Polypharmacy Among Older Adults in Long Term Care Facilities

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Dedication

I would like to dedicate this DNP project to my beautiful and astounding daughter, Ma'Kilah. Always dream big, work relentlessly, and never give up. This one is for you, kiddo. MOMMY LOVE YOU, KI KI!!!

Abstract

Polypharmacy among older adults in long-term care facilities is a relevant issue, which leads to an increase in health care costs and adverse drug reactions. The implementation of comprehension medication reviews or medication reconciliation identifies and helps reduce polypharmacy. Evidence shows that nurses help to alleviate polypharmacy through comprehensive medication reviews. The purpose of this DNP project was to reduce polypharmacy among adults 65 years and older through the implementation of the Screening Tool to Older Person's Prescriptions (STOPP) and Screening Tool to Alert Doctors to the Right Treatment (START) while conducting medication reconciliation. This quality improvement project occurred at two sites of a long-term care facility in eastern North Carolina for developmentally disabled adults. The licensed practical nurse (LPN) and registered nurse (RN) team leader were educated on medication reconciliation and trained to use the STOPP/START tool. The results revealed that 100% of older adults (N = 11) pre-implementation and post-implementation had polypharmacy. There was one patient by the end of the project that had a reduction in medication orders and potentially inappropriate medications. Future projects should focus on implementing medication reconciliation with every medication change and transitions of care, including provider education and participation, to have an increasing impact on the reduction of polypharmacy.

Key words: polypharmacy; polypharmacy in older adults; potentially inappropriate medication; potentially inappropriate prescribing; adverse drug reaction

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Chapter One: Overview of the Problem of Interest

Polypharmacy occurs more often among older adult patients than younger patients due to chronic health condition sequelae (Morin et al., 2018). Healthcare professional assessment tools can prevent polypharmacy among older adults (Alpert & Gatlin, 2015). According to Alpert & Gatlin (2015), using validated assessment tools in older adults' medications commonly prescribed can decrease polypharmacy. Validated medicine assessment tools help prevent adverse drug events among older adults (Alpert & Gatlin, 2015). The purpose of this chapter is to present information on this Doctor of Nursing Practice (DNP) quality improvement (QI) project about increasing polypharmacy assessment among older adults in long term care.

Background Information

As patients age, health problems increase, resulting in multiple medications to treat comorbidities. According to Maher, Hanlon, & Hajjar (2017); Morin et al. (2018), polypharmacy is the use of five or more drugs taken by an individual. Jokanovic, Tan, Dooley, Kirkpatrick, & Bell (2015), observed that an elaborate medication plan is a result of several comorbidities among older adults. More than 40% of older adults are affected by polypharmacy (Maher, Hanlon, & Hajjar, 2014; Morin et al., 2018). Polypharmacy correlates with a heightened risk of adverse drug events (Brown, 2016). Polypharmacy is linked to many undesirable outcomes such as the risk for falls, adverse drug reactions (ADR), and hospital readmissions (Maher, Hanlon, & Hajjar, 2014; Masnoon, Shakib, Kalisch-Ellett, & Caughey, 2017). Adverse drug reactions account for almost 10% of hospitalizations among older adults (Jokanovic et al., 2015). Medication elimination is slower, which alters pharmacokinetics and pharmacodynamics to a degree of potential harm (Morin et al., 2018).

According to Masnoon et al. (2017), a potentially inappropriate medication occurs when a risk of adverse drug events exceeds a medication 's beneficial use. Potentially inappropriate medications are common among older adults with many chronic diseases. Polypharmacy may be clinically relevant for some older adults. Still, as health care providers, it is necessary to identify older adults that may be at an increased risk of adverse drug events related to inappropriate medications (Masnoon et al., 2017).

Many evidence-based tools can determine inappropriate medicines in older adults (Alpert & Gatlin, 2015; Dagli & Sharma, 2014; Masnoon et al., 2017). It is essential to evaluate polypharmacy to reduce adverse events among older adults (Dagli & Sharma, 2014). Assessing polypharmacy is done through medication review or reconciliation by the healthcare team (Dagli & Sharma, 2014; Gooen, 2017; IHI, 2019a). According to Masnoon et al. (2017), the Beers Criteria is a validated tool used to identify potentially inappropriate medications, reducing polypharmacy. Other validated tools include (1) Screening Tool to Older Person's Prescriptions (STOPP) (2) Screening Tool to Alert Doctors to the Right Treatment (START) and (3) Assess Review Minimize Optimize Reassess (ARMOR) (Dagli & Sharma, 2014).

Validated tools. Many validated tools have evidence that has shown to be appropriate in identifying potentially inappropriate medications.

Beers Criteria. The American Geriatrics Society developed the Beers Criteria. The Beers Criteria constructed a list of potentially inappropriate drugs that older adults should avoid when diagnosed with certain conditions (AGS, 2019; Masnoon et al., 2017).

STOPP/START. The STOPP/START tool identifies potentially inappropriate medications that are prescribed to older adults by conditions. A section of the STOPP/START emphasizes medicines that are not commonly ordered for older adults when they show benefit in

certain situations (Alpert & Gatlin, 2015; Dagli & Sharma; Hernandez, 2017; O'Mahony et al., 2015).

ARMOR. The ARMOR is a tool designed to be used by the interdisciplinary healthcare team. The process of the ARMOR tool is to assess, review, minimize, optimize, and reassess to evaluate polypharmacy in older adults (Dagli & Sharma, 2014; Hernandez, 2017). This tool reduces polypharmacy with the goal of quality of life (Hernandez, 2017).

Significance of Clinical Problem

Polypharmacy contributes to patient hazards in long term care facilities (Arnoldo, Cattani, Cojutti, Pea, & Brusaferro, 2016). According to Charlesworth, Smit, Lee, Alramadhan, & Odden (2015), from 1988 to 2010, prescriptions of five or more medications for older adults tripled to almost 40%. All prescription medications pose risks (Charlesworth et al., 2015). The more medications an older adult consumes, the higher the chance is for adverse drug-related events (Guharoy, 2017; Morin et al., 2018). Adverse drug events increase the probability of mortality in older adults.

