HCP and pharmacy staff at the RPGC were provided education regarding the use of the new Excel spreadsheet via a voiceover PowerPoint presentation. A voiceover was requested by the clinical staff in lieu of in-person teaching due to the pandemic and to provide the ability to easily teach the new pharmacy residents as they rotated in throughout the project timeline. The spreadsheet was employed to collect information regarding each patients' hospitalization course, discharge plan, and new medications. When completing the MR, the number of medication discrepancies were identified, recorded, and rectified. Pharmacy team members also scheduled patients for FU visits at this time and the form helped to identify those returning outside of the seven-day return goal. To ensure team synergy and a beneficial collaboration, the QI team provided quick education sessions to the involved staff on the proper use of the MR form and instruction of how to customize sections, if needed, for unique circumstances. This education was repeated for each new pharmacy intern that started throughout the project's implementation

dates. Flyers acted as reminders to complete the form with each MR phone call and were placed in several key areas around the clinic. These flyers also included contact information for the clinical site liaison, as well as two of the QI external team, so that someone would be available at all times to answer any questions and help with any concerns.

Study.

The purpose of this study was to increase MR completion during TOC and collect data in order to measure the medication errors prevented and the number of patients seen within seven days of hospital discharge. Each week, pharmacy staff submitted documentation of completed MR telephone calls with patient information redacted to the QI external team in order to allow for dissemination of data and necessary changes to be made to the implementation process. The data was also reviewed for performance and outcome measures by the QI external team. Feedback was requested from involved clinic staff members to improve the accessibility and ease of spreadsheet use, as well as to determine any unnecessary or burdensome ideas on the form.

Act.

After completing the first run through of the PDSA cycle, the external team determined a few things needed to be adjusted on the evaluation tool. The first change was to make the document a running document, rather than separate patient data out by month. This was so that no patients were lost between tabs if they were discharged in a month different than the admitted month. A separate column was inserted at the request of the RPGC HCP to account for completed inpatient geriatric consults.

Second PDSA Cycle

After acknowledging the challenges faced by the implementation team during the first PDSA cycle, the QI external team initiated a second round of implementation by attempting to

provide live, in-person re-education to the clinic staff. This plan was modified by the stakeholders to a question-and-answer forum held via Zoom with the external team members and the facility stakeholders. Unfortunately, the pharmacy student residents who were part of the implementation process for the facility were not included in the meeting.

The external team reiterated they were available via phone or email for any questions and concerns regarding the spreadsheet. Facility implementation team members were advised not to alter the Excel document format or cells without prior consultation from the external team. In conjunction with the provided education, the team members also provided a new copy of the original spreadsheet with functionality and initial rules restored to all cells to be uploaded onto a compatible computer at the clinical site.

Measurement Instruments.

To properly observe outcomes from the implementation of the QI project, an Excel spreadsheet was created for pharmacy staff to utilize when making post-hospitalization telephone calls to patients. The spreadsheet consisted of three key sections of information: patient data, hospitalization information, and the MR. Several spreadsheet cells were customized to contain dropdown selections in order to create a more efficient, time-saving method of data collection. Pharmacy team members were able to use the dropdowns to insert where patients were admitted to, their discharge disposition, and whether they were able to connect to a patient via phone. The form also provided space to record the number of discrepancies identified with each completed phone call. A free text column was created to provide a place to record any pertinent information detailing the reasons a patient was not progressing through the phases of the improved TOC process. Excel cells pertaining to the time between discharge from an inpatient setting to a FU office visit were also tailored to the goals of the project and would highlight the area red if an

appointment was made outside the seven-day window. This change was made to help the QI team more easily visualize when the goals were being met and to identify gaps in the project.

Results

The overarching goal for this project was to increase the MR completion rate at the RPGC to improve upon the identification of medication discrepancies from an inpatient setting to an outpatient clinic and improve upon the seven-day FU appointment rates by utilizing a TOC team and telephone-based MR. The quantitative data was collected on a single, running spreadsheet that was analyzed throughout the three-month study period. A total of 74 discharged patients were recorded on the spreadsheet tool utilized by the clinic; however, only the 18 patients (24.3%) who had MR completed were included in the study. The study measures including medication errors, FU timeframe, and time spent on calls were analyzed. A total of 22 medication discrepancies were discovered during the MR phone calls on 50% of the patients with an average error rate of 1.22 per patient. The identification of these discrepancies saved an average cost of \$357.83 per patient. Of the 18 patients reached via a MR phone call, a total of 88.8% scheduled FU visits, however only 38.8% of patients were seen within the seven-day timeframe goal. At the end of the data collection period, 16 of the 18 patients attended their appointment with two patients still outstanding FU. The average length of time to FU was 9.1 days. This data is represented in the tables found in Appendix I.

Data retrieved from 50 patients in the three months leading up to the intervention demonstrated a higher rate of patients scheduling a seven-day FU (50%) when compared to the QI group (38.8%). The intervention group demonstrated a 21-day scheduled FU rate of 83.3%, an improvement on the control group 21 day scheduled FU rate of 44%. The use of the new spreadsheet also had a positive effect on the number of errors identified with the intervention

indicating a 71.8% improvement, as the control group only identified an average of 0.71 errors per patient. Additionally, the QI project improved upon the time spent with each patient. Overall, the pharmacy team spent an average of 18.9 minutes per phone call, which was a drastic improvement over the previous study's time of 32.3 minutes per call, a decrease of 41.5% (Liu et al., 2019). The implementation of the QI project was successful in several areas such as improvement in identifying medication errors, decreasing the time spent per call, and overall increased scheduling of FU appointments during the TOC from inpatient to outpatient settings.

Discussion

Implementation Process

There were unforeseen delays in implementation because the project required three IRB approvals from different entities (Michigan State University, Wayne State University, and the Detroit Medical Center). Therefore, the implementation of the QI project did not begin until December 6th, 2021. Since different IRB board approvals were needed, there was a duplication of inquiries which resulted in a delayed, drawn-out process. A more streamlined process would have entailed just one IRB approval with endorsements from the other IRB boards.

The initial implementation process was scheduled for a three-month period. As a consequence of the delay, the external team, along with faculty advisors, decided to monitor the efficacy of the project over eight weeks. It was unanimously determined by the stakeholders that the goals of the QI project would not be compromised by an abbreviated implementation phase. However, it was acknowledged that more gaps in care may have been discovered with a longer monitoring phase.

