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Medication Management in a Primary Care Practice

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MEDICATION MANAGEMENT IN A PRIMARY CARE PRACTICE

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Melissa Fowler

ABSTRACT

Improving medication management has become the 3rd National Patient Safety Goal (NPSG. 03.06.01). Medication errors cost $42 billion annually. A 5-month quality improvement project was conducted in a primary care clinic located in south Texas metropolitan city to address medication reconciliation problems. The project improved medication management by implementing seven tools to decrease preventable medication errors: One Source Medication List, staff knowledge pre- and post-tests, visual signs and staff badges, staff templates, Beers Criteria pocket guide, patient brochure, and a quality improvement tracking form. There were two objectives: 1. Staff would improve medication reconciliation documentation by 50%. 2. For patients 65 years of age and older, potential contraindicated medications review using the Beers Criteria medication list to reduce adverse drug events, drug interactions, and allergies would increase by 50%. Objective 1 was not met, achieving only 30%, and Objective 2 reached only 29%, indicating that medication reconciliation continues to be a challenge in that clinic. The implications for practice are for doctorally-prepared nurse practitioners to lead the improvement of medication management by implementing robust medication reconciliation processes, to increase the knowledge and motivation of the staff, and to advocate for a more current medical record software. Therefore, nurse practitioners can help increase patient safety and the outcomes of prescribing practices by providers whose clinical decisions must rely on accurate medication information.

Keywords: adverse drug events, medication reconciliation, beers criteria, nurse

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Decreasing Medication Errors

Improving medication management has become the third National Patient Safety Goal, implemented in January 2018, under The Joint Commission (TJC) (2018) and Agency of Healthcare Research and Quality (AHRQ) (2018). According to the World Health Organization (WHO) (2018), medication errors cost an estimated $42 billion, and approximately 42 million patient safety incidents are reported annually. Out of those incidents, many preventable medication errors affect approximately 7 million patients yearly across all healthcare settings (Da Silva & Krishnamurthy, 2016). Therefore, one in every 10 patients is harmed while receiving care (WHO, 2018). In December 2004, the 100,000 Lives Campaign was started to bring awareness to the following: improper medication management, poor documentation, and ineffective patient and provider communication. These problems have caused errors and increased healthcare costs, making the supervision of medications a top priority in healthcare in the United States (Institute for Healthcare Improvement, [IHI] 2018). Therefore, it is currently being addressed as a national goal and objective across healthcare organizations and frequently is the focus of quality improvement initiatives. IHI (2018) stated that all institutions including primary care clinics were required to have a medication reconciliation process in place to ensure appropriate usage of medications. Further, the accurate tracking of medications is critical to safe and effective functioning of physicians and nurse practitioners who manage treatment regimens and prescribe medications.

A root-cause analysis of a local primary care clinic in a south Texas metropolitan city was performed and showed significant gaps in medication management from when the patients arrived at the clinic to their departure. The Doctor of Nursing Practice (DNP) student was the facilitator who guided this quality improvement project that focused on improving medication

management in the clinic. The project began with an assessment of all facets of the clinic. Following the assessment, two objectives were created, and a plan was devised and implemented. This paper describes the development of the project and the results that were obtained.

Statement of the Problem

What are the best practices to help providers in outpatient primary care clinics decrease medication errors? When multiple patient transfers among hospital inpatient departments take place, starting from admission to discharge and to outpatient settings, numerous changes to a patients' care plan and medication list create opportunities for errors to occur. In order to communicate and maintain accurate medication administration, both patients and staff must act in "good faith" such that the medications being documented are the most current and the patients are taking the medications as they should (TJC, 2018). The complex array of medications originating from multiple settings has the potential to increase errors, adding to national healthcare costs and decreasing patient safety. The AHRQ (2018) reported current literature reviews strongly suggested that medication errors made by healthcare staff during patient transitions or transfers between care were the major cause of adverse drug events (ADEs) and drug-drug interactions. Therefore, a project to reduce medication errors was initiated by the DNP student and medical staff of a new primary care clinic (NPCC), the point at which patients often first enter the healthcare system.

In the NPCC, located in a south Texas urban community, a comprehensive needs assessment of the care environment was conducted. That assessment included the clinic's purpose, the patients, professionals, care processes, and patterns, known as the 5 Ps according to the Dartmouth microsystem quality improvement curriculum (Dartmouth Institute Microsystem Academy, 2018). In short, there were many gaps or areas of deficiencies that needed to be

addressed in each category. Notably, only one medical doctor worked at the clinic, with less than the minimal support staff required, trying to keep the NPCC open using an evidence-based practice approach whenever possible. Some clinical issues suggested areas where the clinic did not meet the national standards according to Centers for Medicare and Medicaid Services (CMS) (2016) quality strategic goals. Those created problems for patient safety, reimbursement, and increased healthcare costs. Without the proper staff, support, or training, there was room for errors to occur, in particular those focused on proper medication management, which also had not been a priority in that primary care clinic. This DNP student's quality improvement project therefore focused on implementing a proper medication management process at that new primary care clinic, as well as incorporating the Beers Criteria medication list to decrease ADEs and human errors.

Background and Significance

The United States is currently facing a shortage of primary care providers in every state. Due to higher demands for healthcare coverage of Americans, especially those who did not have health insurance before the Patient Protection and Affordable Care Act of 2010, policy makers are seeking nurse practitioners to cover these gaps (Federal Trade Commission, 2014). In 2008, the Robert Wood Johnson Foundation and the Institute of Medicine launched an initiative called The Future of Nursing: Leading Change, Advancing Health to utilize nurse practitioners to the full extent of their training and education, which will play a fundamental role in reducing the shortage of care providers (Puetz, 2013).

According to the American Association of Nurse Practitioners (AANP), nurse practitioners play a key role among the few community providers that provide fee-for-service to value-based reimbursement (Judge-Ellis, 2018). Therefore, the National Nurse-Led Care

Consortium and the AANP came together to create the Nurse Practitioner Support and Alignment Network. This will prepare nurse practitioners for future healthcare system changes, provide professional development and continued education, and offer training for value-based reimbursement related to CMS standards. In the future, nurse practitioners will be the main providers in primary care (Judge-Ellis, 2018). This is an opportunity for nurse practitioners to employ evidence-based, cost effective, and high-quality care regarding the standards of the Medicare Advantage Quality Improvement Program as described in the Federal Regulation 42 CFR 422.152 (CMS, 2019). The National Nurse-Led Care Consortium and the AANP are ensuring that nurse practitioners receive the support needed to remain competitive (Judge-Ellis, 2018). Meanwhile, nurse practitioners and medical providers who work in primary care are addressing the many demands of primary care while increasing patient safety (e.g., decreasing medication errors in prescriptions and documentation). This quality improvement program's primary goal was to improve patient health outcomes.

Medication discrepancies affect patients up to 80% of the time during admissions, transfers, or discharges (Penn, Vaillancourt, & Pouliot, 2018). Reconciliation takes place when a complete and accurate list of medications is documented and subsequently compared to previous medications that are already in the patients' record and which might need updating (Wilson, Murphy, & Newhouse, 2013). Medication reconciliation is defined by the AHRQ as the process avoidance of unintentional inconsistencies with medication orders within healthcare systems, particularly in any new setting to which patients transition. The complexity of updating a medication list lies in the human thought processes, which are not always consistent or reliable, and in the dynamic environments in which technology has little accountability and mistakes can be overlooked. Accuracy with all patients' medication list requires completeness; participation of

healthcare staff, patients, and their families; and evidence-based data to increase patient safety (Wilson et al., 2013).

Assessment

Organization's Readiness for Change

In the NPCC where this current quality improvement project took place, a clinical microsystem assessment tool was used to assess the organization's readiness for change (Godfrey, Nelson, & Batalden, 2004). Ten characteristics were graded, scored, and categorized as leadership, organizational support, staff focus, education and training, interdependence, patient focus, community and market focus, performance results, process improvements, and information and information technology.

According to the microsystem assessment tool scoring worksheet (Johnson, 2003) published by the Dartmouth Institute Microsystem Academy, this outpatient primary care clinic scored a total of 7 out of a maximum 26, indicating satisfactory performance in only 27% of 10 dimensions. Each characteristic could receive a possible score of 0 (lowest), 1 (middle), or 2 (best). A score of less than 2 in each of the characteristics meant that those were potential areas for improvement. For this clinic, a total score of 7 for all characteristics combined meant staff were most likely spending a lot of time each day working around defects in processes of care. The area in which the clinic functioned the best initially was staff focus. That was followed by areas with moderate functionality, which included leadership, education and training, interdependence, patient focus, and information technology. Even though there were gaps in the NPCC's readiness to take on change, it was still imperative to implement quality improvements that included medication reconciliation process changes.

Description of the Clinic

The primary care profile assessment of the NPCC showed that the majority of the population being served was between the ages of 19 and 60 years and approximately 65% were female. The three largest ethnic and racial groups living in the area surrounding the clinic were Caucasians at 78.8%, Hispanic or Latino at 63.6%, and African Americans at 7.1% (U.S. Census Bureau, 2018). That matched the demographic profile of the patients seen at the NPCC.

The NPCC was in a new building that housed three small businesses and offices. It was on the first floor and upon entry had a small waiting area with about 15 chairs. There was one clerk desk station at the entrance, with one computer workstation and the manager's office behind it. In the center was a large central station where three other computer desks were located. Five patient rooms encircled the main hub with three mainly used for patient care. The other two exam rooms were not fully equipped. There was an x-ray room staffed by one x-ray technician who was there most of the time unless asked to cover for another department. There were two supply rooms and one break room for the staff. The layout of the clinic was efficiently arranged and functional. It was also aesthetically appealing for staff and patients with current design and decoration to create a therapeutic environment with relaxation aroma therapy and pictures on the walls. The clinic was equipped with NexGen electronic record system but had a wireless system that was not always functional.