Polypharmacy contributes to increased health care costs for the patient and healthcare organizations. Older adults that consume many medications are prone to many healthcare visits (Charlesworth et al., 2015). Polypharmacy increases the number of outpatient visits and hospitalizations, which increases health care costs for patients and healthcare systems (Guharoy, 2017; Jokanovic et al., 2015; Maher, Hanlon, & Hajjar, 2014). The Centers for Disease Control and Prevention (2018) stated that there are about 1.3 million patient visits to the emergency department, resulting in approximately 350,000 hospitalizations annually related to adverse drug events. Polypharmacy induced adverse drug events drive medical costs beyond $3.5 billion

(CDC, 2018). According to Jokanovic et al. (2015), being knowledgeable about polypharmacy, and developing a plan to reduce it can decrease patient health care costs and mortality.

An interview completed with the Chief Nursing Officer (CNO) of a long-term care facility in eastern North Carolina. The CNO stated that there were several residents in multiple sites that received excessive medication; almost 95% of the residents within two facilities considered to have polypharmacy (CNO, personal communication, February 2019). According to the CNO, many residents were taking a duplicate class of medications, which contributed to excessive drugs at two facilities (CNO, personal communication, February 2019). The CNO stated that an LPN conducts monthly medication reviews when the batch medications are checked into the facility. The batch medications are medications that are automatically filled monthly in a cycle. The batch medications include all medications except liquids, eye drops, nasal sprays, and topicals; these items require individual refill request every 30 days. The monthly medication reviews conducted by the LPN include comparing medications to the updated and most accurate provider orders. These medication reviews do not identify duplicate classes of medicines that may cause adverse events (CNO, personal communication, February 2019). The CNO stated that state regulations require a pharmacist to review drug utilization every three months at each facility (CNO, personal communication, February 2019). The pharmacist drug utilization review gives recommendations to nurses and physicians about changes that can be made to a resident's medication regimen (CNO, personal communication, February 2019).

While working with this long-term care facility, it was evident that the facilities needed to develop strategies in reducing polypharmacy. The facilities need to intervene to prevent

adverse reactions and events among the residents resulting in more emergency room visits or stays at the hospital.

Question Guiding Inquiry (PICO)

In older adults residing in a long-term care facility, how does training, and using the STOPP/START criteria compare to once monthly medication review affect the reduction of polypharmacy and potentially inappropriate medications?

Population. The population of this project was the Licensed Practical Nurses working within the facility daily and the Registered Nurse that supervises the facility.

Intervention. The intervention was to train the Licensed Practical Nurses and Registered Nurses on a validated tool. The validated tool included the STOPP/START criteria to identify potentially inappropriate medications, with provider alerts to discontinue medication, if needed.

Comparison. The occurrence of polypharmacy and potentially inappropriate medications in older adults before and after nurses received education about the STOPP/START criteria.

Outcome(s). The intended outcome was to reduce polypharmacy and potentially inappropriate medication occurrences among older adults. New policy development requires nurses to complete comprehensive medication reviews to increase safety among older adults.

Summary

Polypharmacy is associated with safety among older adults. Polypharmacy has a high prevalence among older adults residing in long term care facilities. Multiple comorbidities increase an older adult's chance of taking more medications. Older adults are at an intensified risk of undesirable drug events (falls, geriatric syndromes, and drug-drug interactions), which increases the need to reduce polypharmacy. Evidence indicates that evidence-based tools can

reduce polypharmacy or potentially inappropriate medication. At times, multiple medications may be appropriate for older adults. However, it is relevant to assess to reduce potentially inappropriate medications. Combating polypharmacy and potentially inappropriate medications can reduce (1) adverse drug events, (2) office visits and hospitalizations, and (3) healthcare costs. Polypharmacy is a problem; evaluation of evidence to establish a solution that is beneficial among older adults in long-term care facilities.

Chapter Two: Review of the Literature

The purpose of this literature review was to understand polypharmacy and its effects. This literature review describes evidence-based practice interventions that reduce polypharmacy. Reviewing the related topics allows one to understand the importance of reducing polypharmacy.

Literature Appraisal Methodology

Sampling strategies. The literature review was completed using the databases PubMed, Medline via Ovid, Google Scholar, and Cumulative Index of Nursing and Allied Health (CINAHL). The search terms used were *polypharmacy, polypharmacy in older adults, polypharmacy in older adults in long term care facilities, polypharmacy in elderly people, polypharmacy in the aged, inappropriate prescribing, potentially inappropriate medication, and potentially inappropriate prescribing*. The MeSH (Medical Subject Headings) terms used were humans, long-term care, polypharmacy, prevalence, adult, aged, aged 80 and over, education, nursing, medication therapy management, and education, nurse's role, nursing staff, and education, and patient education topics. The searches were limited to adults only. The articles were limited to the English language and published from February 2014 to the present date.

Evaluation criteria. The literature review articles had several inclusion and exclusion criteria. The initial search on PubMed returned over two-thousand articles using the search term polypharmacy; however, the studies did not address older adults. The inclusion criteria were polypharmacy in male or female, older adult (65 years or older) population, and residing in long-term care facilities. The inclusion criteria also included interventions for polypharmacy and potentially inappropriate medications. Included were studies published within the last five years. After the search was concluded, seven articles were kept and reviewed. The flow diagram presented additional detail about study selection (see Appendix A).

The level of evidence was assessed with the Melnyk & Fineout-Overholt's (2011) model because it describes hierarchy evidence. There were seven levels of evidence with level one displaying the most rigorous data. Most of the evidence were systematic reviews with randomized control trial (RCTs).

This search focused on interventions to reduce polypharmacy. The literature review included multiple levels of evidence (see Appendix B).