Barriers and limitations

Throughout the implementation phase of the project, several barriers were identified. These barriers not only delayed the implementation schedule, reducing the timeframe for data

collection, but also affected the quality of the data collected during the first PDSA cycle. The first barrier the team encountered was the prolonged IRB approval process, which included having to receive three IRB approvals. Due to these unforeseen setbacks in the commencement of the project implementation, data collection was delayed by approximately 50 days and the timeframe for collection was decreased from about 20 weeks to 12 weeks. The next significant barrier resulted from precautions due to the COVID-19 pandemic. The clinic opted to do virtual training via Zoom for the two main facility stakeholders in the project, who would then utilize the PowerPoint presentation provided by the external team to educate the rest of the staff on the utilization of the new spreadsheet data collection form. Due to the lack of external team representation for the second round of teaching, the team was unable to address any questions or concerns. Once the project was implemented, no data or feedback concerning the tool during the first few weeks was received and the primary stakeholder in the clinic was off for personal reasons. It appears that in-person implementation training may have been more effective than third party implementation, i.e., facility stakeholders.

Once data was made available, the external team noted the spreadsheet had several changes to the original design. Drop down menus had been altered, and some of the functionalities ceased after only a few rows. Additionally, there was a separate note section made available to elaborate on reasons that FU appointments were not made; the column was underutilized and did not clarify barriers to completing the MR. After investigation by the external team and facility stakeholders, it was determined that the computer system used within the clinic to open the original file was not compatible with Excel 2019, so the program defaulted to available options. The defaulted options reduced the usability of the intended project spreadsheet and increased the amount of free text required to complete patient documentation,

which in turn decreased the overall readability of the document from cells overflowing into neighboring columns.

The data returned to the external team for review was limited either due to incomplete documentation by the pharmacy team or inability to reach the patient by phone. Despite the high number of patients discharged home, many data entries lacked complete documentation with only a fraction of the uncompleted cells being attributed to discharge to rehabilitation facilities (n=10), being placed in hospice care (n=5) or expiring (n=4) during the admission. Team members were unable to obtain weekly data updates as originally discussed, which may have identified barriers to be addressed earlier into the implementation process. Communication was only with the lead facility stakeholder and the pharmacist. There was no communication with the ancillary staff members which included schedulers, pharmacy students, and other HCP who were involved with the project implementation. This lack of direct involvement of the external team impeded the training process that could have included instructions, demonstration, and teach-back by primary pharmacy staff to verify proper comprehension of the objectives of the QI process. No feedback was received during the implementation process and the external team was underutilized as a resource throughout the project. This occurred in spite the external team being available; contact information was posted throughout the clinic.

Finally, the low rate of patient FU could be attributed to the time the project was implemented. Since the program took place during the winter, patient FU may have decreased due to weather conditions and holiday obligations. One of the original barriers identified on the clinic SWOT analysis was lack of patient transport, which becomes more difficult in the snow and ice and may have played a key role in cancellations or no-show appointments. During implementation of the project, the Omicron variant of the COVID -19 virus was skyrocketing in

number, and people were advised to limit travel and contact with other people, which may have played a role in affecting the number of patients who successfully completed their FU visits.

Implications for Advanced Nursing Practice

For years, patient safety as it relates to medication error prevention has been a main focus for all HCP. As demonstrated by the IOM (2000), nearly 100,000 Americans had deaths attributed to medical errors annually during hospitalization and 1 in 131 occurring in the outpatient setting. The use of a quality, established MR program can help to expose errors made during patients' TOC between different levels of healthcare. While previous studies have determined that TOC MR teams have the potential to identify errors in over 80% of charts examined, there are still many barriers to implementing a well-rounded MR program (Albano et al., 2018; Surbhi et al., 2016). Healthcare professionals wishing to initiate programs within their individual settings must work to identify both patient and clinic-specific barriers. By enacting effective MR programs, HCP have the opportunity to positively affect the number of errors that reach patients throughout their TOC.

Overall, the use of a MR process has the potential to be a considerable source of revenue for any outpatient healthcare clinic, which may incentivize clinics to push for the use of post-hospitalization phone calls to schedule FU appointments and review medications. HCP are able to bill Medicare using code 99496 for any patient seen within seven days of hospital discharge or code 99495 for those seen within 14 days with reimbursement values of \$237.11 and \$175.76 per patient, respectively (HealthViewX, 2021). This substantial increase from billing codes 99211-15 that are regularly used in the clinic provides approximately an extra \$100 on average per patient (Binder Dijker Otte United States, 2021).

The TOC presents an important opportunity for QI for the APRN. The APRN can play an essential role during TOC that spans the hospitalization of patients to primary care. However, as

exemplified by the deficiency of patient participation in this QI project, the compartmentalization of the TOC process can create obstructions to the implementation of a comprehensive TOC. According to Kansagara, Chan, Harmon, and Englander (2013), multicomponent strategies to create a smooth and safe transition of care from in-hospital to primary care setting includes:

- fostering patient engagement and empowerment
- guiding patients in medication management which includes a medication reconciliation
- timely follow up clinical visits
- a dedicated and consistent transition coordinator that has the competency to provide resources and education to the patient across the spectrum of primary care management

The fragmentation of healthcare, along with health disparity/inequity and the lack of access to healthcare in the US, greatly impacts less affluent OA similar to the targeted population for this QI project (AHRQ, 2021). Despite spending a significant amount of healthcare dollars, when compared to several other developed countries, the US has among the lowest life expectancy rates, highest chronic disease rates, highest hospitalization, and avoidable death rates (Commonwealth Fund, 2022). The role of a dedicated transition coordinator with the availability, education, and competencies to manage or coordinate all aspects of TOC would be efficiently assigned to the APRN.

Timely primary care FU is additionally considered a key strategy to decrease rehospitalization, as 50% of patients readmitted within 30 days of initial hospital discharge do not receive FU prior to readmission (Jackson, Shahsahebi, Wedlake, & Dubard, 2015).

Therefore, utilization of TOC to encourage patients to attend timely primary care FU can provide meaningful incentive of reducing rehospitalization. The utilization of TOC teams can identify gaps in care, psychosocial and economic factors, integrate medication management, encourage participation of care partners, and timely FU with HCP (Noel, Messina, Hou, Schoenfeld, & Kelly, 2020; Thomas-Hinkel, Turner, & Freda, 2018).