Three orthopedic physicians used the other empty patient rooms to see patients. They had a Professional Service Agreement and were not directly employed by the organization. That allowed for a less structured work schedule for their practice and allowed for more freedom to see their patients at certain times and days. The orthopedic specialists agreed that the pain management specialist would see patients on Tuesdays, the hand surgeon on Mondays and

Thursdays, and the general and orthopedic surgeon on Fridays. Those physicians had other offices in nearby areas where they saw patients on other days. The organization did have a patient portal, but the NPCC's primary care physician did not check it due to overwhelming responsibilities and time constraints. Therefore, patients were not told there was a patient portal and did not use it. If there was a question for the physician, the patients called the office rather than posting on the portal, and that increased the work volume and stress of all staff when questions could be answered in a more timely manner online.

Purpose of the Clinic

The NPCC was part of a bigger hospital system that had been in the south Texas city for nearly 90 years. They offered inpatient and outpatient services with an emphasis on orthopedic, bariatric, and behavioral health services. Their services were also offered in other facilities located around the area. The organization's website had a mission statement that was focused on patient-centered care and the values they adopted that included complete patient focus, teamwork, integrity, and leadership. The NPCC was part of a corporate group that hired a new chief officer of operations during the period of the project. The NPCC saw patients from ages 7 years and up with a focus on sports medicine and injuries. Their staff strived to create an environment in which those patients not only received attentive and holistic personalized healthcare, but they were also treated with the respect, dignity, and compassion they deserved. The organization was committed to providing patient-centered, high-quality, and compassionate care; advanced treatment and services with modern equipment; and open communication with their patients. Educational opportunities were offered to the public, and outreach programs were in place to educate community and healthcare professionals. Their goal was to give patients and providers the tools needed to live a healthier, longer, and happier life. The local NPCC was

unable to meet all of the larger organization's mission and goals at that time, and in particular did not achieve standards for medication management as will be shown.

Patients

In the NPCC, the single primary care provider saw an average of 15 unduplicated patients daily during weekdays only. The system's primary care practice groups and hospitals were evaluated for provider productivity based on Relative Value Units (RVUs), which is Medicare's national standard to determine how much pay doctors receive for their services. RVUs represent volume of work in numbers showing patient treatment for services and procedures covered under the Medicare Physician Fee Schedule (CMS, 2018a). Congress sets dollar per RVU values, and they vary yearly. The American Medical Association is in charge of updating the Current Procedural Terminology (CPT-4) numeric coding system that is used to identify procedures and medical services provided by healthcare professionals and providers (CMS, 2018b). CPT codes are used to bill the service/item provided to patients and are used to get reimbursement from private or public health insurance companies (CMS, 2018a).

The NPCC's top five patient diagnoses based on CPT codes listed from highest to lowest were cardiac problems, diabetes, obesity, back pain, and allergic rhinitis. In a national survey, patients were users of primary care services because they experienced some kind of pain (34%), needed refills on medications (27%), had problems with decreased sleep (18%), and had headaches (12%) per week, which is similar to the NPCC (Khalil & Lee, 2018). At the NPCC, the patients' average cost per initial visit when paying out of pocket was $175 and follow-up visits cost approximately $120. Medicare Part B funded approximately 80% of the patients' bill, while the patients had to pay approximately a 20% deductible. Preventive medical services were free for those covered under the same insurance (Medicare, n.d.). Private pay patients paid full

amounts, but at times the provider would not charge the patients depending on the circumstances. Patient referrals made by the NPCC were most frequently sent to community providers such as cardiology, gastroenterology, endocrinology, and psychiatry, most of which were not within the organization's healthcare system. Within the clinic's microsystem, there was regular interaction with other departments, which included orthopedics, radiology, laboratory, and pharmacy services. Within the clinic, a limited range of pharmaceuticals, such as Tylenol, Prednisone, and Flonase, were provided by the provider. There was no full-service pharmacy on site. The medications available were accessible in the clinic's medication room to give to patients prior to discharge, and typically were medications found over the counter. Patients were not billed for those medications. Instead, the provider paid out of pocket for over-the-counter medications to give to patients or prescription samples provided by drug company representatives in bulk were provided to patients. None of the medications provided by drug company representatives included scheduled drug medications that were regulated by the U.S. government under Title 21 United States Code–Controlled Substances Act (DEA, n.d.).

Patient satisfaction levels were very high based on surveys collected by the DNP student using a Likert scale questionnaire over a 2-week period. All NPCC patients who had appointments and agreed to take the survey were given a patient satisfaction survey called the Dartmouth Microsystem Institute Patient Survey (Godfrey et al., 2004). The results demonstrated that approximately 80% of patients thought their service was *Excellent*, 8% was *Very Good,* 5% was *Good,* 1% was *Fair*, and no one thought service was *Poor*. There were a few patients who waited over 30 minutes, left the clinic, and did not return. A patient satisfaction form was not able to be obtained from them. There was also one negative review on the Vitals webpage regarding miscommunication between one staff member and the patient on how much private

pay cost for an initial visit. Therefore, the results of the satisfaction scores varied only a little. Overall, patients appreciated the care they received.

Professionals

Five full-time staff members worked for the organization at the NPCC. The staff consisted of one primary care provider, three medical assistants (MAs), one manager, and three orthopedic physicians contracted privately to use the other patient rooms a couple of times a week. The provider acquired her medical degree in family medicine with a specialty in sports medicine and had been practicing for 6 years. She, along with three MAs, started this NPCC on March 1, 2017. At that time, nothing was in place before moving into the unit space. The clinic did not come with medical equipment, supplies, or the wiring needed for computers to work to access patients' electronic medical records. Soon after, the organization implemented a system software, called NexGen, where patients' electronic medical records were stored. The provider did not have an office and usually used a laptop that she carried with her into the patients' rooms. At other times, the provider stood at the back side of the center workstation, closest to the patients' rooms, to continue documenting or to place medical forms on which she was currently working. There were no licensed vocational nurses, registered nurses, or nurse practitioners working in the clinic.

Initially, the staff included three MAs who were certified and had more than 2 years of experience each. After high school education, the requirement to attain their certification was approximately a year-long MA's training program. Only the clerk and manager of the NPCC went to MA school, but neither had their certification. All MAs had acquired their high school diploma. The main provider and manager were supportive and encouraged all MAs in the clinic to obtain their certifications. The manager and provider hired two more MAs who had an average

of 2 years of experience in other departments, and thus the clinic was fully staffed at the time of the intervention. The MAs' role was to admit the patients, get a basic history and medication list, complete the Wellness Questionnaire for the provider to address with the patients later, obtain vital signs, document progress notes, administer injections, assist to prepare rooms for procedures and the provider, prepare consult paperwork, answer phones, print patient education forms and discharge patients, document on charge forms for services provided, and any other jobs delegated by the provider. They were not always adequately supervised due to time constraints. It was more of a learn-as-you-go approach after being shown how to do processes once. The provider always stepped in if an MA was not available and did things on her own related to admitting a patient, procedures, documentation, printing, and calling patients about results.

The staff were all given a Professionals Satisfaction Survey using the Dartmouth Institute Professionals Survey Form (Godfrey et al., 2004). For the most part, staff were more satisfied with their work environment than not. Appendix A shows the perceptions of the staff and how satisfied they were overall working in the NPCC. The survey included questions regarding respect, stress, equipment adequacy, morale, best place at which to work, how easy it was to care for patients, and acknowledgement for good work.

Throughout the project period, a high turnover of MAs continued due to a high stress level and burnout as reported by most of the staff. The staff was supposed to work 8-hour shifts 5 days a week, but usually worked overtime. On a weekly average, MAs worked 10 hours overtime per week and received time and a half pay. That was highly discouraged though, and the manager tried preventing overtime from happening by reminding staff they needed to clock out. Sometimes, it was inevitable to work overtime due to the workload. They were entitled to

accrue 5 hours of paid time off and 2 hours sick leave per paycheck every 2 weeks. MAs made just above minimum wage of an average of $11 an hour. Recent lack of support and rumors of corporate restructuring might have contributed to staff stress.

Recently, the clinic manager made efforts to build morale and create more optimism in the workplace, including acknowledging when someone did something positive. The physician helped the manager with her inexperience in being a facilitator and in seeking guidance. The clinic's culture change was slow with ongoing resistance. The DNP student saw that as an opportunity to talk to the staff about how difficult and slow change can be and why it's important to implement interventions that were going to take place in the near future. With the lead team of the physician and manager facilitating the process, not much change had been seen within the culture of the NPCC.

Processes

Patients followed a linear process when they came into the NPCC for their appointments that can be seen in Appendix B. Patients first entered the clinic and signed in at the window in the patient waiting area where the admission clerk was located. Co-payments or full payments were collected by the front desk clerk. The clerk admitted the patients, and there was usually an average waiting period of 20 minutes in the waiting room. When an exam room became available and the MA was prepared to in-process the patients, the patients were escorted to get their weight, vital signs, and admission paperwork completed, which included a verbal gathering of the patients' current medications and recorded on the Wellness Questionnaire form to be transcribed later to the electronic health record (EHR). That was the first time during the process that patients were asked about their medications. The steps for gathering the patients' medication information were not always consistent or completed.

Usually the provider was given a brief patient report by the MA, and then entered the room to go over the history and physical, medications, and reason why the patients were being seen that day. During the medication review conducted by the provider with the patients, the provider briefly asked the patients if the medications they were taking were current, but that did not happen often. There was no consistency in how the medication information was gathered by the provider. Sometimes, the provider went over all medications briefly, or only the ones she found pertinent to the current diagnosis, and sometimes checked patient reports against a list or the prescribed medication bottles the patients had on hand. The Beers Criteria was not being implemented for the patients aged 65 years and older. Following a physical exam, procedure, or diagnostic exam (e.g., injection or x-ray), if a medication was needed, the provider completed all orders. If none was needed, the patients were then escorted out of the room with discharge orders and saw an MA for further instructions (e.g., referrals, new medications prescribed, and laboratory tests to be done). Most prescribed medications were electronically conveyed to the patients' pharmacy at that time. Some prescriptions were written out on a script, and the patients had to hand carry them directly to the pharmacist. The MD was inconsistent in confirming with the patients if they understood how to take their medications. No medication counseling was provided by the discharge MA. Finally, the patients saw the front desk clerk for their next appointment and then exited the clinic. At the front desk, the office's contact information was not provided to patients, patient education brochures about their medications were not being handed out, and the patients were not reminded to bring in a current medication list or bottles to their next appointment.