Literature Review Findings

After completing the literature review, level one evidence was the typical findings. Level one evidence comprises randomized controlled trials, systematic reviews, and meta-analyses. Some studies reported clinical guidelines based on systematic reviews. One study was a cohort and a case-control study.

Polypharmacy. Polypharmacy is a rising concern for older adults in the United States. Morin et al. (2018) found that polypharmacy had several definitions, all inconsistent. A systematic review of RCTs completed on the precise meaning of polypharmacy (Masnoon et al., 2017). According to Masson et al. (2017), results of a systematic review indicated more than 130 definitions for polypharmacy. The study reported that about 80% of the definitions were numerical instead of descriptive (Masson et al., 2017). As an example, polypharmacy was described as several medications, inappropriate medications use, or what most prescribers considered unnecessary (Jokanovic et al., 2015). The most appropriate definition, used among half the studies, was the consumption of five or more medications per day (Masnoon et al., 2017). Another term used was appropriate prescribing (Masnoon et al., 2017). Older adults consuming multiple prescribed or over-the-counter medications are at a higher risk of needing to

be seen by the provider more often. The more visits with the provider, the more healthcare cost increased related to polypharmacy.

Safety. Polypharmacy is considered a patient safety concern (Arnoldo et al., 2016). Polypharmacy was often related to older adults with comorbidities (Jokanovic et al., 2015). Jokanovic et al. (2015) wrote that the complexity of the medication regimen was secondary to comorbidities in older adults. In long-term care facilities, there was an increase in polypharmacy among its older residents (Arnoldo et al., 2016). Polypharmacy increases the risk of adverse events in older adults (Alpert & Gatlin, 2015). Adverse events in older adults included falls, severe drug reactions, and decreased medication compliance (Alpert & Gatlin, 2015). The literature states that at least 40% of all older adults have reduced renal function (Alpert & Gatlin, 2015). The decreased renal function increases older adults' risk for adverse drug events (Masnoon et al., 2017). Older adults have reduced drug elimination, which results in an abnormal level of drugs (Wooten, 2015). Thus, it is essential to reduce the number of medications among older adults, to optimize renal function.

Medication review. The literature states that nurses help eliminate polypharmacy (Brown, 2016). A systematic review of RCTs conducted to reduce polypharmacy and inappropriate medications through comprehensive medication reviews (Brown, 2016). A nurse should complete routine medication reviews on older adults living in long-term care facilities (Alpert & Gatlin, 2015). In the project site, medication reviews were infrequently completed. Specifically, they are completed monthly at the project site. The project site does not have a policy of medication reconciliation utilizing validated instruments to help nurses determine if an older adult is consuming inappropriate medications. Nurses were using clinical judgment to alert prescribers about adverse medication-related events.

Interventions. The literature states that frequently used is the BEERs Criteria tool to assess older adults are on safe medications (Alpert & Gatlin, 2015). There was one literature review on interventions to polypharmacy and potentially inappropriate medications. When using a validated tool, such as BEERs Criteria, healthcare staff can identify drugs that may be inappropriate (Alpert & Gatlin, 2015). There are several other tools:(1) Screening Tool to Older Person's Potentially Inappropriate Prescriptions; (2) Screening Tool to Alert Doctors to the Right Treatment (STOPP/START); and (3) Assess Review Minimize Optimize Reassess (ARMOR) to address polypharmacy or prescribing errors (Alpert & Gatlin, 2015). The STOPP/START tool is a shorter version of the BEERs Criteria. The STOPP/START tool developed to identify further common prescribing patterns that may result in an error. For example, (1) if older adults were receiving the same class of medication (2) Lasix usage in an older adult with edematous extremities, without HF diagnosis (3) prescribing tricyclic antidepressants in older adults with glaucoma (Alpert & Gatlin, 2015). The ARMOR can be used by anyone on the interdisciplinary healthcare team (Alpert & Gatlin, 2015).

Limitations of the Literature Review Process

Many studies stated that older adults living in long-term care facilities are at risk of adverse drug events due to polypharmacy (Charlesworth et al., 2015; Jokanovic et al., 2015). Before polypharmacy interventions, studies suggested there must be a consistent definition of polypharmacy (Jokanovic et al., 2015; Masnoon et al., 2017).

Many studies offered interventions to reduce potentially inappropriate medications. Interventions achieved through validated tools can reduce inappropriate medications. However, the literature presented little evidence about which tool is best suited in long term care and that nurses can use for medication reviews. The research has limited information on how an

interdisciplinary team should use pharmacist reviews to identify inappropriate medications among older adults (Brown, 2016).

Discussion

Conclusion of findings. Inconsistency of polypharmacy definitions created uncertainty about solving this problem of older adults with comorbidities. The nature of polypharmacy can help drive interventions. Potentially inappropriate medications increase older adults' risk of polypharmacy. When polypharmacy is present, a drug to drug interaction increases. Drug to drug interaction can increase injury among older adults. One way to reduce the use of potentially inappropriate medications, the implementation of a validated assessment tool should be considered. Multiple validated assessment tools provided an intervention to reduce polypharmacy, such as BEERs Criteria, STOPP/START, or ARMOR. The practice of completing medication reviews frequently is another strategy. The validated tool that can accurately assist in providing medication reviews for old adults is the STOPP/START; the tool is a similarity of the BEERs Criteria, although it gives more information related to the physiological systems (Brown, 2016).

Advantages and disadvantages of findings. The benefit of the proposed intervention is that the START/STOPP tool is validated (Dagli & Sharma, 2014). The STOPP/START tool will help assess the risk of polypharmacy in older adults (Dagli & Sharma, 2014). Using the STOPP/START will help reduce unwarranted safety outcomes related to potentially inappropriate medications (Arnoldo et al., 2016). In the literature, it asserts that a reduction in polypharmacy would reduce the cost of health care (Jokanovic et al., 2015). The utilization of the STOPP/START tool significantly improves potentially inappropriate medications in older adults (O'Mahony et al., 2015).