Sustainability Plan

For a QI project to be sustainable, it has to be meaningful, useful, and pragmatic (Mortimer et al., 2019). The patient outcomes as a result of QI project implementation need to be analyzed for social, environmental, and economic impacts. Based on strengths and limitations observed during the implementation of the QI project, the RPGC could successfully sustain the utilization of the TOC team for effective outcomes related to reducing medication errors and improving seven-day FU. However, barriers and limitations must be appropriately addressed and thorough education should be provided to existing and new TOC team members, as the team members do change. Successful strategies include improved TOC team training, permanently assigning TOC team members, and emphasizing responsibilities and accountability from team members (Lawson, Weekes, & Hill, 2018). Effective leadership support appears essential for the sustainability of QI. Frequent PDSA cycles and an improvised data collection tool may be needed to achieve the maximized identification in MR errors and improve seven-day FU. Even though there were significant obstacles faced during the implementation, the project provides insight towards the solutions. Some of the limitations encountered during the project were unrelated to the outpatient primary care facility and therefore should not be a factor in the sustainability of the improvement. If the project was initiated and implemented by RPGC

internal staff members, it may have had higher chances of success assuming improved communication, training, team support, and timely PDSA FU (Kiran et al., 2019).

Recommendations

As demonstrated by the implementation of this project, the utilization of the TOC team has the potential to improve patient safety. A beneficial intervention could be completed after addressing obstacles involving patient engagement and healthcare systems practice. This project sought to reduce medication errors and improve seven-day FU. Such initiatives can add value towards achieving the triple aim goals; improving patient health, reducing cost, and improving patient satisfaction (IHI, 2022).

Recent studies suggest that the unimodal approach of using only MR interventions during transitions of care to improve patient safety could have a limited impact on patient outcomes (Anderson et al., 2019). This is not to suggest that MR has no value in the real-world clinical care of patients. MR before treatment management that includes pharmaceutical intervention is necessary for patient safety (Lehnbom, Stewart, Manias, & Westbrook, 2014). However, implementing multi-focal approaches to TOC, such as patient and caregiver/care partner education and focusing on patient empowerment, could positively impact healthcare utilization.

One of the essential roles in NP practice is to foster patient engagement that results in person-centered care. Encouraging a person to be an active participant in their healthcare is a primary goal of a person-centered healthcare model (National Patient Safety Foundation's Lucian Leape Institute [NPSF], 2014). An essential component of increasing patient engagement involves improving health literacy. Health literacy is necessary for patient empowerment, resulting in increased patient engagement (NPSF, 2014). When patients have improved health literacy, they can make informed decisions and be active participants in their own healthcare. Allowing patients to have autonomy in their healthcare results in positive personalized and

patient-specific outcomes. Improving health literacy and patient empowerment gives patients a sense of control over their healthcare and lives (Finley, 2015).

With improved health literacy and patient empowerment, the patients' understanding of the purpose and benefits of participation in MR and timely FU could have improved patient and family engagement. A fundamental goal in healthcare is decreasing healthcare inequities common among the RPGC patient population (CDC, 2022). Meeting these disparities could be attained by the utilization of comprehensive, patient- and family-centered TOC. Ideally, it is beneficial for OA to partner with family members in their healthcare decision-making (National Academies of Sciences, Engineering, and Medicine, 2016). This would theoretically result in increased FU and reduced risk of complications stemming from adverse medication events (NPSF, 2014). Meeting these disparities could be attained by the utilization of comprehensive, patient- and family-centered TOC. Therefore, any healthcare literacy and empowerment process should include the patient's family members and care partners.

Patient discharge education should begin on admission to the hospital through collaboration with inpatient HCP who can ensure that patients are receiving medication and reconciliation education while hospitalized and at discharge. Providing patients with educational materials that are at a fourth to sixth grade reading level, to ensure comprehension, is recommended (AHRQ, 2019b). HCP should limit discussions to five main points written in layman's terms and utilize imagery, teach-back methods, and physical tools to connect with patients with all types of learning styles (AHRQ, 2019b). Additionally, HCP should assess the learner's mental state, current stressors, and illnesses prior to providing education (AHRQ, 2019b).

The implementation of TOC teams can improve patient safety, however, there are still outstanding inquiries on how exactly utilization of the TOC team, reducing medication errors, and improving seven-day FU can reduce rehospitalization, thus reducing healthcare cost and improving patient satisfaction. For future TOC studies, it would be beneficial for the external team to be involved with the internal TOC team and responsible for making the MR phone calls and FU appointments. A patient-centered longitudinal study of the QI project implementation could provide a clearer understanding of the outcomes.

Conclusion

Changes made to medications during the patient's hospital stay and delay in post-hospital FU by primary care providers can potentiate medication errors and harm patients. Although implementation can be challenging, the utilization of the TOC team has the potential to improve patient safety but requires increased patient participation and staff commitment. The goal of the project was to identify medication errors by utilizing a telephone-based TOC team and to improve upon the number of patients seen in an OP clinic visit within seven days of hospital discharge. The interventions of this QI project did demonstrate significant statistical support for the effectiveness of a TOC MR on improving the identification of medication errors and overall FU appointments scheduled at the RPGC. The project did not positively impact the number of patients seen within seven days.

Several barriers were a factor in the outcome of the QI project. The implementation time for the project was limited, which was reflected in the quantity and quality of the data collected. Medication errors and untimely FU can have serious negative consequences, which can often be avoided by using TOC teams. The results of the project did not allow for the external team to ascertain whether the lack of improvement in seven-day FU rates was attributed to the utilization

of a TOC team or the ineffectiveness of the implementation tool. Although the seven-day FU goal was not met, the intervention group did demonstrate improved 21-day FU, which would suggest that a longer implementation phase could provide data to support improved FU rates. Further studies should also be completed to assess interventions to promote timely FU.