All staff members had their own role in the NPCC, but often that was not always followed due to the current shortage of staff. One MA was to be in the clinic by 7:30 a.m. to help

accommodate any needs by the physician and to prepare for the day. Unless the MA showed up early, there was no consistent early morning staff in attendance at the clinic, and the MD was left alone in the clinic with patients until a staff member showed up.

If an MA was available, having not been pulled to another department, he or she was responsible for prepping charts for the provider before patients were seen that day for their appointment. Another option was that the manager would step in to help the provider in the clinic by 8:00 a.m., even though she was not currently certified as an MA. The third MA was strictly in charge of checking patients into the clinic and setting up their appointments. During phone encounters, patients were not told to bring in a list of medications to their next appointment date. Not only did the provider do most of her own billing for services on her off-time, but she double checked that all documentation related to medications and patients' office visits by the MAs was correct. Therefore, an up-to-date information technology (IT) system software was a priority for this clinic to be able to function effectively and efficiently. The lack of such created problems with documentation in real time, because the NexGen software was outdated and the Wi-Fi was not always functional in the building.

Due to the shortage of staff and high turnover of MAs, other processes had gaps or inconsistencies. For example, regarding medication management, at times patients were asked by the MA to list their medications and again by the provider when she saw the patients. The medication reconciliation that took place typically did not include a review of medication allergies, seasonal allergies, ADEs, herbal supplements, or over-the-counter medications. That initial documentation by the MA was done by paper and pen on a Wellness Questionnaire form. If time permitted, the provider reviewed the medication list hoping the patients remembered what they were taking, including the name of medications, time, dosage, route, frequency, and any

supplements, herbs, or over-the-counter medications. That process was not always completed if there was a crunch for time. An average of 15% of patients overall had a complete medication reconciliation done on the same day after the patients left the clinic. For example, it was possible that only refills would be addressed and not a complete medication reconciliation. For the most part, the provider took the patients' word that they were remembering the correct information especially if the patients did not bring in their medications to their appointment or bring in a correct medication list. The provider usually had a laptop where she input information into the computer if the wireless modem was working. Otherwise the provider resorted to documenting by hand using paper and pen until the Wi-Fi was functioning appropriately, decreasing accuracy of medication recording and clinical documentation. Small notes were kept on paper to remember what was done for the patients on that visit for documentation later. There was no dictation system in place either.

There had been several cases where patients aged 65 years or older called the NPCC raising concerns regarding ADEs, polypharmacy, and incorrect medications prescriptions ordered after discharge. Those calls for assistance were linked to gaps in the processes of medication management. Da Silva and Krishnamurthy (2016) defined ADE as a harmful event that resulted from a medication error occurring during any process of patient adherence, ongoing monitoring, prescribing, transcribing, and dispensing. In any given week, about 7% of ADEs were documented as happening in the clinic by the DNP student. In the NPCC, when the provider encountered those situations, she communicated to the patients to stop the medication, come in for a walk-in appointment, or go to the emergency room. No formal procedure for screening for polypharmacy or ADEs was in place.

In a systematic review by Masnoon, Shakib, Kalish-Ellett, and Caughey (2017), it was noted that several articles defined polypharmacy numerically without taking into account the appropriateness of the regimen of therapy or the rationale for those medications. They stated that when the medications were appropriate for the patients' chronic conditions, under practice guidelines, the numerical definition of polypharmacy became irrelevant. Noting the increase of patients taking larger numbers of medications nowadays, all medications should be assessed for potential harm (i.e., alone or with other medications), why they were prescribed, and if there were more benefits than risks (Masnoon et al., 2017). With that being said, Masnoon et al. noted that 46.4% of studies reviewed defined the term polypharmacy as patients taking five or more medications (i.e., prescription or over the counter). For this quality improvement project, five or more medications prescribed to patients was the criteria used to identify patients who were at risk of a potential harmful ADE that could occur, by comparing the patients' admission medication list to the American Geriatrics Society (AGS) 2015 Beers Criteria. At baseline, 47.6% of patients over age 65 years had contraindicated medications that were listed on the Beers Criteria medication list.

The AGS 2015 Beers Criteria list of medications is a valuable tool that should be utilized for quality improvement regarding patients 65 years and older in the NPCC. It is not intended to be used as a list for making explicit decisions, but rather to support the provider's good judgement and implemented with flexibility (Steinman et al., 2015). The provider should be mindful of using the list to identify medications that may be potentially unfavorable or harmful to older adults. If appropriate, other nonpharmacological alternatives should be considered while using common sense and identifying potentially inappropriate medications for older adults (Steinman et al., 2015). Therefore, the AGS 2015 Beers Criteria medication list was used as a

starting point further to investigate elderly patients' medications, especially if they had multiple chronic conditions, five or more medications, and multiple providers.

Patterns

The staff had expressed interest in optimizing medication management to increase patient safety and preventing harm by decreasing medication errors and ADEs. An assessment tool used was the Primary Care Practice Patient Cycle Time by the Dartmouth Institute Academy (Godfrey et al., 2004). It gave the staff an idea of how long patients were seen from the time they checked into the clinic to the time they exited since that was a dimension of the clinic. The average waiting room time was about 20 minutes. The quickest appointment, when seen by the provider, took 10 minutes and the longest appointment took a total of 2 hours. The average should have been approximately 15 minutes for assessments and 15 minutes for documentation per the NPCC target allotted time, which ideally would allow for incorporating a medication review within the visit.

On a weekly average, 24.7% medication error follow-up appointments were related to medication issues. On average, 19.7% of phone calls were from patients who did not understand their medications. That could be avoided if the proper medication education was given to the patients during their appointments. Responding to patients took up a lot of the staff's time and needed to be addressed for patients consistently to avoid unnecessary calls to the clinic. Overall, that impacted the clinic's reimbursement payments, the provider's performance, and patient outcomes.

In 2017, the Quality Payment Program required CMS legally to begin an incentive program under two models: Merit-based Incentive System (or Advanced Alternative Payment Models). Most individual and small practices such as NPCC fall under Merit-based Incentive

System, which adjusts provider payment under four performance categories: quality, cost, operability, and quality improvement programs, several of which are potentially impacted by medication errors (Judge-Ellis, 2018). CMS implemented tools to measure quality of care, processes, outcomes, organizational structure, and patient perceptions (CMS, 2018b). The goal was to incentivize the provision of safe, effective, patient-centered care in a timely manner. Specifically, Meaningful Measures assessed high priority issues in patient care that were vital to quality outcomes (CMS, 2018b). The provider would receive a positive, negative, or neutral pay adjustment based on the information submitted related to Medicare's Part B payments that were covered under the Physician Fee Schedule or professional services provided (CMS, 2018a).

One dimension of the clinic's problems with medication management was attributed to information recording and documentation, specifically, the lack of a dictation system and no current IT system software in place for efficient and effective communication between staff, which would meet the Medicare Electronic Health Record Incentive Program of 2019. Also, there were no billing or coding personnel, computers were not working in patient rooms, and there was insufficient staff to assist the provider with treatments or procedures. The clinic was in the process of implementing a new program for EHRs to meet Medicare standards in order to reduce healthcare costs and time, improve communication with other providers and healthcare quality, prevent medical errors, improve consistency, decrease paperwork, and provide early detection and prevention of infectious diseases (Medicaid.gov, 2018). More staff training would need to be done to understand the new EHR computer software and to be able to do a thorough medication reconciliation for all patients during their appointment.

In addition, it was observed that none of the patients were asked to bring in a list of medications when scheduling an appointment, never were medications checked against a current

pharmacy list, and only 15% of patients on any given day were told over the phone to bring in their medications prior to their appointment. It was usually left to the MA to make changes to the patients' medications list to update any current information. More than 75% of the time, the MA or the provider did not do an electronic medication reconciliation until some hours after the patients left the clinic. That could leave room for errors if the information was not documented immediately, and information could be left out if the patients had already been discharged.

The NPCC used a software called NexGen to input healthcare information in the patients' medical record. Many features were not operational (e.g., automatic charges to patients and provider-to-provider communication) with the current software being used. The current EHR in the NPCC had a skeleton documentation software to save patients' health medications, allergies, and information on their medical record. An electronic medication list was not available to print out without printing an initial master progress note. When the initial progress note was printed, the medications that were seen were the initial medications that were documented on the EHR when the patients had their first appointment at the NPCC. A limited electronic prescription function sent new prescriptions to the patients' choice of pharmacy, but not all pharmacies were available through the EHR at the NPCC. For example, military personnel had to hand carry their new prescriptions from the NPCC to the pharmacy located at the military base.

Another issue identified related to the interface of provider, pharmacy, and patients. Often, staff and patients were frustrated with the inconveniences of having to be in the middle between the provider and pharmacy regarding an incomplete and inaccurate medication list. Patients called daily about different concerns about their medications: refills, prescriptions not sent to their pharmacy on time or not at all, discrepancies about the new prescription ordered, reminders on how and why they needed to take their medications, and ADEs. That was not cost

effective or high-quality care locally, but also such instances nationwide cost U.S. consumers millions of dollars by not meeting national standards. That affected the patients' travel time, hours of work, and mental health and social life, and increased their costs. Therefore, several patients did not return for care at the NPCC, likely because of those inefficiencies. That also created stress among the staff, as they not only continued to do routine care for the patients, but also repeatedly corrected any mistakes by interrupting the provider for medication management. That contributed to high staff turnover in the clinic.

In the midst of the DNP project, the goal of the organization's administration staff was to install All Scripts, which was an EHR upgrade with more facilities for keeping track of patients' information including their medications. However, there was no funding for installation, and the clinic continued to use NexGen software. Typically, the NPCC provider spent an extra 15 hours of her own time every weekend catching up on patient charges and reviewing medical records. At the end of this project, the staff was still awaiting the new program software and training.

The microsystem assessment results showed that a medication reconciliation was not being completed on most patients during their initial visit or updated after their following visits. Fifteen random charts were reviewed to gather information. They were compared against the current EHR in the NPCC and all patients' pharmacy record medication list. Findings showed many discrepancies in the patients' medical records, and that led the DNP student and the NPCC to establish a central project purpose of increasing patient safety by decreasing medication errors within a 3-month period, and later extended to a 5-month period. Specifically, the assessment results showed that 14 of the 15 records had a combined total of 45 discrepancies. That indicated that 93% of the medical records reviewed had incorrect documentation. The five medications most frequently prescribed to those patients were Duexis (45%) for pain, Metformin (35%) for

diabetes, Melatonin (25%) for sleep, Lisinopril/hydrochlorothiazide (20%) for hypertension, and Vascepa (15%) for high triglycerides.