The disadvantage of findings is that the literature does not explicitly state that nurses have used the STOPP/START tool in the past. There is limited evidence found on nurses utilizing the tool in long-term care facilities; a provider usually uses the STOPP/START tool.

Utilization of findings in practice change. The facility Licensed Practical Nurse (LPN) and Registered Nurse (RN) received training to use the STOPP/START tool. The STOPP/START tool utilized to complete a comprehensive medication review to decrease potentially inappropriate prescribing (Dagli, & Sharma, 2014). The literature stated that the STOPP tool provides intervention related to duplication of drug class, interactions between drugs, drug-disease interactions, and medicine that may increase the resident risk of falling (Brown, 2016). The START tool is combined and used with the STOPP tool. However, the STOPP is more often used to recognize the use of inappropriate medications and the presentation of adverse drug events (Brown, 2016). The START tool is used with the STOPP tool, guiding recommendations of medicines in older adults that may relate to a diagnosis (Brown, 2016). The START tool recommends medications that should be considered in implementation to benefit older adults (Brown, 2016). This validated tool helped nurses recognize the “warning signs" related to potentially inappropriate medications that may need observation (Brown, 2016).

Summary

This chapter reported information on the literature review related to polypharmacy in older adults residing in long-term care facilities. After reviewing the literature, the results showed that there was a need to reduce potentially inappropriate medications and polypharmacy in older adults. The synthesis of the research showed that polypharmacy in older people results in an increased risk of drug events. Due to the increase in drug events in older adults related to polypharmacy, there is an increased need to be seen by a provider driving the cost of healthcare

up. The literature review showed that the implementation of a validated tool such as the STOPP/START tool could reduce polypharmacy and potentially inappropriate medications in older adults.

The implementation of the STOPP/START tool is in alignment with Triple Aim by improving the older adults' quality of care, improving older adults' health, and reducing the cost for health care. The STOPP/START tool improves older adults' health by improving medication appropriateness and reducing adverse drug events, which will enhance patient safety.

Chapter Three: Theory and Concept Model for Evidence-based Practice

The theory is at the forefront of evidence-based practice. The purpose of this chapter is to discuss the key concepts used in this project. Besides, Lewin's change theory relates to a change of behavior in the implementation of a quality improvement project. The Plan Do Study Act (PDSA) cycle provides an overview as it relates to a sequence of change through a process.

Concept Analysis

The major concepts of this project are polypharmacy, older adults, adverse drug events, potentially inappropriate medication, potentially inappropriate prescribing, and medication review. In this section, defined and discussed are the concepts.

Polypharmacy. According to Masnoon et al. (2017), there is no agreement on the definition for polypharmacy; definitions vary from numerical to descriptive. Frequently defined as a numerical definition is polypharmacy (Masnoon et al., 2017). After reviewing the literature, several articles defined polypharmacy as the use of five or more medications consumed by an individual (Alpert & Gatlin, 2015; Arnoldo et al., 2016; Brown, 2016; Charlesworth et al., 2015; Jokanovic et al., 2015; Masnoon et al., 2017; Morin et al., 2018).

Older adults. Older adults sometimes referred to as adults aged 65 years or older (Morin et al., 2018; O'Mahony et al., 2015). At times, the terms elderly and aged were used instead of older adults (Alpert & Gatlin, 2015; Brown, 2016; Dagli & Sharma, 2014; O'Mahony et al., 2015). According to Wooten (2015), the older adult was distinguished by age, as 65-74 years old were considered early older adults, and those 75 years and older were considered late older adults. This distinction is vital if conducting specific research or interventions (Wooten, 2015).

Adverse drug events. Adverse drug events (ADEs) happens when an individual obtains an injury as a result of an intervention related to medication (Alpert & Gatlin, 2015; Arnoldo et

al., 2016; Brown, 2016; Morin et al., 2018). More than half of the adverse drug events that occur in older adults are preventable (Alpert & Gatlin, 2015).

Potentially inappropriate medication. Potentially inappropriate medication (PIM) is a medication that has the potential for harm where the risk outweighs the benefit for an individual (Brown, 2016; Dagli & Sharma, 2014; Masnoon et al., 2017). Polypharmacy increases the chance of an individual taking inappropriate medications.

Potentially inappropriate prescribing. Potentially inappropriate prescribing increases the cost of health care (Jokanovic et al., 2015). Potentially inappropriate prescribing (PIP) is a medication used in a situation in which the adverse drug events or risk dominates the benefit of the medication clinically; there may be safer alternatives for treatment (Jokanovic et al., 2015; Masnoon et al., 2017; O'Mahony et al., 2015).

Medication review. A medication review is the review of all medications taken by an individual, whether prescribed by or purchased over the counter (Alpert & Gatlin, 2015; Arnoldo et al., 2016; Brown, 2016). Various health care professionals conduct medication reviews, including a nurse, nurse practitioner, physician assistant, medical doctor, and (or) a pharmacist (Alpert & Gatlin, 2015, Brown, 2016).

Theoretical Framework

Naming the theory. This DNP project modeled Lewin's change theory. A behavioral scientist developed the Lewin's change theory in the 1940s, Kurt Lewin (Bishop, 2018). Lewin's change theory intended to help implement change in the desired direction (Borkowski, 2016). Lewin's change theory describes behavior related to change as the dynamic force that moves in opposing directions within an organization (Bishop, 2018). The Lewin's change theory has three stages within a process used to implement planned changes among an organization (Borkowski,

2016). The three stages of Lewin's change theory are unfreezing, change (sometimes referred to as moving), and refreezing (Bishop, 2018) (see Figure 1).

Unfreezing is the process of interrupting and getting rid of old behavior patterns (Bishop, 2018). To establish unfreezing, driving forces must push direct behavior from existing situations (Bishop, 2018). When there is effective communication about the need for change between managers and staff, unfreezing can take place or implemented in an organization (Borkowski, 2016). It is crucial for unfreezing in the organization to eliminate potential risks and behaviors that may affect the change. The staff should understand that change is needed. The second stage of Lewin's change theory is a change or moving stage. The stage of change is a process; this is when the change takes place (Bishop, 2018). The stage of change is the process of changing thoughts or behavior, permitting individuals to shift to acceptable behaviors (Bishop, 2018). The third stage of Lewin's change theory is refreezing, which involves re-establishment of equilibrium and change, so that old behaviors do not return (Bishop, 2018).