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Appendix A

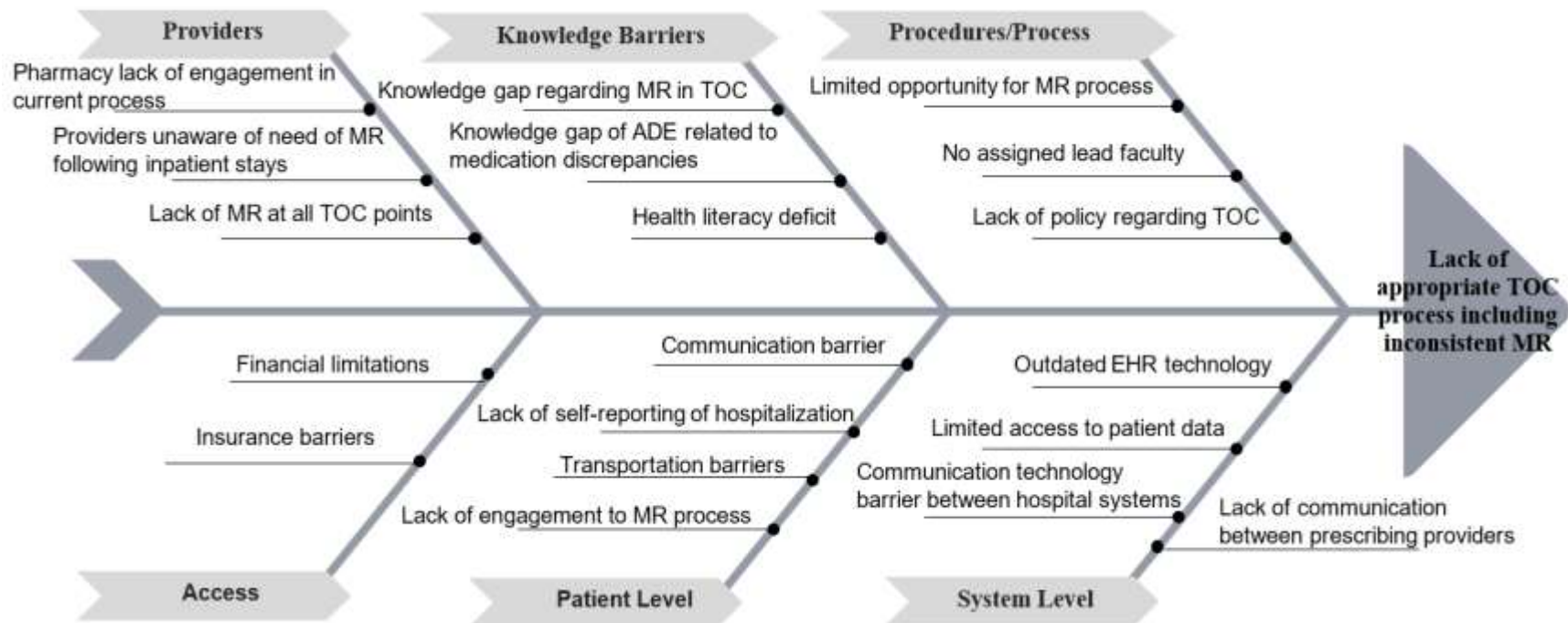
Table 1

SWOT Analysis Matrix of Rosa Parks Geriatric Center

Strength	Weakness
1. Well established, patient-centered primary care organization	1. Limited knowledge regarding MR in primary care setting
2. Stakeholders at primary care are receptive to QI project	2. Limited access to patient data
3. Dedicated community member & faculty available to coordinate & guide the project	3. Availability of advanced technology (for communication, data extraction)
4. Group members knowledge & experience with QI projects	4. Financial constraints, limited resources
5. Easy access to patients & other community stakeholders	5. Significant hierarchical process for specific QI project
6. Explore best practices related to preventing adverse events	6. Transportation burdens for focused patient population
7. Ability to collaborate with IDT members	
Opportunities	Threats
1. Introduce improved MR process	1. Barriers to accessing patient information
2. Educate patients &/or caregivers on MR to prevent medication-related adverse events	2. Resistance from IDT members
3. Reduce adverse events related to medication errors	3. Patient adherence or refusal to participate
4. Improve post-hospitalization visit adherence	4. Inability to complete the project within a one-year timeframe
5. Decrease hospital readmission rates/ED visits	5. Lack of access to integrated EHR/hospital utilization data
6. Ability to explore best practices related to preventing adverse events	6. Potential attitudes/resistance towards students performing QI project
	7. Project abandonment secondary to internal & external factors (e.g., COVID-19 pandemic)