In order to determine the extent of ADEs and medication contraindications in the clinic's elderly population, a survey of patient records was completed. Thirty percent of the NPCC clinic's adult patients were 65 years and older. Ten patient EHRs were assessed within a 3-month period at the NPCC. Those elderly patients were evaluated for possible ADEs, polypharmacy, how many providers they were currently consulting, and how many chronic conditions were present on their problem list. Within the 3-month period, there were 12 phone calls and nine in-person visits related to ADEs among all elderly clients. All 10 patients sampled were on a 7- to 12-medication regimen, including over the counter and supplements, which fit the definition of polypharmacy. The patients had from two to five providers they were actively consulting. Their problem lists included between seven to 11 diagnoses. That was problematic especially if the communication was not effective between community providers and local pharmacies, and further made worse by an outdated software system like NexGen.

It was also noted that inconsistencies about asking patients what their allergies were caused two mistakes within a 1-week period. The outside pharmacist caught other mistakes prior to dispensing medications to patients and called the clinic for clarification with the provider. The rest of the staff also bypassed medication errors and never addressed them after the physician left the room. Medication discrepancies were also caught after patients had left the clinic.

Another problem found was duplicate medication orders for the same drug due to earlier prescriptions not being discontinued in the EHR. That meant patients were likely continuing to take the wrong medication or wrong dose. Medication errors were not being reported on patients' record within the NPCC. The manager was not addressing identified errors in order to improve

processes. In short, there was no effective quality improvement reviewer. Medication errors were only immediately corrected by the physician after an error had been verbalized to her. Therefore, staff training needed to be implemented to correct future medication errors. For the process of reporting the event in order to minimize shaming and guilt, the staff would need not to be reluctant to hold themselves accountable or to speak up and address the problem.

There were no system quality improvement processes being used. That could cause serious ADEs, sending patients to the hospital.

In the assessment, several components were compared between the NPCC patient records and those of the community pharmacy regarding the medication reconciliation done on 15 patient EHRs. Findings on five dimensions of medication management were assessed that included presence of a correct medication list (1 record); listing of a recalled medication prescribed (1 record); taking five or more medications (11 records); currently seeing two to six providers (13 records); and finding 45 discrepancies (14 out of the 15 patient records). Also, five EHRs had duplicate medications found. In summary, numerous inconsistencies in the medication records in patient records compared to local pharmacies showed a potential for medication errors and ADEs in patients of the NPCC.

Problem Identification

Project Purpose

The purpose of the project was to prevent further medication errors associated with patient harm and to improve patient outcomes. The problem of insufficient medication management was identified at the NPCC during the processes of gathering data on the 5 Ps (i.e. purpose, patients, professionals, processes, and patterns) and utilizing the Dartmouth microsystem quality improvement curriculum assessment guides, (Dartmouth Institute

Microsystem Academy, 2018; Godfrey et al., 2004). Appendix B includes a linear flow chart of the process of care, created by the DNP student after following each staff member and several patients throughout the clinic. The chart shows the order of processes experienced by patients from the time they entered the clinic to completion of the visit and represents the sequence that was typical at the clinic. A root-cause analysis showed significant gaps in medication management from the beginning of the process and continuing after the patients were discharged, many of which could have been prevented or changed.

Several problems were identified. Those gaps in the processes centered on difficulties staff and providers experienced in trying to gather information about the patients' medications and transcribing the correct list in the EHR. No patients were asked to bring in their list of current medications nor the medications themselves prior to their appointment. No information on the current medications' name, dose, route, or frequency was recorded. On any given day, only 15% of the patients brought a list on their own or brought the containers with the medications they were taking. Patients were not given a form to ask them to write down their current medications before seeing the physician. Instead, patients waited until the MA took them to one of the back rooms, where they were first asked what medications they were taking, and where there frequently was no query about any medication allergies, seasonal allergies, over-the-counter medications, herbs, or other supplements. The Wellness Questionnaire form for admission was used to write down the patients' current medications. That form included an insufficient space labeled Medications with only three lines provided below so that staff could fill in the medication name, dose, frequency, route, and allergies. That space was frequently left blank. Documentation of patient allergies was often absent. Furthermore, duplicate medication

orders for the same drug due to earlier prescriptions not being discontinued were found in the EHR.

Since chronic diseases accumulate as the people get older, the risk for polypharmacy in the geriatric population is high. Onder and Marengoni (2017) and Gleason (2017) indicated several things to do if patients were taking many medications due to their illnesses or were not necessary to take anymore. For example, primary care practices and patients should always keep an accurate and current list of medications, include all over-the counter medications and supplements, and often discuss the medication regimen with the provider, and the patients should avoid suddenly stopping prescribed medications without consulting with their provider first. Therefore, patients should be included in their care by letting them know they are also part of the team when it comes to their care.

Utilizing the Beers Criteria to identify contraindicated medications would contribute to improved outcomes in the elderly. The Beers Criteria was not being applied to the medication lists of patients 65 years and older in the NPCC as 47.5% had contraindicated medications on that list. According to the assessment information gathered on the processes of the NPCC, a medication reconciliation was not being done correctly. Therefore, polypharmacy was a serious problem because the assessment of the NPCC showed all elderly patient charts had at least seven medications. The rate of polypharmacy in the United States for patients 65 years and older is 40% (Rose, Fischer, & Paasche-Orlow, 2017).

On the basis of an analysis of the assessment data, a set of objectives and strategies was developed. The purpose of the quality improvement project was to increase patient safety by decreasing medication errors within a 5-month period. The focus of interventions was on the

introduction of medication reconciliation processes and Beers Criteria screening of elderly patient medication records.

Objectives

The two main objectives were identified to improve medication management. Objective 1: To improve the consistency and completeness of medication documentation from a baseline of zero for three indicators to 50%. The indicators were increased accuracy of patients' medication list, increased involvement of patients in medication reporting, and improved staff ability to conduct a medication reconciliation. Objective 2: To reduce potential medication complications due to polypharmacy, ADEs, and drug-drug interactions through a 50% improvement in four indicators: documentation of allergies, identification of contraindications from medications on the Beers Criteria list for patients 65 years and older, polypharmacy, and patients' understanding of medications upon discharge.

Summary of the Evidence

The American Pharmacists Association and the American Society of Health System Pharmacists reported many healthcare systems were searching for interventions to improve patients' quality of life, lower hospital readmission rates, and reduce medical costs because there was no current medication reconciliation model in place to follow (as cited in Armor, Wight, & Carter, 2016). The majority of safety practice standards or guidance regarding medication safety comes from the AHRQ, TJC, and the IHI (Steckowych & Smith, 2018). TJC (2018) expected that medication reconciliation be done with all patients at every visit. That certainly was not being done in the NPCC or in many other primary care clinics according to the literature. Even though studies showed an increased awareness regarding medication safety, there was little understanding about the preliminary events that should take place regarding interventions and

workflow processes to reduce medication errors in primary care clinics (Steckowych & Smith, 2018). Armor et al. (2016) found several factors that increased hospital readmissions after discharge that included medication discrepancies, failure to identify ADEs, patient nonadherence, and time between hospital discharge and primary care follow-up. For that reason, medication errors had increased by two thirds of adverse events posthospital discharge related to medication discrepancies (Armor et al., 2016). There is a need to improve the role primary care practices play in mitigating medication error risk. Doing a proper medication reconciliation every time patients are seen for their appointment will improve patient outcomes.

Toolkit

The AHRQ (2012a) created a step-by-step tool, MATCH Toolkit, to help implement an evidenced-based medication management process to decrease medication errors that could be utilized in primary care settings. A recent study in a rural primary care clinic adapted the MATCH Toolkit to reduce medication errors and to examine the internal workflow, processes, and staff responsibilities (Jarrett, Cochran, Baus, & Delmar, 2019). During their study, a quality improvement process with nurses, reception staff, administration, technology, clinicians, and researchers defined the leadership team. Their role was to identify the strengths and gaps and to address them. They were able to achieve their goal by identifying charts with inaccuracies using the toolkit. Results indicated that 40% of the 38 charts audited were inaccurate or had incomplete medication lists. Using the MATCH Toolkit helped to show that 82% of patients did not recognize the importance of reporting over-the-counter medications. The MATCH Toolkit also provided important information regarding transition of care, workflow in the clinic, caregiver perspectives, and challenges for providers and nurses related to bringing about awareness to medication reconciliation. Inconsistency in the care processes; lack of defined roles and

responsibilities of staff; miscommunication among the patients, staff, and community; and how staff conducts a medication reconciliation in their facility all affects how medications gets documented into the patients' EHR. From there, the medication list becomes a semi-permanent record until it is changed again or updated. Depending on how accurate the medication reconciliation is, it can have an effect on the patients' quality of care and safety (IHI, 2019). The Jarrett et al. study (2019) demonstrated that using a toolkit can increase the consistency and quality of medication reconciliation in a primary care practice.

Nurse Practitioner and Nursing Role

Based on the literature findings and WHO (2016), primary care services have increased in patient load and are the main entry point for where care happens. Poghosyan, Liu, and Norful (2016) concluded a cross-sectional study showing nurse practitioners could assist with the demand for primary care by stepping into the provider role. Nurse practitioners with independent practice and with the proper organizational support have shown a significant positive result (p = 0.036) for meeting the demand and responsibilities as providers compared to primary care practices without nurse practitioners (Poghosyan et al., 2016). For example, one study regarding management of medication reconciliation led by nurse practitioners whose goal was to reduce medication discrepancies in an elderly population with cardiac problems demonstrated that nurse practitioners helped significantly reduce the total number of discrepancies from an acute care setting to home (Young, Barnason, Hays, & Do, 2015). Therefore, the WHO (2016) set up the Safer Primary Care Expert Working Group and published their series Medication Errors: Technical Series on Safer Primary Care to help guide practitioners working in primary care clinics.