A quality improvement project in a new community nursing team used Lewin's change theory (Tinkler, Hoy, & Martin, 2014). The framework improved how nurses complete bandage techniques on individuals with venous leg ulceration after implementation (Tinkler, Hoy, & Martin, 2014). The Lewin's change theory proposed to improve change among the nurses using the guidelines and protocol to complete compression bandaging (Tinkler, Hoy, & Martin, 2014).

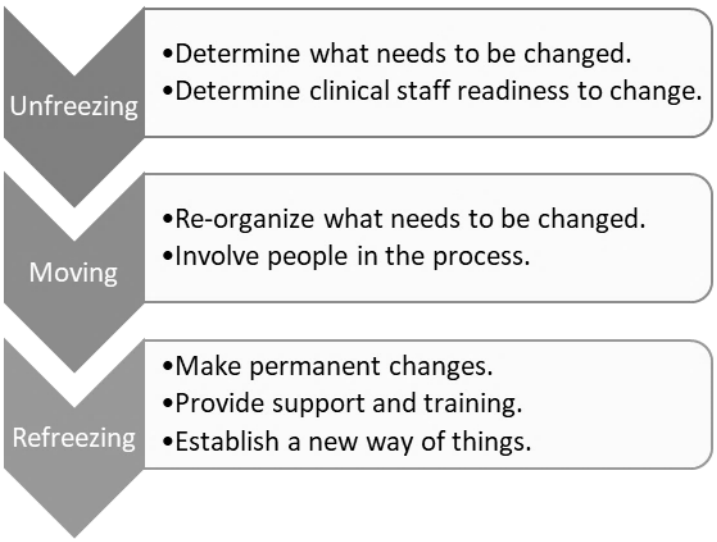

Figure 1. Lewin's Change Theory

Application to practice change. Change is certain to take place in every organization; without change, habits develop. The Lewin's Change Theory supported the intervention for this DNP project implementation by initiating change among the nurses. This framework used to implement the use of the STOPP/START tool among nurses in a long-term care facility.

In stage one (unfreezing), the nurses were more willing to change their feelings, thoughts, and behavior about when and how medication review completion takes place among older adults. The nurses were encouraged to shift from completing medication reviews monthly to more frequently using a validated medication tool. During the unfreezing stage, there may be many restraining forces that the nurses must overcome. Some of the restraining forces might be the demand for workload and lack of time.

In stage two (change), the STOPP/START tool was implemented in the long-term care facility for the nurses to use when completing medication reviews or reconciliation.

In stage three (refreezing), the nurses would continue to use the STOPP/START tool to complete medication reviews, reducing polypharmacy, and potentially inappropriate medications

among older adults. The nurses received support from managers until a change was complete. The STOPP/START tool would be implemented into policy, stimulating practice change.

Evidence-Based Practice Change Model

Plan Do Study Act. Research and quality improvement (QI) were the driving forces of changes taking place in healthcare. This quality improvement project implemented the Plan Do Study Act (PDSA) cycle. Developed in the 1920s was the PDSA cycle was formerly known as the Demin Cycle (Crowfoot & Prasad, 2017). The PDSA cycle is a continuous cycle of plan, do, study, act used to increase knowledge and improve a process within healthcare (Anderson, 2018). The PDSA cycle has elements of the cycle used for adjusting a process: Plan, Do, Study, Act.

The PDSA cycle focuses on quality improvement in four steps that can repeat. The first step of the PDSA cycle is the plan. During the planning phase, the problem was determined. The planning phase involved identifying an area that needs to be improved and determining if it could benefit from quality improvement (Crowfoot & Prasad, 2017). During the "do" step, implementation of changes takes place, whether they are unintended or unplanned outcomes (Crowfoot & Prasad, 2017). The "study" step is sometimes called the check step. Anderson (2018) states that the study step involved the evaluation of change, as well as data comparison to a prediction. The "act" step is when adjustments take place; this determines whether the change was implemented or unused, causing the cycle to repeat (Anderson, 2018).

Application to practice change. The PDSA cycle implementation in this quality improvement project helped with making changes quickly and successfully (Anderson, 2018). This change cycle focused on the continuous improvement of the process (Crowfoot & Prasad,

2017). The PDSA cycle helped reduce resistance when change begins in the long-term care facility. Four stages of the PDSA cycle helped implement change (see Appendix C).

Plan. The plan involves understanding the current problem or situation. The problem was polypharmacy among older adults. The enforced change is a new policy that will incorporate the use of the STOPP/START tool for comprehensive medication reviews. The development of the outcome or goal was to (a) train nurses about comprehensive medication reviews and (b) reduce polypharmacy and potentially inappropriate medications through using a validated tool (STOPP/START). The DNP project lead used a data collection tool to obtain the patient's age, gender, total medications taking, and potentially inappropriate medications. With the data, weekly chart reviews completed using the collection tool. The nurse of the facility completed medication reconciliation for the older adults utilizing the STOPP/START tool medication orders are changed and transitions in care.

Do. Do involves the change being implemented and carried out on a small scale to test change. The unexpected problems and results documented, explained what happened during the implementation of the plan.

The nursing staff received education on medication reconciliation. The STOPP/START tool provided for each LPN that conducts medication reconciliation at the site to use during reconciling medications. There was an evaluation of the LPNs behaviors as it related to using the STOPP/START tool for medication reconciliation.

Study. The study involves reviewing the changes and outcomes and comparing the results or data to what is predicted or learned (Hunter, 2015). Every week the results or data were reviewed.