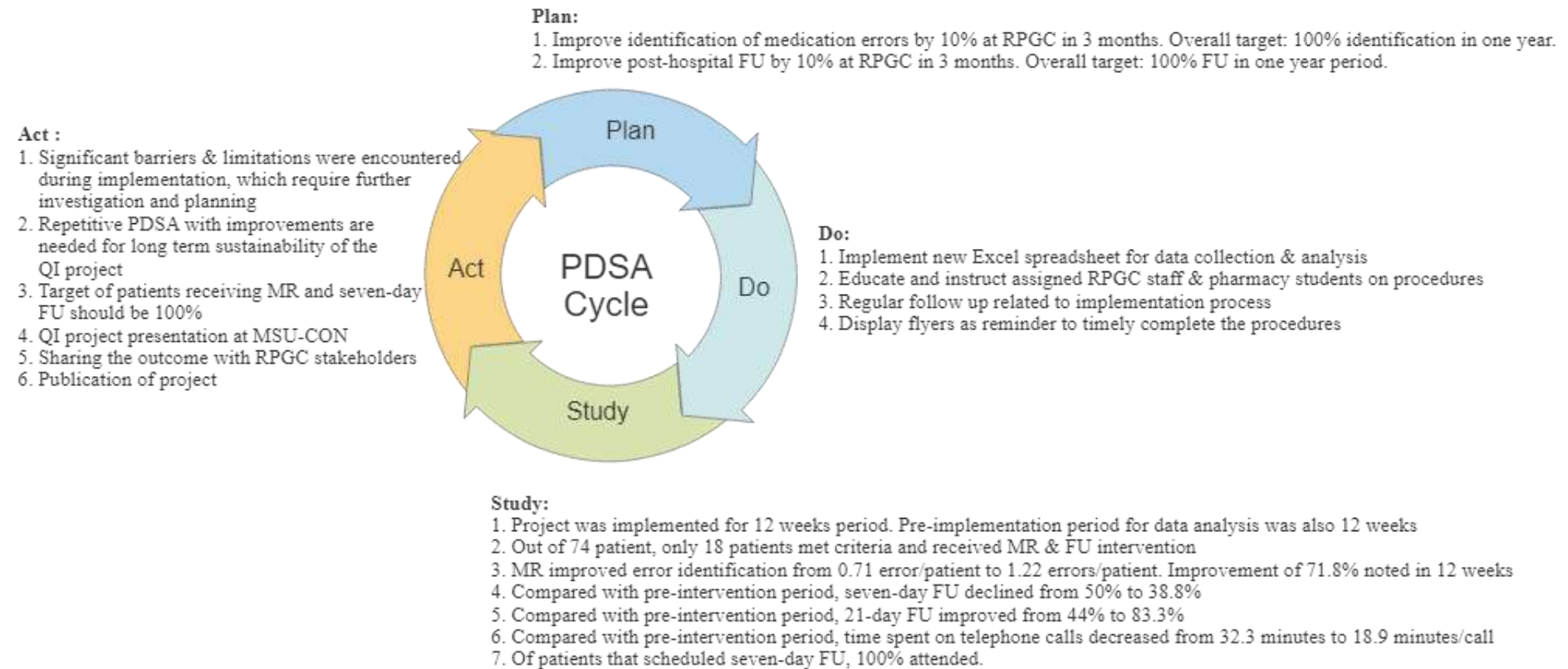
Appendix B

Figure 1

Fishbone Diagram

Appendix C

Figure 2

PDSA Model for Improvement

Appendix D

Table 2

Literature Synthesis Table

Author (Year)	Title	LOE*	Purpose of Research	Framework	Results	Relation to Project	Implications for practice
Albano et al. (2018)	Discrepancies identified through a telephone-based, student-led initiative for MR in ambulatory psychiatry	RA**	To determine the prevalence of medication errors after the use of a telephone-based MR service	A student-conducted study aimed at improving rate of medication discrepancies using a telephonic system to speak with patients one week prior to initial clinic visits. The call team included student pharmacists, pharmacy fellows, and a psychiatric clinic pharmacist. The phone calls focused on identifying medication additions/deletions, changes to doses, medication interactions, & use of supplements.	A total sample size of 656 patients were used & 84.7% reviewed patient profiles were found to have at least one medication discrepancy with a total of 1416 discrepancies identified. Discrepancies included deletions (38.6%), additions (38.9%), & dose changes (22.5%). The study was able to reach 99% of patients but identified waitlisted	Identifies the gaps in outpatient care & focuses on amendment by connecting with patients to determine potentially harmful medication interactions & discrepancies.	MR prior to clinical visits benefit patients by identifying discrepancies within patient medications. Identifies the importance of use of a pharmacy-based team to conduct MR reviews.

				Medications were updated in the EHR as appropriate & the team identified cost & adherence issues with each patient.	patients who were added on a day prior to their appointment as a potential gap in practice.		
Corbett et al. (2010)	Nurse identified hospital to home medication discrepancies: Implications for improving transitional care.	QE*** & RA	A sub-study of a larger RTC that analyzed data exclusively from the intervention arm of the primary study. The purpose was to evaluate the impact of medication errors that occur during TOC as identified by RNs interviewing 101 patients.	Researchers used the Medication Discrepancy Tool to determine if there were any discrepancies from hospital discharge lists and the medication list the patient reported following.	94% of patients surveyed was found to have at least 1 discrepancy in medication list.	Illustrates the extensive problems with medication errors occurring during TOC.	Supports the need for structured and comprehensive TOC to avoid adverse events and medication errors in patients transitioning from hospital to the community.
Kee et al. (2018)	A review of interventions to reduce medication discrepancies or	SR^	Researched literature data for studies that examined gaps of patient care	Grading of LOE & strength of recommendations were conducted using the Strength	Intervention methods included phone interviews; home visits, & in	Noted different methods of implementation. mostly face-to-face interviews	Established there is an opportunity for IDT members to participate or coordinate with

	errors in primary or ambulatory care setting during care transition from hospital to primary care		during transitions from in-hospital to primary care. Focused on the rate incidence, impact of medication discrepancy, errors, & the impact of interventions such as MR to improve patient outcomes.	of Recommendation Taxonomy, a new grading scale created to establish a standard of quality, quantity of evidence synthesized in scientific studies that focuses on evidenced-based medical practices that impact patient outcomes.	person consultation interviews conducted immediately prior to FU office visits. The article noted there was little body of evidence that confirms suggestion that MR process resulted in measurable favorable patient outcomes (such as decrease in 30-day hospitalization & laboratory findings) & there is a need for future studies to validate this commonly accepted theory	immediately prior to in-office FU visit; and telehealth visit/interviews that resulted in the most favorable outcomes. a Discovery of medication discrepancy, & appropriate medication changes.	the MR process in the primary care setting. Noted need to focus on TOC during inpatient to ambulatory care setting to reduce medication errors that frequently occur following discharge into the home/community setting.
Khalil et al. (2017)	Professional, structural and organizational interventions in primary care for	SR	Determine if professional, structural, and organizational interventions are more	RCT where healthcare professionals offered community-based services. 30	The authors could say with moderate to low certainty that primary care interventions to	Provides insight related to current professional & organizational interventions used to prevent adverse	Helps understand the importance of addressing the current interventions at this QI project

	reducing medication errors.		successful than standard care in reducing preventable prescription mistakes by primary healthcare practitioners.	studies with a total of 169,969 patients with different approaches to reducing medication errors. 3 writers extracted data independently. Hospitalization, ED visits, & mortality were the 3 outcomes studied. Data presented using risk ratios with a 95% confidence range. The GRADE method was used to determine the certainty of the evidence.	decrease preventable medication errors had little to no effect on decreasing ED visits, hospitalization, or mortality.	events related to medication errors. Likely a need for structural interventions & new innovative interventions at professional & organization level to reduce adverse events.	organization. A comparison can be made with the interventions mentioned in the study & the primary care organization.
Liu et al. (2019)	Post-discharge medication reconciliation: Reduction in readmissions in a geriatric primary care clinic	RA	To evaluate telephonic MR methods	An IDT in an urban clinic developed a TOC program that utilized telephonic MR after hospital discharge. Nurse case management notified the team of discharges, &	The authors could say with moderate to low certainty that primary care interventions to decrease preventable medication errors had little	Demonstrates the importance of timely & accurate MR to prevent adverse effects from affecting the patient.	To provide safe & effective care to patients, medications need to be reviewed after any inpatient visit to ensure no medication interactions are present, that

				pharmacy team would call patients within 48 hours of discharge. The phone call was used to reconcile medications, ensure prescription access, identify any medication issues, and schedule a FU visit in the clinic within 7 days. Medication records were updated, refills provided, & necessary changes were made for interacting medications.	to no effect on decreasing ED visits, hospitalization, or mortality.		patients have access to the appropriate medications after discharge, & that timely FUs are scheduled.
Naylor & Keating (2008)	Transitional Care: Moving patients from one care setting to another.	SR	To understand the TOC models experienced by patients and family caregivers in U.S.	An archival review of TOC models to explore the results of strategies used during TOC of older patients. This was done to assess impact on patient care due to TOC models.	Three strategies were determined to improve quality of patient care: improving patient access to community resources; improving and expanding TOC services during transitions; and	Will serve as guidance of setting project goals and designing a TOC model to meet standards of care.	Revealed large gaps of care that existed for patients and family caregivers. These deficiencies resulted in poor patient outcomes, unmet needs, high rehospitalization

					improving handoff of pertinent patient information and treatment plans during TOC.		rates and lower patient satisfaction. This archival article was part of a body of evidence that elucidated the need for improvement of TOC methods in older chronically ill patients.
Neu et al. (2020)	Impact of pharmacist involvement in heart failure transition of care	QE	To evaluate the impact of pharmacy-led heart failure (HF) TOC programs on HF readmission rates.	Study conducted at Ascension St. John Hospital in Detroit MI. A pre-post design was used to determine if having a pharmacy-led TOC team would decrease the readmission rate for HF patients. 3 main interventions were included in the study: admission MR, discharge MR, & patient or caregiver education on HF medications via verbal	The study included patients who were admitted with a HF diagnosis between March 1, 2016, and August 31, 2018. 872 patients were screened, 209 patients were excluded leaving 663 patients included in the study. Of those patients 330 were the control group & 333 were in the intervention group. The 30-	Study provides evidence in support of a pharmacy-led TOC team. This is important for this project because it will involve collaborating with pharmacy & articles like this one support why working with pharmacy is beneficial for the MR process & to have on this TOC team. Important to note the most commonly	Demonstrates the importance of having a pharmacy-led TOC team to decrease 30-day readmission rates in HF patients. The evidence supports having a pharmacy-led hospital-based MR TOC team, which provides specific education to HF patients. This is beneficial for decreasing the 30-day admission rate for HF patients.