A comparative nonrandomized study by the Mayo Clinic showed that patients and staff education could significantly improve medication reconciliation in primary care clinics (as cited in AHRQ, 2018). The interventions included participation and collaboration of patients with the clinic's staff, communication with patients so that patients were aware to bring their current medications to every visit, and staff training on IT to be able to use the appropriate tools. Reduction in medication discrepancies results showed a 50% decrease (AHRQ, 2018). Therefore, implementation of a successful medication safety program requires communication, consolidation, and collaboration of the key stakeholders in order for all the pieces to come together (Khalil & Lee, 2017). Nurse practitioners and registered nurses are in a position to impact the assessment of patients' medication, their recording, and the prescribing practices within a primary care practice. Improving medication management is critical to nurse practitioners' safe prescribing, and thus working collaboratively with staff at all levels is an effective approach to reducing errors and poor patient outcomes.

Adverse Drug Events and the Beers Criteria

The National Electronic Injury Surveillance System–Cooperative Adverse Drug Event Surveillance gathers data from emergency room (ER) visits due to ADEs. A study of encounters related to ADEs that were attributed not only to prescription medication, but also vaccines and nutritional supplements, happened from 2013–2014 (Shehab et al., 2016). The study included 42,585 ER visits in which 4 ER visits per 1,000 patients (95% confidence interval) each year were related to ADEs that included polypharmacy. The drugs most prescribed were anticoagulants (17.6%), antibiotics (16.1%), followed by antipsychotics and diabetic medications (13.3%), and warfarin accounting for 85.7%. Most were female (57.1%) patients 65 years and older (Shehab et al., 2016). The Beers Criteria medications most likely to avoid in patients 65

years and older were implicated in 1.8% of the ER ADEs that happened. Anticoagulants (28%), followed by diabetes agents (19%), were the most frequent category of drug prescribed with 95% confidence interval (CI) (Shehab et al., 2016).

The Health Quality Innovators (2018) created a simplified Medication Safety Toolkit with website links to help providers reduce ADEs and to improve medication safety. It focuses on promoting tools for patients taking several medications in order to prevent polypharmacy. The Medication Safety Toolkit has been validated by the Quality Innovation Network as part of the Quality Improvement Organizations to help bring awareness and improve medication safety while engaging patients and their families. They also include links to the Beers Criteria list for high-risk populations like the elderly, aged 65 years and older. The AGS 2015 designed the Beers Criteria to decrease the exposure to possibly inappropriate medications, to encourage providers to use certain prescribed medications with caution, and to be alert to drug-disease interactions that may cause ADEs that could be avoided (Hartford Institute of Geriatric Nursing, 2019). The Beers Criteria list is designed to support, not contradict, common sense when a provider reconciles patients' medication list. It is a tool to help educate not only providers, staff, caregivers, and older adults but helps guide and prevent providers from prescribing potentially inappropriate medications that could possibly cause harm and ADEs.

Several research studies that support the utility of the Beers Criteria list have been published. A retrospective cohort study was done by Yusupov, Chen, and Krishnamachari (2017) to gather information on 158 patients with Parkinson's disease. It assessed patient falls with consideration to their medical diagnoses and medications they were taking. Patients taking medications that were on the Beers Criteria that potentially contributed to a history of falls and fractures was significant ($p > 0.04$) in the study done before and after implementation of the

Beers Criteria. They also recommended that institutions implement an EHR-based intervention to help decrease medications that could be high-risk. A systematic review was completed by Skaar and O'Conner (2017) who gathered information on Medicare and Medicaid beneficiaries who were prescribed medications on the Beers Criteria list. Their findings were clear that almost half of all their dental care visits included one (56.9%) or two (28.3%) prescription medications on the Beers Criteria list. Therefore, their results implied that clinicians should become more aware of potentially inappropriate medications in that vulnerable population (Skaar & O'Connor, 2017).

A study by Ble et al. (2015) in the UK took three cross-sectional samples from primary care EHRs in 3 separate years. Their sample included 13,900 patient medical records for those 65 years and older. They implemented the 2012 Beers Criteria showing that one third of those patients were exposed to high risk medications, and women and those with polypharmacy (10 medications or more) already in their EHR were at greater risk for exposure (Ble et al., 2015). When the Beers Criteria was applied, the most prevalent inappropriate medication was amitriptyline (6.4%), followed by benzodiazepines at (4.9%), and doxazonsin (4.4%), while NSAIDs, a category of seemingly benign over-the-counter medications implicated in serious bleeding and renal complications, were used less frequently (3.1%) (Ble et al., 2015).

Anticipated Outcomes

The anticipated outcomes from addressing the two main objectives above included using the MATCH Toolkit (AHRQ, 2012a) by tailoring it to the NPCC and addressing several gaps in the processes of medication reconciliation.

Anticipated Outcomes for Objective 1

Staff would improve the consistency and completeness of medication documentation

from baseline of zero to 50% in the following 3 indicators:

- Fifty percent of the patient charts would have a current medication list, signed off by the MA and physician.
- Fifty percent of the patients would receive an educational brochure and be informed of the medication quality improvement process.
- Fifty percent of staff would achieve at least a 90% on the post-test regarding their knowledge of a proper medication reconciliation, staff's roles and responsibilities, and staff communication with each other and accountability.

Anticipated Outcomes for Objective 2

The project would reduce potential medication complications due to polypharmacy, ADEs, and drug-drug interactions through achieving a 50% rate on each of four indicators:

- Fifty percent of the records of patients 65 years and older would be reviewed and identified for contraindications of medications included on the Beers Criteria list.
- Fifty percent of patients would have allergies documented in the EHR.
- Fifty percent of patients would have polypharmacy alerts documented.
- Fifty percent of patients would be able to verbalize an understanding of their medications prior to leaving the clinic.

In order to achieve those outcomes, a comprehensive intervention that addressed medication management was planned and introduced to the NPCC. It included introduction of a medication reconciliation process using the MATCH Toolkit and a system of documenting medication contraindications using the Beers Criteria, as well as allergies and polypharmacy.

Methods

Medication management continues to be a problem that affects patients throughout the continuum of care in the healthcare system. Medication management for patients and provider stakeholders was a major concern such that a national goal has been implemented to bring about major changes at different levels (e.g., national, state, and organization). The NPCC aimed to provide excellent care by bringing about changes to areas they were lacking related to developing a proper medication reconciliation that was an evidence-based process. Therefore, a quality improvement project was implemented to address the gaps in the NPCC's day-to-day processes and to apply the best solutions tailored to the clinic.

A review of the literature has demonstrated that medication reconciliation can be complex since it follows patients throughout their continuum of care in different settings with different providers as they seek medical attention to address their health needs. The literature has shown that, due to preventable medication errors and unfavorable patient outcomes regarding proper medication management, a process needs to be in place or the quality of care of the patients is likely decreased. A current EHR software needs to be implemented. A quality improvement evidence-based program should be in place, which addresses a properly defined medication reconciliation process to include identifying susceptible points during admission, transfer, and discharge, and methods to decrease preventable ADEs (IHI, 2018). Therefore, the following interventions were developed to address each objective.

Project Interventions and Evaluations

The quality improvement project for NPCC was created to improve medication documentation and accuracy, to improve patient participation on how to manage their medications, to increase staff medication reconciliation knowledge, to decrease medication

complications prior to being prescribed, and to assess all medications for patients 65 years and older using the Beers Criteria. Six intervention tools were implemented: One Source Medication List, visual signs and staff badges, staff templates, Beers Criteria pocket guide, patient brochure, and the Speak Up quality improvement form. Tables 1 and 2 show the specific interventions and how they were evaluated.

Table 1

NPCC Project Objective 1: Interventions and Evaluations

Staff will improve the consistency and completeness of medication documentation from baseline of zero to 50%.		
Objective Sub-elements	Intervention	Evaluation
1a. Increase the accuracy of patients' medication list	a. Update EHR with current medication list.	a. 50% of charts have current medication documentation and signed off after completion on One Source Medication List form by the MA and MD.
1b. Increase involvement of patients in medication reporting	a. Visual information signs and educational brochure given to patients on the first encounter. b. Front desk clerk alerting patients to bring in the current medication list every encounter via phone or in-person.	a. 50% receive a patient educational brochure. b. 50% of patients coming in are informed of the new medication quality improvement process.
1c. Improve staff's ability to conduct a medication reconciliation	a. Give staff a written pre-test on medication reconciliation. b. Conduct three one-half hour staff training sessions regarding the topics: • Complete medication reconciliation process on the One Source Medication List form • Roles & responsibilities of MAs & MD related to ADEs and Beers Criteria list • Staff communication/documentation and Speak Up quality improvement form	a. All staff achieve at least 90% on medication reconciliation written post-test. b. 50% reduction in Speak Up quality improvement incident reports.

Table 2

NPCC Project Objective 2: interventions and Evaluations

Reduce potential medication complications due to polypharmacy, ADEs, and drug-drug interactions through achieving a 50% rate on each of 4 indicators: documentation of allergies, identification of contraindications from medications on the Beers Criteria list for patients 65 years and older, polypharmacy, and patients' understanding of medications upon discharge.

Objective Sub-elements	Intervention	Evaluation
2a. Identify patients with medication contraindications who are 65 years and older	a. Medical assistants identify patients 65 years and older. b. Medical doctor reviews Beers Criteria list for elderly patients.	a. 50% of patients 65 years or older are identified by having a check mark on the One Source Medication List form. b. 50% of the records of patients 65 years or older are reviewed for contraindicated medications by MD.
2b. Increase documentation of patient allergies	a. Medical assistants to initially identify and document medication allergies. b. Medical doctor reviews allergies. c. Medical assistant corrects all discrepancies using the One Source Medication List in the EHR after patients are discharged. d. Staff uses the Speak Up quality improvement incident report form to improve the medication reconciliation process.	a. 50% of patients have allergies documented in the One Source Medication List by MA. b. MD reviews allergies with patients 100% of the time in every visit. c. 50% of the medication discrepancies are corrected after the patients leave the clinic. d. Staff uses the Speak Up incident report form 100% of the time when an incident with the medication reconciliation process is not completed by the end of the shift.
2c. Increase documentation of polypharmacy (i.e., 5 or more medications)	a. MA and MD identify if patients are currently taking 5 medications or more.	a. All polypharmacy alerts are documented 100% of the time on the One Source Medication List.
2d. Increase patients' understanding of their medications upon discharge	Medical assistant will: a. Ask patients if they have any questions regarding their discharge medication list. b. Give patients office contact number. c. Tell all patients to bring current One Source Medication List back on their next visit with any new medications they are taking prescribed by other providers.	a. 50% of patients verbalize understanding of how to take their medications at home. b. 50% are told what the office number is on the patient medication brochure given on admission. c. 50% are given a copy of the One Source Medication list on initial visit and when renewal of it is needed.