Act. The act involves what changes that should be made and the planning of the next change cycle (if needed), starting over with a plan based on the information obtained (Anderson, 2018; Crowfoot & Prasad, 2017; Hunter, 2015). The cycle was revised every two weeks based on the data collected and the needs of the site. The site received recommendations for future modifications.

Summary

Concepts are the terms or words that used to communicate an idea within a theory; the terms are usually broad (Butts & Rich, 2018). Most concept terms have multiple definitions. There are several concept terms used in this project: polypharmacy, older adults, adverse drug events, potentially inappropriate medication, potentially inappropriate prescribing, and medication review. A change in behavior is needed to take place in the organization among the nurses before this quality improvement project implementation took place. Lewin's change theory is the chosen framework to be implemented. The Lewin's change theory will change behavior through unfreezing, moving, and refreezing, causing the driving forces to push the nurses toward change. The nurses were more willing to complete medication reviews more often than once per month using a validated tool. The Plan Do Study Act (PDSA) cycle supported the acceleration of the quality improvement project in reducing polypharmacy and potentially inappropriate medications. The PDSA cycle is a continuous cycle that will be used for ongoing quality improvement to ensure the implementation of the new policy related to the nurses using the STOPP/START tool as part of medication reviews.

Chapter Four: Pre-implementation Plan

To implement a DNP project, it must have a comprehensive plan. A pre-implementation plan is essential to have a successful quality improvement (QI) project. During the pre-implementation planning, the approval process from the institutional review board (IRB) began. This DNP polypharmacy project pre-implementation plan will be detailed in this chapter.

Project Purpose

The purpose of this Doctor of Nursing Practice (DNP) project was to decrease polypharmacy among older adults and to increase medication reconciliation. The STOPP/START criteria, a validated tool, will identify inappropriate medications that contribute to polypharmacy. The project site was a nonprofit organization in eastern, North Carolina. It is an Intermediate Care Facility (ICF), which is a level of long-term care. This DNP project aligns with a Triple AIM: reducing health care costs by reducing the number of inappropriate medications that contribute to polypharmacy.

Project Management

Organizational readiness for change. According to the Chief Nursing Officer (CNO) and the Medical Consultant, the project site was ready for change. For example, the CNO stated that there were multiple sites in which older adults consume numerous medications. The CNO thought that some individuals received inappropriate medications. The medical director of the project site agreed to be site champion to help change practice. The Medical Consultant and CNO chose the STOPP/START criteria to reduce polypharmacy, healthcare cost, and improve care quality among patients at the facilities. The clinical staff was reluctant to change due to the feeling of not completing all other daily duties. Most clinical staff had longevity with the organization and were complacent with completing the task as trained initially.

Interprofessional collaboration. In partnership with the medical director, the DNP student-led the project. Other project team members were the Chief Executive Officer (CEO), CNO, DNP project faculty mentor, and facility Licensed Practical Nurses (LPNs) and Registered Nurse (RN) team leaders. The CEO of the organization signed for approval of this quality improvement project. The Medical Consultant was the site champion, who holds a master's degree in nursing (MSN-ANP) and provided polypharmacy knowledge to the project lead. The CNO provided relevant knowledge about each site's needs related to polypharmacy, ensuring each LPN give recommendations to the provider. The DNP project faculty mentor provided academic expertise and resources to help guide the project lead. The DNP project team members worked together to improve polypharmacy in long-term care.

Risk management assessment. The Strength, Weakness, Opportunity, Threat (SWOT) Analysis assessed the risk management within this DNP project.

Strength. There are many strengths to this project. One of the strengths was the project leader was an RN team leader at the project site. Because of this experience, the project leader was aware of the organization’s needs to improve an individual’s quality of care. Another strength is that the Medical Consultant (site champion) was responsible for policy implementation within the organization. This factor made it easier to gain support for this DNP project. The strength of the project included that there was a strong need to reduce polypharmacy in the elderly within long-term care facilities. There was relevant information in the literature to support polypharmacy.

Weakness. Time was a significant weakness in this project. The facility LPN and RN team leaders may not have time to use the STOPP/START criteria due to other job responsibilities. The timeframe of the project implementation included eight weeks, with an

evaluation of the Plan-Do-Study-Act (PDSA) cycle every two weeks. There were knowledge gaps and inexperience among the LPN and RN team leaders. Clinical staff might be resistant to the implementation of new strategies to complete medication reviews.

Opportunity. An opportunity of this quality improvement project included that the project can be expanded and used within all the facilities of this non-profit organization. This project also created educational opportunities for the nurses on a validated, evidence-based tool. The project would decrease polypharmacy among older adults in long-term care. The project would improve patient health outcomes, potentially reducing the cost of care. The project could be implemented as an organization-wide policy.

Threat. Threats to project implementation were increased clinical staff workload. If the clinical staff (LPN/RN team leaders) have more responsibilities to clients, it may affect medication reconciliation while using the STOPP/START criteria. The clinical staff turnover rate was also a threat to this project. Direct-care staff shortage could impose a threat also as the clinical staff may be needed more to assist with daily care.

Organizational approval process. The professional relationship with the project site occurred because the project leader was an RN team leader at the non-profit organization. The method of gained organizational approval was the project leaders met with CNO to discuss polypharmacy in the organization and the purpose. Then communication via email was completed with the Medical Consultant about the plans of the project with feedback about the best-validated tool to use. The project stakeholders supported this project because there was a need for a decrease in polypharmacy in the long-term care facility. The Medical Consultant communicated with the CEO about the project, plans, and timeline. The final project approval was given by the Medical Consultant and the CEO of the organization to conduct it (see

Appendix D). The project was approved through East Carolina University College of Nursing. If any changes occur during this project, the approval process would be revisited with both organizations to obtain supplementary approval.

Information technology. The project required minimal use of information technology to implement it. The project used electronic mail for communication among stakeholders and clinical staff. The electronic medical record (EMR) provided relevant data. The EMR, *Eclipse*, is owned by the non-profit organization. Other information technologies are Microsoft Office Word, Microsoft Office Excel, and Microsoft Office PowerPoint. There will be no HIPPA violations because no patient identifiers will be obtained.