				communication as well as provided written education materials.	day readmission rate for HF patients in the control group was 57 patients (17.3%). The 30-day readmission rate for the intervention group was 35 patients (10.5%). Common interventions needed were dose titrations (7.5%), adding additional medications (11%), discontinuing medications (6.6%), & avoiding medication duplications (2.7%).	needed interventions were all medication related & likely prevented medication errors, omissions, & adverse events related to medications.	
Prusaczyk et al. (2020)	Understanding transitional care provided to older adults with and without dementia: A mixed methods study.	QE & RA	A mixed method study utilizing provider interviews (qualitative) to guide medical	The framework for this quasi-experimental study was not defined by authors but methods of analysis resemble	Determined that different providers play different roles during the TOC process and these steps differ	Clarifies traditional roles of providers during TOC and identifies barriers encountered during transitions	Clarifies traditional roles of providers during TOC and examines any barriers to providers

			chart reviews (quantitative). The purpose was to understand the current process used to deliver health care during TOC.	the Framework Study analysis method.	between patients with and without dementia.		assuming additional tasks to augment TOC services.
Redmond et al. (2018)	Impact of MR for improving TOC	SR	To analyze selected studies about how MR affects medication discrepancies, healthcare utilization, & patient-related outcomes in patients who receive it during care transitions versus people who don't.	Only RCT were chosen. 2 review authors screened for titles & abstracts, determined study eligibility, assessed bias risk, & extracted data. The results of individual studies were combined to produce summary estimates with a 95% confidence interval. For each pooled outcome, the GRADE method was used to assess the evidence.	Researchers found 25 randomized studies with a total of 6995 individuals. With poor certainty of the available evidence, reconciliation may have had minimum to zero effect on avoidable adverse medication events. Evidence for effect of MR on healthcare usage was conflicting, & probably made minimum	Provides some evidence on impact of MR. Authors identify that pharmacist-mediated interventions were specifically not helpful. Therefore, a QI project will require further exploration to suggest pharmacist-mediated MR as one of strategies for improving clinical outcomes such as preventing adverse events, ED utilization, & rehospitalization.	Demonstrates need of further studies with high certainty related to impact of MR on preventing adverse events, rehospitalizations, & use of EDs.

					difference on unexpected rehospitalization.		
Rustad et al. (2016)	Older patients' experiences during care transition	QI^^	Explore the older patients experience during transitioning from hospital to community	Interviews of 14 older patients (≥80 years of age) to explore the experience of transitioning from hospital setting to healthcare in the community	TOC is complex in OA who require direct invitations to participate in own healthcare planning due to expectations of roles that older patients have as a result of history of patriarchy in medicine.	The targeted population at RPGC is older population and this will require special consideration to empower and engage patients to participate with healthcare planning.	Older patients are often reluctant to "interfere" with healthcare, instead taking a more passive role in own health. This could be due to a legacy of a more patriarchal structure of healthcare in earlier years. Lack of engagement may not necessarily be due to lack of healthcare literacy or interest.
Stolldorf et al. (2020)	Implementation of sustainability of a medication reconciliation toolkit: A mixed methods evaluation.	QQ^^^	Described the sustainability of a QI change using the MARQUIS Toolkit.	Survey of the leaders of the 5 hospitals that implemented QI change using the MARQUIS toolkit.	The study revealed hospitals successfully implemented QI change using a variety of strategies. Lack of staff buy-in resulted in	Described various strategies used to execute interventions that can be utilized in the proposed QI project.	Staff buy-in can facilitate QI projects. Supporting strategic staff empowerment that can lead to ownership from staff and

					significant barriers to QI implementation, such as low prioritizing the improvement process.		prioritization by staff.
Surbhi et al. (2016)	Drug therapy problems and medication discrepancies during care transitions in super-utilizers	RA	Analysis of drug therapy discrepancies during care transitions among patients with multiple comorbidities & polypharmacy	Study conducted to evaluate effectiveness of SafeMed care transitions program. Patients were enrolled in the program during their hospital admission. Medication records were reviewed at the bedside with pharmacists to aid in identifying errors. Upon discharge, patients were provided with a personalized medication list with administration instructions & education regarding purposes & potential side effects. Pharmacy	374 participants enrolled in the SafeMed program. The program identified therapy problems in 80.7% of cases & 75.4% discrepancies. The most frequently identified drug therapy problems included not obtaining medications, underuse, & incorrect dose or duration. The program helped prevent costs of more than \$290 per problem	Identifies the period of care transitions as a key care gap area with a high potential for error. Pharmacy-based teams utilized both face-to-face & telephonic interventions to reconcile medications appropriately.	Pharmacy-based teams have been beneficial to the prevention of drug-related discrepancies in patient charts occurring throughout care transitions.

				<p>technicians reconciled medications at home visits in order to recognize discrepancies with outpatient medications which included omissions, duplications, & dosing errors. Between each home visit, the technicians called patients to help recognize barriers to medications, adherence rates, & potential therapy issues. After completion of 2 home visits & 2 FU calls, patients were given a finalized medication record.</p>	<p>identified. The study recognized those with multiple comorbidities were at the highest risk for discrepancies.</p>		
Tomlinson et al. (2020)	Successful care transitions for older people: A systematic review and meta-analysis of the effects of	SR & MA+	Reviews interventions that help older patients transition from one type of	A database search for RCT. Older persons, interventions during hospitalization,	Successful transition of care is likely possible with interventions that bridge the	Considered strategies including MR to prevent adverse events.	The study reinforces the importance of MR as one effective strategy to prevent