One Source Medication List

Several tools were created to implement the project. Objective 1 had four primary interventions that included the One Source Medication List, promoting the project, staff templates, and staff training. The One Source Medication List was a form created and tailored to the NPCC, as the patients' medical home. It was intended as the central medication list to be transcribed and used as the only place where medications were compiled even as patients went outside the clinic to see other providers. Ideally, when patients initially checked into the clinic, the One Source Medication List (Appendix C) would be given to them to fill out in the waiting room. It included patient demographics, including age, if 65 years or older, and a cautionary written reminder after the fourth medication transcribed (an indicator of polypharmacy) used by the staff to alert for adverse events. That would cue the provider to check the medications side by side with the Beers Criteria pocket guide. After patients would be called to the room by the MA, the staff member would review current allergies; medications to include dosage, route, and frequency; and any supplements, herbs, or over-the-counter medications. The provider would enter the exam room and use a template created by the DNP student to review the list of medications for Beers Criteria contraindications. At the end of the visit, the provider would ask all patients if they had any questions about their medications and how to take them. After patients exited the exam room, they would take their current One Source Medication List form to the discharge area, where the MA would make a copy of the current medication list to reconcile the medications on the EHR. The original copy of the One Source Medication List form would be given back to the patients to utilize and update the form whenever they were seen in every healthcare facility they visited until they came back to their next appointment at the NPCC. Since there was not a universal EHR software locally or that crossed state boundaries, it was hard to

communicate with other providers and to transfer the most current medication list of patients. Therefore, the purpose of the One Source Medication List was to assist patients to provide that information to other providers.

Promoting the Project

Visual signs promoting the new quality improvement project were placed in the patient waiting area and staff workstations where patients could see them easily. Badges were made for all staff members so that patients were prompted to ask about the new medication quality improvement project. That helped communicate to everyone entering the clinic that changes were happening to improve their quality of care.

Staff Templates

Cueing templates were made and tailored specifically to all staff members depending on their roles and responsibilities. Ideally, the front desk MA template would notify all patients who called or walked into the clinic about the quality improvement project, give them the One Source Medication List form to fill out, let them know to bring in their current medications to every appointment, and encourage any questions the patients might have. The front desk MA would then give a report about the form the patients filled out and if they brought their medications with them to the visit. The MA template was to ask more specific questions when patients were in the exam room. That was where medication reconciliation first took place. The MA would ask if the patients were able to fill out and complete the One Source Medication List form. If not, the MA would assist at that time. A second reminder to bring in their medications to every visit would be verbalized at that time. The patients would also be notified that the new form should be taken to every provider they saw to update the One Source Medication List form, which would keep their medication list current. Again, questions were encouraged at that time before giving a report

about the patients' medications to the provider. The provider then would use another template and ask the patients if their medications were current, if they had any side effects to the medications they were taking, if the patients knew how to take their medications appropriately, and, before leaving the room, the provider would ask if they had any questions regarding their medications on their list or current prescribed by the provider. At that point, the provider would escort the patients out to see the discharge MA. At discharge, the MA had a template that would verify if the patients had any questions about their medications. If they did, they would be referred back to the provider for further education. If not, the discharge MA would ask the patients to bring in the One Source Medication List to every appointment and to keep it current. The NPCC's office number and patient brochure would be provided in case the patients had further questions after they left the clinic. Finally, they would thank the patients for their involvement in the new quality improvement project.

Staff Training

At the beginning of the project, three training classes were scheduled for 30 minutes on each topic to educate the staff. The teach-back method was used to help the staff to understand their role. The topics consisted of how to do a proper medication reconciliation according to the AHRQ (2012b) MATCH Toolkit, staff roles and responsibilities, and how to report any mistakes regarding medication management for quality improvement. A pre-test was created to test the staff's knowledge before the training sessions, and the same test was used after the training sessions were completed.

Beers Criteria Pocket Guide

The Beers Criteria pocket guide from the American Geriatric Society (2015) was downloaded, copied, and laminated. They were placed in each patient exam room for the

physician to access when asking older patients about their medications. The physician was cued to assess the medications further for potential drug events because it was also noted in the front page of the One Source Medication List form prior to the provider speaking to the patient.

Patient Brochure

A patient brochure was made to educate patients about the importance of keeping their medication list current. It encouraged patients to be involved in keeping their medications updated and not to depend on clinic staff and EHRs to maintain current medication lists since their medication list could change at any point of care. It let the patients know to bring in their medications to all their appointments, keep them up to date and recorded on one single list (i.e., One Source Medication List form), carry their list with them, and let others know where to find their current list.

Quality Improvement Form

A Speak Up incident report form was created and tailored to the NPCC to improve the quality of services provided to patients and their care. The incident report form was utilized to report any medication discrepancies, mistakes, or human error made when transcribing to the EHR, or other issues to improve the success of the clinic. The incident report forms were intended for one-to-one counseling so that the staff person could understand the mistake. The form would also be used to retrain and educate staff members about the current NPCC policies and how to avoid mistakes in the future by covering gaps that could cause a medication error.

Population and Participants

The NPCC was a primary care clinic that was detached from the hospital system under which it fell. It was located in a south Texas metropolitan area and saw mainly adult patients. There were 324 patient visits in a 5-month period from January 2019 through June 2019. That

was the period in which the project intervention, the introduction of a new medication management program, was implemented. After the initiation of the medication management interventions, 1,247 patients' EHR medication lists were reviewed and compared to the Beers Criteria list. All five staff members participated in the education component and in implementing the new quality improvement program. The DNP student was the facilitator of the project. Patient demographic characteristics and other baseline data were obtained and shown in Table 3. A preintervention sample of 45 EHRs was reviewed to gather baseline data.

Table 3

Demographic Characteristics and Other Baseline Data

Patient Demographics (Variables)	*N* = 45	%
Sex		
Male	26	58
Female	19	42
Age (Years)		
7–12	5	11
13–64	29	64
65 and older	11	24
Ethnicity		
Caucasian	28	62
Hispanic	14	31
African American	3	7
Primary Language		
English and Spanish	32	71
English Only	9	20
Spanish Only	1	9
Education Level		
12 years or less	7	16
2 years college or less	26	58
> 2 years of college	12	27
Insurance		
Medicare	11	24
Private Pay	4	9
Other	30	67
# of charts with missing data on medication list in EHR	42	93

Note. The total *N* = 45 (100%).

Data Analysis and Results

The start of the quality improvement project began with a meeting between the DNP student and physician to address the overview of the project, timelines for implementation of the tools, and the start and ending dates for the quality improvement project. This was a 5-month project that was guided by two main objectives. Data analyses consisted of descriptive statistics including counts and percentages. The results were organized according to the two objectives.

Objective 1 Results

The goal of Objective 1 was for staff to improve the consistency and completeness of medication documentation from a baseline of zero to 50%. At pre-intervention, none of the EHRs had a complete medication reconciliation (Table 4). Post-intervention, 15 of 150 EHRs had complete reconciliations done, indicating a rate of 10%. Patients who received a brochure and who were presumed to be informed about medication reporting rose from 5% during the pre-intervention phase to just 8% at the conclusion. Three training sessions were facilitated by the DNP student to teach staff how to conduct a proper medication reconciliation. Staff knowledge and ability to conduct a correct medication reconciliation increased from 0% to 100%. Objective 1 was not met because the consistency and completeness of medication reconciliation was not, on the whole, improved to 50%.

Objective 2 Results

Objective 2 aimed to reduce complications for patients 65 years and older using the Beers Criteria and other screening measures. Post-intervention, EHRs of patients older than 65 years (N = 1,247) were used to gather documentation of potential medication complications due to polypharmacy, ADEs, and drug-drug interactions that suggested possible contraindications with medications on the Beers Criteria. At baseline, none of 30 EHRs reviewed had any indications

that the Beers Criteria were reviewed. A review of 1,247 records revealed 37 or 3% had medication contraindications in the EHRs that were identified. None of those 37 patient EHRs had any modifications by the provider according to the Beers Criteria once those were identified. That was despite the DNP student's attempt to facilitate medication reviews by printing all EHRs and highlighting the medications in all patient EHRs for the provider to review. Nevertheless, the provider was unable to complete the review process. Therefore, contraindicated medications were not addressed (see Table 5).

Table 4.

Results for Objective 1

Staff will improve the consistency and completeness of medication documentation from baseline of zero on each of 3 sub-indicators to 50%.	Pre-Intervention		Post-Intervention	
	#	%	#	%
a. Increase the accuracy of patients' medication list. Benchmark: 50% will have medication reconciliation form on chart.	0 of 30	0	15 of 150	10
b. Increase involvement of patients in medication reporting. Benchmark: Staff provides educational brochure to 50% of patients.	10 of 200	5	50 of 600	8
c. Improve staff's ability to conduct a medication reconciliation. Benchmark: 50% of staff attend medication history taking class.	0 of 5	0	5 of 5	100

On the other hand, the rate of allergy documentation did improve. Comparing pre- and post-intervention results, patients who received discharge information about their medications improved from 37% to 63%. Overall, however improvements in the identification of risk factors for medication complications, including contraindicated medications, polypharmacy, and allergies, were modest. Therefore, Objective 2 did not meet the criteria of 50%.

Table 5

Results for Objective 2

Reduce potential medication complications due to polypharmacy, ADEs, and drug-drug interactions through achieving a 50% rate on each of 4 indicators: documentation of allergies, identification of contraindications from medications on the Beers Criteria list for patients 65 and older, polypharmacy, and patients' understanding of medications upon discharge.				
	Pre-Intervention		Post-Intervention	
	#	%	#	%
a. Identify all patients with medication contraindications who are 65 years and older	0 of 30	0	37 of 1,247	3
b. Increase documentation of patient allergies	12 of 180	7	16 of 90	18
c. Increase documentation of polypharmacy (i.e., 5 or more medications)	0 of 30	0	9 of 30	30
d. Increase patient's understanding of their medications upon discharge	11 of 30	37	19 of 30	63

Discussion

The primary goal for this quality improvement project was to increase patient safety by affecting patient outcomes. There were two main objectives that required interventions to bring about change to the clinic. Neither Objective 1 nor Objective 2 were met for this project because improvements did not increase to the established criteria, the reasons for which will be discussed.