Cost Analysis of Materials Needed for Project

DNP project implementation required a minimal cost. The project cost included hard copy printing and employee snacks. Project costs equaled less than $80 (see Appendix E). The STOPP/START tool was printed as hard copies for the clinical staff at $0.13 per page. There was a copy of the STOPP/START laminated for each facility use, costing $1.89 per page. The DNP project lead completed prints and lamination at Staples. There was no cost for the Microsoft PowerPoint presentation because the DNP project lead created it. Snacks were available during medication reconciliation presentations.

Plans for Institutional Review Board Approval

The project site does not have an Institutional Review Board (IRB), but an internal organizational equivalent to the Ethics Committee and C-Team Risk Management. The C-Team or Corporate Team consisted of the chief executive officer, chief operating officer, chief financial officer, and chief nursing officer. The project lead contacted the Medical Consultant via electronic mail and obtained project approval once the project was confirmed beneficial to

the organization. The project lead completed an Approval Process-Quality worksheet to submit to ECU IRB. The DNP project lead completed the University IRB verification process. The first step was completing the IRB QI/Program Evaluation Self-Certification Tool. After obtaining approval from the DNP Faculty Lead, the tool was submitted online. The project deemed to be QI; an immediate response was received stating that IRB review was not required. An IRB letter was obtained on July 15, 2019, saying the project does not require IRB approval (see Appendix F). The Social/Behavioral Research Investigators and Key Personnel course was completed via the Collaborative Institutional Training Initiative (CITI training) in February 2019.

Plan for Project Evaluation

Demographics. The demographic information collected was age, gender, and ethnicity. The age reported as a mean and a range. Gender and ethnicity reported through descriptive statistics, frequency. A bar graph presented age data. A pie chart indicated gender and ethnicity data.

Outcome measurement. This DNP project's outcome measurement is to reduce polypharmacy and inappropriate medications in long-term care. The outcome is to increase the use of STOPP/START by each LPN, increasing accurate medication reconciliation for each individual in the long-term care facility. The project metric is an outcome measure related to patient outcomes.

Instrument. The project leader did not need to obtain permission to use the STOPP/START tool. This project used Version 2.0 of the STOPP/START tool. The STOPP/START tool has an attribution non-commercial 4.0 international license. The STOPP/START can be shared or adapted if appropriate credit is given and not used for commercial purposes (O'Mahony et al., 2015). The STOPP/START tool received validation by

an expert panel and Delphi consensus methodology (O'Mahony et al., 2015). The validated tool has reliability, as there is evidence in which the instrument has effectively reduced potentially inappropriate medications in older adults (see Appendix G).

Educational Tool. The educational tool was developed in Microsoft Office PowerPoint, used to educate the clinical staff. The tool was used by the project lead to inform the clinical team about medication reconciliation. The educational tool defines medication reconciliation. The tool also explains why, when, who, and how medication reconciliation is completed.

Data Collection tool. The data collection tool was developed in Microsoft Office Excel spreadsheets by the project leader. The tool was used by the project lead to obtain demographics (excluding patient identifying information), and the medication list from each chart (paper/EMR) assessed (see Appendix H).

Data analysis. Percentage of medication reconciliation were obtained three months before implementation from the EMR and some paper charts; June 2019 to August 2019. Data was reviewed in a short period due to NC State Regulations to archive previous year information from the client's chart after the annual individual program planning meeting each year. Rate of medication reconciliation, the number of adults that had polypharmacy, and prescribed inappropriate medications will be reviewed to obtain data. The percentage of pre-intervention and post-intervention were derived and compared. There were no pre-existing benchmarks for this quality improvement project. There was no current data found related to state and national benchmarks as it refers to polypharmacy. Due to the lack of viable information, the national benchmarks related to reducing adverse drug events related to medications was archived in 2015 (Office of Disease Prevention & Health Promotion [ODPHP], 2019)

Data management. Data were managed by documenting in a Microsoft Office Excel Spreadsheet. No patient identifiers were obtained from the EMR. Any data collected was shared through the secure file system, *Egnyte*. Egnyte allows data-sharing limited to stakeholders of the organization. The data-share through Egnyte has a two-step verification system. A secondary storage method was the project lead's password-protected computer. A flash drive was purchased to store data separate from the project lead's password-protected, which was locked in a file cabinet for eight months. All electronic mails were completed from the organization's electronic mail system with a privacy/confidentiality statement. The EMR and paper charts provided relevant data. The data collected for this quality improvement project was only stored on the flash drive and password-protected the computer from September 2019 to April 2020. When the project lead completed the DNP program, all files and data were deleted.

Summary

The pre-implementation planning of the DNP project was a crucial stage completed before obtaining a waiver for QI and project implementation. The project goal was to meet the Triple Aim objectives. Project completion will increase medication reconciliation by nursing staff, which will reduce polypharmacy and healthcare costs. Being able to increase medication reconciliation to at least 25% at the project site will improve the quality of care. Strategically planning of this project took place with the stakeholder input. The STOPP/START tool was available for use by the LPNs and RN team leaders before project implementation in September 2019. The data obtained during this project will be organized, then examined to show where barriers may exist.

Chapter Five: Implementation Process

The chapter describes the DNP project's implementation process. This chapter also describes the project setting and participants. During this chapter, discussion related to recruitment, implementation details, and project variation plans. Recruitment of the participants will include in what dynamic the participant was involved in the project, and any barriers the participants may have. The implementation details will describe how the plan for the project, emphasizing evaluation periods. The PDSA cycle showed changes made during the project within the project variations plan. The re-evaluation of the project was throughout eight weeks.

Setting

This project implementation was in eastern North Carolina (NC). The project site is a human service agency, which is a division providing service under the supervision of the department of health. This site is a long-term care facility, which is an intermediate care facility (ICF) for adults with intellectual and (or) developmental disabilities. It is part of an NC based non-profit organization 501(c-3). The project site operates under federal regulations and standards with annual state surveys. Project site funding source is Medicaid; all clients must be eligible or receive Medicaid. The project goal was to reduce costs and improve the quality of care to the organization’s consumers. The project designed to have a measurable impact on the clinical staff’s medication reviews.