	interventions that support medication continuity		care to another by keeping their medications consistent.	post-discharge activities that support medication continuity were among selection criteria. 24 studies with total 17,664 participants. Reviewed outcomes related to hospital readmissions, safe medication use, & quality of life. Random-effects meta-analysis was used to pool the outcomes.	transition. Self-management activities, telephone follow-up, & MR were all statistically linked to fewer hospital readmissions.		adverse events in patients discharged from the hospital.
Tuttle et al. (2018)	Medication therapy management after hospitalization in CKD: A randomized clinical trial	RCT	Effects of MR following hospitalization for CKD	Chronic care model & algorithm of implementation was the "5As" strategy. Assessed 141 patients on the impact of rehospitalization rates of patients discharged from hospital with a CKD diagnosis without hemodialysis. Patients were	Concluded that pharmacy led MR did improve patient adherence rates but did not ultimately improve patient outcomes. An initial improvement in the intervention group at the onset of the study, but when	Another perspective on how effective the proposal of MR to improve patient outcomes will have the desired impact. Also looked at long term interventions that can provide strategies to guide this design for sustainability.	Provided insight to the benefit of pharmacy involvement with patients to improve medication adherence. The study challenges the commonly held belief that increasing medication adherence & appropriate

				assessed with a MR and assessment of medication adherence 3 times during the post discharge phase. The metric used to evaluate success of program was rehospitalization rates.	the study concluded with the final MR interview, the rates of hospitalization for the intervention group compared to the usual care group was insignificant at only 1% improvement rate.		prescribing alone will improve patient outcomes. Concluded that more comprehensive medication programs should be studied to evaluate improved patient outcomes.
World Health Organization (2016)	Transitions of Care: Technical Series on Safer Primary Care	SR	A technical report series/literature review to identify gaps in health care that negatively impact patient safety.	Review of published peer-reviewed literature and interviews of international experts in the medical field regarding TOC was used to create this series.	Examined the gaps in care and the impact on patient safety due to these deficiencies. The report offered strategies successfully used by experts to avoid adverse events during TOC.	This report provides historical evaluations of gaps of care encountered during TOC and provides a foundation of evidence to guide future approaches to effective and safe TOC.	Cumulative landmark report of 9 monographs examining all aspect of patient care. TOC has been determined to be a high priority process that can result in poor patient outcomes and increased healthcare cost through increased hospitalization.
Xuan et al. (2021)	Impact of adding pharmacists &	L++	The purpose is to evaluate the	The effectiveness of adding Synergy	Included 13,256 hospital	This study supports adding	Supports adding a pharmacy-led

	comprehensive medication management to a medical group's TOC services		impact of having a TOC team lead by pharmacists. The research will determine if the pharmacist-provided TOC service will decrease hospital readmission rates.	Pharmacy Solutions to the TOC is evaluated. Adding pharmacists allowed the evaluation of patients' medication orders before discharge & assesses the appropriateness of the medication, safety risks, barriers to patient adherence, effectiveness of the medication, & the ability of the medication to be taken by the patient. An individualized plan of care was created & focused on the patients' goals of therapy. Pharmacy followed the patient after discharge, made sure they had access to medications post-	discharged adult patients for 30-day readmission analysis & 10,740 discharged for 180-day analysis. Adding the TOC program reduced the 30-day readmission risk by 34.9% & 180-day readmission by 33.4%.	pharmacy to the TOC team to decrease hospital readmission rates. Adding pharmacy also decreased MR errors.	TOC program & demonstrates decreases of hospital readmission rates at 30 & 180 days.
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				discharge, & reevaluated medications at a 1-week post-discharge appointment. Pharmacists followed patients for 30 days post-discharge & maintained communication with patients to ensure there were no medication problems & FU on medication effectiveness & appropriateness.			
--	--	--	--	--	--	--	--

**LOE*= level of evidence

***RA*= retrospective analysis

****QE*= quasi-experimental

^*SR*= systematic review

^^*QI*=qualitative interview

^^*QQ* = Qualitative/Quantitative survey

+*MA*= meta-analysis

++*L*= longitudinal

Appendix E



Date: August 3, 2021

Kara Schrader, DNP, RN, FNP-C
Primary Care Nurse Practitioner Program Director
Michigan State University-College of Nursing
Life Sciences Building
1355 Bogue Street
East Lansing, MI 48824

Dear Dr. Schrader,

I am familiar with the quality improvement project being conducted by Tanya Brooks, Kristen Campbell, Chelsea Pettit, and Sam Singh entitled "Utilization of Transition Care Team for Medication Reconciliation in Primary Care." I understand that DMC-Rosa Parks Geriatric Clinic (RPGC) involvement will include the mentorship of the above-named students and will require the application of the proposed process including: reviewing our current process and/or practice, accessing patient records for review, protocols and practices related to the project, participation in improvement team meetings, educating staff, access to benchmark and performance data, revising current policy/procedures related to implementation of timely post hospital discharge medication reconciliation and follow up with primary care providers at RPGC, and education of staff or providers impacted by the development of the project.

I have read the project's proposal, discussed the project with the relevant parties, and am comfortable with the described project taking place at our facility. I understand that this project will be carried out following sound ethical principles. The DMC-RPGC gives permission for the students to disseminate project data and outcomes at Michigan State University College of Nursing for the purpose of academic course completion and at approved meetings at DMC-RPGC. The DMC-RPGC gives permission for publication of the DNP project. I concur that all information released by the DMC-RPGC facility to the above-mentioned students falls under health care operations of DMC-RPGC and therefore will not be considered privileged information. Disclosure of relevant patient information for the quality improvement project is private and will remain confidential among the aforementioned parties.

Therefore, as a representative of DMC-RPGC, I agree that the quality improvement project of Tanya Brooks, Kristen Campbell, Chelsea Pettit, and Sam Singh may be conducted at our facility.

Sincerely,

Signature:

Name:

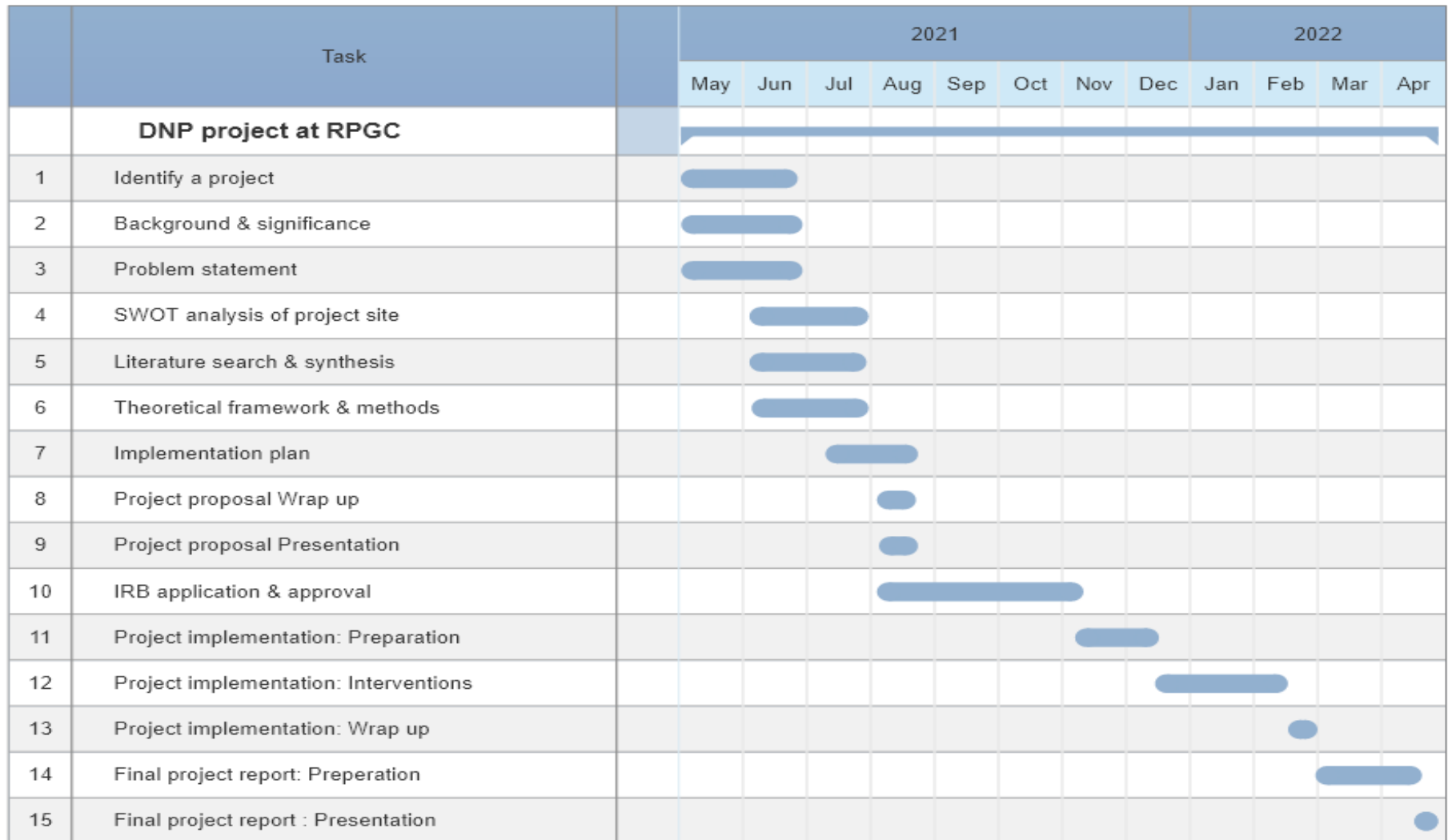
Title:

Pragnesh Patel
Intern Chief of Geriatrics
Wayne State University
School of Medicine

Lisa Brooks Emerit
GNP
Rosa Parks Geriatric Center
WSU

Appendix F

Table 3
Gantt Chart



Appendix G

Table 4

*Project Budget***Covered Period: September 2021 to December 2021 (13 weeks)****Personnel Expenses**

Type of Expense	Source	Total Expense per Line Item	Notes
Chelsea, RN	In-kind	\$ -	90 hours of gratis labor
Kristen, RN	In-kind	\$ -	90 hours of gratis labor
Sam, RN	In-kind	\$ -	90 hours of gratis labor
Tanya, RN	In-kind	\$ -	90 hours of gratis labor
Dr. Binns-Emerick, DNP (Clinical site expert)	RPGC	\$ 8,587.80	\$55.05 x .3FTE hours x 13 weeks
Pharmacist	Employee RPGC	\$ 9,409.92	\$60.32 x .3FTE for 13 weeks
Pharmacy intern	In-kind	\$ -	.3FTE hours per week of gratis labor
Registered nurse	RPGC Employee	\$ 4,000.88	\$38.47 x .2FTE
Medical office assistant	RPGC Employee	\$ 1,846.00	\$17.75 x .2FTE 104 hours x weeks

Mean salaries retrieved from the U.S. Bureau of Labor Statistics (2021).

MISCELLANEOUS EXPENSES

Office supplies	In-kind	\$ 100.00
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Total Expenses	\$ 23,944.60
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Estimated cost savings per patient	\$ 586.60	2 medication errors @ \$293.30 per error
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Estimated cost saving from reduced medication errors.

Covered Period: January 2022 to April 2022 (13 weeks)**Personnel Expenses**

Type of Expense	Source	Total Expense perLine Item	Notes
Chelsea, RN	In-kind	\$ -	90 hours of gratis labor
Kristen, RN	In-kind	\$ -	90 hours of gratis labor
Sam, RN	In-kind	\$ -	90 hours of gratis labor
Tanya, RN	In-kind	\$ -	90 hours of gratis labor
Dr. Binns-Emerick, DNP (Clinical site expert)	RPGC Employee	\$ 8,587.80	\$55.05 x .3FTE hours for 13 weeks
Pharmacist	RPGC Employee	\$ 9,409.92	\$60.32 x .3FTE hours for 13 weeks
Pharmacy intern	In-kind	\$ -	.3FTE hours per week of gratis labor
Registered nurse	RPGC Employee	\$ 4,000.88	\$38.47 x .2FTE
Medical office assistant	RPGC Employee	\$ 1,846.00	\$17.75 x .2FTE hours per week x weeks

Mean salaries retrieved from the U.S. Bureau of Labor Statistics (2021).

Miscellaneous
expenses
Office supplies

In-kind

\$100.00

Total Expenses: \$ 23,944.60

Total Combined Expenses:

\$ 47,889.20

Estimated cost savings per patient \$ 586.60 2 medication errors at \$293.30 per error
Estimated cost savings from reduced medication errors.

Total cost savings for 50 patients (100 medication errors) \$ 29,330.00

Table 5

[illegible]

Appendix I

Table 6

Pre-intervention data

Month	Number of patients	Total FU scheduled	FU scheduled within seven days
September 2021	5	2	0
October 2021	24	10	3
November 2021	21	10	8

Table 7

Intervention data

Month	Total number of patients discharged from hospital	MR completed	Total FU scheduled during MR	FU scheduled within seven-day goal	Percent attendance within seven days	Percent of overall FU attendance (extended to 21 days)
December 2021	22	5	5	1	100%	80%
January 2022	31	7	5	3	100%	100%
February 2022	23	6	6	3	100%	83.3%