In order to provide patients with optimal care and to protect them from medication complications, it is necessary for staff and providers to implement a proper medication reconciliation every time patients visit a clinic. Medication discrepancies continue to be prevalent at different points on the continuum of care, which can lead to rehospitalizations and mortality. This project aimed to increase the rate of medication reconciliation by teaching the

staff processes that would more accurately gather patients' medication history. To assure that every medication is accounted for and the patient history is complete, staff must be persistent and dedicated to gathering complete information at every visit. In this project, staff were unable to implement fully the medication reconciliation for a variety of reasons. Specifically, despite the DNP student efforts, there was no in-house champion, and new processes did not become a routine part of care.

A second aim was to reduce the risk of complications in the elderly by applying the Beers Criteria. This also requires a dedicated staff with sufficient time and resources to review records and make medication substitutions. Only 3% of the medical records were reviewed, which indicated the objective was unmet. While there were detailed plans for implementation, obtaining the buy-in of staff and provider was a key element that did not occur. As described, the DNP student approached the intervention by first assessing in detail the clinic's processes. She then developed a multi-focused intervention by beginning to offer education to the staff. Unfortunately, the staff was stressed for time and by their many responsibilities and, thus, unable consistently to implement the tools and strategies. New reconciliation processes were not carried out. Identifying a strong manager and leader who is responsible for outcomes is pertinent. Therefore, a dedicated champion is necessary for process improvements to be launched and successfully sustained.

Even though the post-test indicated that all staff seemed to understand the basic content regarding the information to be gathered for a medication reconciliation, it was not implemented according to evidence-based practice (Gleason, 2017). Nevertheless, successfully to implement a change, more than knowledge is necessary. The staff must involve the patients and be consistent in obtaining the medication information, and the provider must be involved when there are any

questions. More importantly, clinics need qualified personnel, such as licensed nurses, who have been trained to manage medication records to assist in the process. If not, gaps in the medication reconciliation conducted by an MA, and the information needs of the provider, will continue to pose risks for patients.

Initially, the readiness of the clinic for change was insufficient due to other processes that were unstable and created many barriers while trying to implement a proper medication reconciliation. Those made it harder to implement the change. For Objective 1, the staff was unable to increase the accuracy of the patients' medication list due to time constraints, high staff turnover, and lack of motivation. Patients did not want to get involved in medication reporting because it took too much time, and some reported that it was their understanding medications should already be documented in the computer. What they failed to understand was that there was a gap between the clinic software's ability to communicate effectively with outside providers. There was no one electronic record where all patients' health information was kept. The staff's inability to conduct a medication reconciliation was hampered by no consistency in the process or champion to help them adhere to the same routine.

For Objective 2, the DNP student was able to review all records of patients 65 years and older and to provide a Beers Criteria pocket guide by placing one in each room. The provider did not fully implement the review in her routine while doing patient care. The provider stated that it was not feasible without the proper staff and it would have to done by her after hours. She also indicated more current software that would flag those medications would be helpful.

Medication reconciliation is a complex process that involves some human judgement, which, therefore, allows some degree of human errors to occur. Standardizing the process is designed to reduce these errors. Even though information technologies nowadays are more

efficient at communicating with other providers and offer the potential for better documentation in patients' medical records, it takes time to gather patient information at every visit. Lack of institutional support, limited staff training and knowledge, and little time to gather patient information might have hindered obtaining a comprehensive medication history by decreasing staff buy-in and motivation. Buy-in is considered to be a commitment made by a person who actively participates in the task and facilitates the change to take place. According to French-Bravo and Crow (2015), it is imperative for organizations to understand that several initial factors (trust, staff engagement, balance of options, adequate time to engage in an initiative, and personal connection) are necessary for buy-in for a systematic change to happen. If there is a lack of buy-in, employees are more likely to go through the motions but not enough to get over the threshold to make change happen (French-Bravo & Crow, 2015). Since little of the quality improvement program was fully implemented, the chances are likely for medication errors to continue.

According to Young et al. (2015), the study of nurse practitioner-led medication reconciliation from hospital to home reduced the number of unintentional medication discrepancies in elderly adults prior to being discharged. This evidence-based quality improvement project was led by a nurse practitioner graduate student, which was entirely appropriate since effective medication prescribing was contingent upon a correct medication list. Further identification of Beers Criteria contraindications should be an inherent component of their provider role. The Young et al. (2015) prospective study documented the value of comprehensive medication reviews by nurse practitioner. Young et al. described a nurse practitioner-led medication reconciliation done on 200 cardiac patient records. The purpose was to examine how well nurse practitioners managed medication reconciliation during transitional

points in cardiac patients. Pre- and post-intervention periods led to improvement of patient outcomes and safety after discharge from the hospital in a rural community (Young et al., 2015). The nurse practitioners reviewed and checked the patients' medication containers brought from home against the patients' pharmacy and other providers. Medications of patients 65 years and older were also compared to the Beers Criteria list. The final product was that a current medication list was produced before presenting it to the patients' primary care provider and their local pharmacy, which prevented readmissions to the hospital and enhanced patients' safety. The average number of discrepancies per patient was decreased from 8.09 (± 6.75) preintervention versus 4.32 (± 5.66) after intervention (Young et al., 2015). This meant that those patients with at least one medication error decreased from 94% pre-intervention to 81% post-intervention (Young et al., 2015). Despite modest progress in the current project, patients will benefit if nurse practitioners persist in promoting robust clinic medication management systems.

Limitations

There were several limitations to this study. Although there was documentation in the literature about best practices regarding medication reconciliation, there were insufficient validation studies, creating a gap in identifying the exact problems to address. Several limitations pertaining to the implementation in the study also existed. First, this study was done in a clinic that was not ready for change in their procedures. The provider had no previous experience running a clinic on her own, and not all MAs were qualified to work in a clinic without being certified. This is why the addition of a registered nurse would have helped in proper medication reconciliation and championing the proposed changes. Furthermore, this project was done over a 5-month period with a small number of patients participating. The physician was only able to provide minimal assistance given limited staff and time. She expressed an inability to find time

to review charts for Beers Criteria list contraindications. As stated, the presence of a registered nurse or a full-time nurse practitioner might have assured that quality processes remained in place. Overall, the major limitation derived from an overall lack of direction from leadership and support from that small primary care clinic's larger system, which seemed to lack planning and implementation of quality processes for its clinics. Successful change would include using humanistic values or human behavioral science to bring about a large systemic change to an organization (Gratton, 2018). Those were the major contributors to lack of change as evidenced by results of Objective 1 and Objective 2.

Recommendations

Future recommendations for sustainability of a proper medication reconciliation process will require several factors to come together. One of the project's major positive findings was that the staff were initially motivated to bring about changes to the clinic and the MD was onboard to lead the team. A main reason the project failed to thrive was the lack of institutional support. That strained their resources, and staff were working around different processes that were already not functioning properly. For example, there was no consistency in telling patients to bring in their medication list or bottles, how a medication reconciliation was conducted, or how the staff communicated since there were no official meetings being held. That, in turn, later decreased the staff's motivation to continue implementing the tools for this project. One recommendation is for clinics implementing change clearly to identify a champion who can guide them continuously on these changes. A registered nurse who could supervise clinical and quality initiatives would be in a good position to lead the team. The nurse could work in tandem with a nurse practitioner who has a stake in accurate medication records, and together they could lay plans for sustaining the process change. Leadership buy-in at different levels was not seen in

this project, as evidenced by the staff deferring to previous inconsistent routines. A study was done regarding multi-level leadership buy-in and organizational readiness for change (Mccrae, Scannapieco, Leake, Potter, & Menefee, 2014). It showed that consistent leadership at different levels in the organization could influence the success of implementation and help promote the new changes with the staff with two major components: staff motivation and the organization's capacity to make the change. It also showed that tenured staff of over 15 years or more showed higher buy-in. It would benefit the NPCC to hire staff members to do specific tasks (e.g., billing, medical records, admission, and discharge), which would free other staff to focus on their clinical roles and responsibilities to decrease the stress level. It would also be an advantage to the clinic to invest in a current software system and a modem that could send signals to all computers in every room. Setting clear goals and having formal meetings and training sessions more often can increase the communication among staff and improve their motivation and morale.

Implications for Practice and Role of the DNP

Doctorally-prepared advanced practice nurses are capable of affecting patient outcomes by making changes to the ways in which care is being delivered. By being a facilitator and leading a healthcare team, the DNP student made changes to the knowledge levels of staff in a primary care clinic, which increased the potential for improved documentation of medications and their review. The DNP student used an evidence-based approach, implementing several tools at different points in the delivery of care to patients, from clinic admission to discharge. It is hard to say if there was an increase in patient safety and outcomes, since process changes were slow to take hold, and outcomes are often determined months or years after implementation. The Essentials of Doctoral Education for Advanced Nursing Practice was used as a guide to improve

medication management in this primary care clinic (American Association of Colleges of Nursing [AACN], 2006). The three main DNP Essentials addressed in this project were Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice, Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes, and Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health (AACN, 2006).

The Medications at Transitions and Clinical Handoffs (MATCH) Toolkit was used to implement the tools for the project using evidence-based practice (AHRQ, 2012b). This tool is helpful to nurse practitioners in that it states the steps and tools needed to implement an evidenced-based medication management process. The Dartmouth Institute Microsystem Academy workbook (Godfrey et al., 2005) was used to gather baseline information before implementation of tools using the 5 Ps. Those included the clinic's purpose, the patients, professionals, care processes, and patterns. An evidence-based approach, as suggested by AACN Essential III, was imperative holistically to assessing, diagnosing, and treating the gaps in the primary care clinic and, by using several tools, to affecting all stakeholders in the process. This project showed the DNP student that medication management is a continuously changing process that requires a community effort that includes the patients and all providers they encounter (Essential IV). To close the gap in the community and to increase continuity of care, there should be one system of software that both pharmacists and providers can access across the United States (Essential VII). In primary care clinics, nurses who are qualified to do a proper medication reconciliation should be employed. Improving the processes of medication management is not only critical to the safe practice of physicians and nurse practitioners, but key to the quality of care and health outcomes patients have a right to expect from their local primary care clinic and

from the larger healthcare system. Nurse practitioners who have previous nursing experience with medication management and are hired in primary care clinics can have an overall positive impact not only on directly affecting patient outcomes but also on patient safety.

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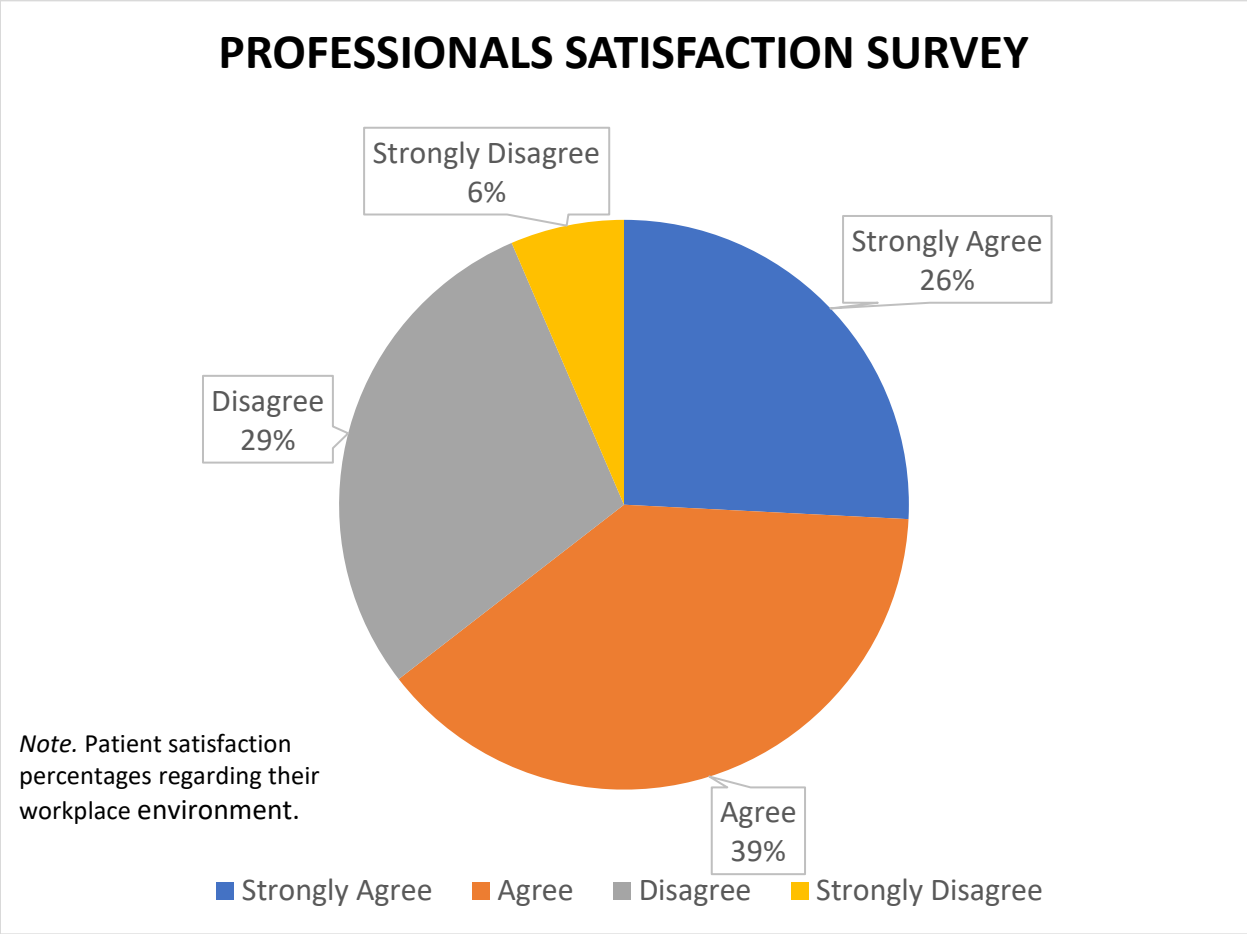
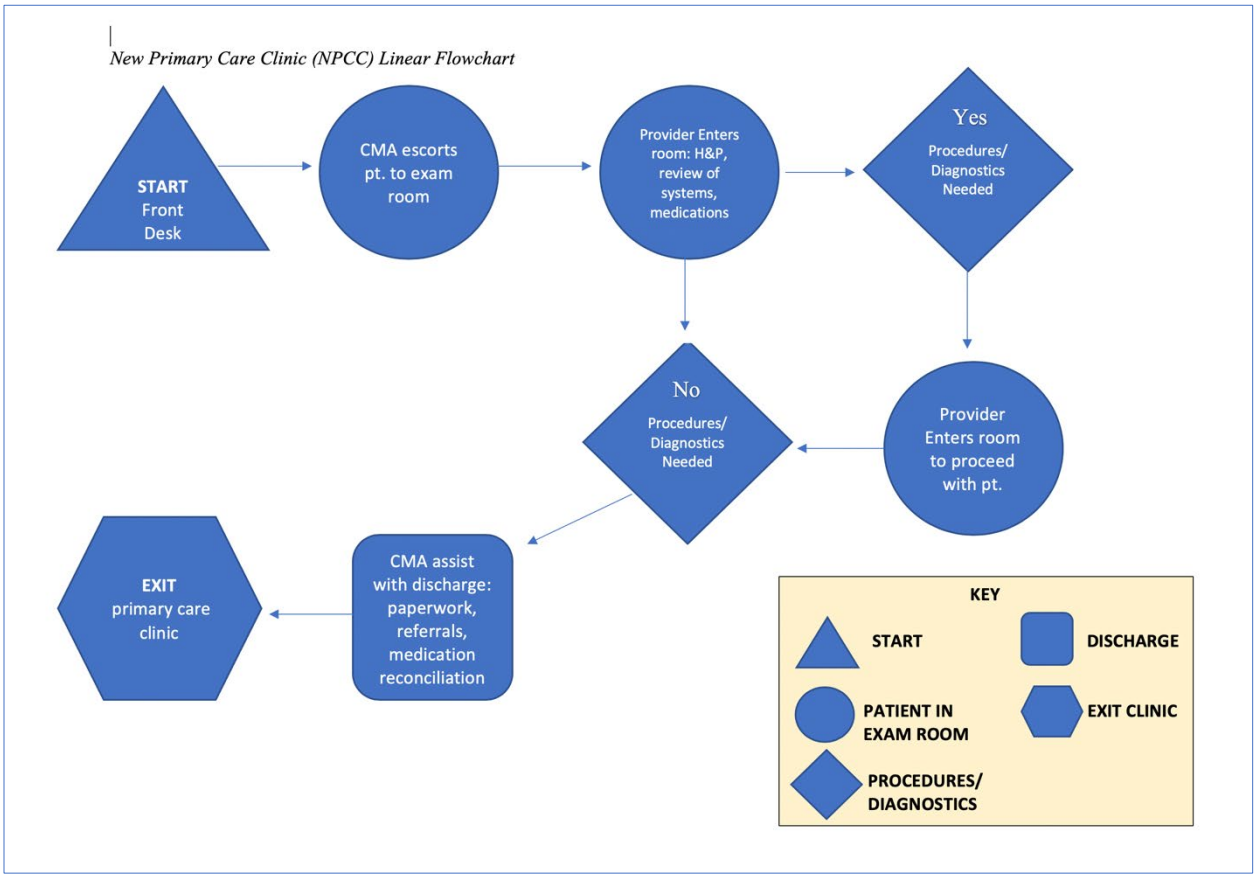
Appendix A: Professionals Satisfaction Survey



Note. Patient satisfaction percentages regarding their workplace environment.

Appendix B: New Primary Care Clinic Linear Flowchart



Appendix C: One Source Medication List

Patients Be an Active Member of Your Care

NIX Health Primary Care and Orthopedic Clinic

My Medicine Record "ONE SOURCE MEDICATION LIST"

My Personal Contacts		Allergic Reactions: include any medicines, foods, seasonal, skin cleansers, medical tape	
My Name *(Last, First, Middle Initial)*	Date of Birth (mm/dd/yyyy)		
Contact Information			
Emergency Contact			
Name	Relationship		
Contact Information			
Primary Care Physician		Medical Conditions and Operations *(include year)*	
Name: Danielle Stramandi, MD			
Contact Information: Office #: (210) 579-3624 Fax #: (210) 579-3789			
Pharmacy / Drugstore			
Name		Smoker: (Y) _____ (N) _____	Drink Alcohol: (Y) ___ (N) ___
Contact Information		How many packs/ day/ week/ month?	Beer ___ Wine ___ Liquor___ How many per day/ week/ month?

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Patients Be an Active Member of Your Care

NIX Health Primary Care and Orthopedic Clinic

My Medicine Record "ONE SOURCE MEDICATION LIST" Office #: (210) 579-3624

Name *(Last, First, Middle Initial):* _____ Date of Birth *(mm/dd/yyyy):* ____/____/_____

Male ☐ Female ☐ Other (i.e. *transgender)* _____ Check if 65 or older: ☐

	I am using: -Rx (Prescription) -OTC (over the counter)	**Name of Medicine:**	**Dose:** (How much to use)	**Frequency:** (How to use it)	**Start:**	**Stop:**	**What am I using it for:**	**Who told me to use it & phone #:**
Enter ALL Prescription (Rx) medicine (include samples), over-the-counter (OTC) medicine, dietary supplements, herbs/ teas								
1.								
2.								
3.								
4.								
TAKING 5 MEDICATION OR MORE BELOW - *(POLYPHARMACY CAUTION)*								
5.								
6.								
7.								

MD Verified _____ **CMA Verified** _____ **Patient Verbalized Understanding** (Yes)____(NO)_____

Medication Reconciliation Completed in EHR by: _____ **Date Completed**_____

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