Participants

Project participants are the clinical staff that provides care to the individuals served at this organization. The clinical staff consists of the facility licensed practical nurses (LPNs) and registered nurse (RN) team leaders. Facility LPNs are responsible for the resident’s daily care, physician orders, order and receive medication, maintain the drug room, documents episodically

on all clients, schedule medical/dental appointments, and works under RN supervision. RN team leaders supervise and train LPNs, attend annual team meetings and program planning, and make referrals to appropriate community resources as needed and during discharge planning.

The inclusion criteria are that participants must be either an LPN or an RN team leader, including the CNO and quality management nurse. All LPNs employed within the organization at the two sites received education about medication reconciliation. Project exclusion criteria of the project are any LPNs directly supervised by the DNP student.

Recruitment

The QI project involved all RN team leaders and the LPNs employed at each of the two sites. The two sites included in this project are each staffed by an RN team leader and a weekday LPN. The change of process included the RN Team Leaders and LPNs. The CNO explained the process to the RN team leaders, and the LPNs received information regarding the project from their supervising RN. The internal stakeholders were thrilled about the possibility of reducing polypharmacy, which long-term could reduce health care costs. The nursing staff was in agreeance to working with the DNP leader on this project since they felt there was a need to decrease polypharmacy while increasing medication reconciliation, utilizing an evidence-based tool. However, the nursing staff, including the CNO, did not know the STOPP/START tool before project implementation. The information documented on the tool was all new to each nursing staff. The DNP leader shared information about the evidence-based use of the STOPP/START tool to reduce polypharmacy and potentially inappropriate medications. The nursing staff perceived the project as being what could help reduce the number of medicines the older adults received or consumed daily. The nursing staff were very excited and intrigued by the plan, given that there may be some barriers. The barriers that the RN team leaders were

concerned about was time. There was a concern if the LPN would have time to complete medication reconciliation using the evidence-based tool without lacking in other nursing responsibilities. The use of the EHR would be a barrier to the project; at times, the server was down, making it hard to collect data. The amendment would increase medication reconciliation, and the nursing staff would be able to identify potentially inappropriate medications that could contribute to polypharmacy. The change was needed, and each staff was willing to participate.

Implementation Process

Pre-Implementation. Before implementing the project at the two sites, the DNP lead reviewed every chart at each facility. The DNP lead determined which patients where considered older adults, 65 years, and older. Each patient's medication list for the older adults was collected and determined how many medications were currently prescribed, including over the counter, topicals, and injections. The information was input on an Excel spreadsheet and presented to the stakeholders at a C-Team meeting.

Educational Session. The project involved the implementation of nursing education on medication reconciliation and the STOPP/START tool. The project site champion emailed the DON regarding providing education to the nursing staff. A PowerPoint presentation occurred at the monthly nursing staff meeting on the importance and process of completing medication reconciliation (see Appendix I). During the educational session, it defined medication reconciliation and interventions to complete medication reconciliation. There was an explanation of the STOPP/START tool in detail about how and when to use the tool. The educational session provided an overview of the QI project that included an explanation of the process change and a new process of completing medication reconciliation with possible policy implementation.

Project Implementation. After the education of medication reconciliation and the use of the STOPP/START tool, the LPN used the evidence base tool when conducting medication reconciliation. Medication reconciliation will take place among all adults 65 years and older when there is a change or new order and transitions in care. The LPN will utilize the STOPP/START tool by body systems, obtaining evidence recommendation from the guideline, then providing the evidence-based recommendations to the provider.

Evaluation Method. The DNP project leader completed chart reviews every week at each site to ensure that the LPNs were appropriately completing medication reconciliation on the older adults. The chart reviews identified potentially inappropriate medications as it related to medication risks outweighing the benefits in older adults. The chart reviews determined whether potentially inappropriate medications were started or changed according to the STOP/START guidelines. Data collected from each chart review transferred on an Excel spreadsheet pre- and post-implementation. The final chart review took place eight-weeks after implementation utilizing the PDSA cycle. Upon completing chart reviews, more than 75% of the older adults at each site were prescribed and consuming potentially inappropriate medications. The older adults were receiving the right treatment as it related to the START section of the tool. However, some medications seemed to show duplication of drug class.

During the PDSA cycle, the DNP lead discovered that it was critical to document all potentially inappropriate prescriptions. When the data was collected and analyzed, it was essential to display the total amount of potentially inappropriate medications, to allow the provider to make a judgment as to any changes needing to be made to the older adult medication regimen. Another cycle determined that the LPN at a site required to be educated frequently about medication reconciliation and the reasons. The PowerPoint presentation was presented

initially before implementation and during implementation. One of the sites was able to successfully implement the use of the STOPP/START tool, providing a recommendation to the provider based on evidence at each medication change or transition in care (See Appendix J).

Plan Variation

The LPNs received education on medication reconciliation and the STOPP/START tool at a different time and date than that of the RN Team Leaders. The LPNs were not able to attend the monthly nursing meeting due to location and time. For the initial education session, four RN Team Leaders, one LPN, and the DON attended. Unfortunately, one of the weekdays LPNs went out on maternity leave before implementation; back-up nursing staff participated in the educational session to continue the project plan. There were two subsequent individual education sessions for the nursing staff working at the two sites. There were subsequent individual education sessions completed at each project site with the individual LPNs that provided the care during the week.

Summary

Weekly chart reviews occurred on adults 65 years and older in a long-term care facility. The goal of this QI project was to increase medication reconciliation. A method used to accomplish the goal was the implementation of the STOPP/START tool, an evidence-based tool used to detect potentially inappropriate medications or prescribing omissions. Additionally, it is essential to medication reconciliation to identify older adults at risk for polypharmacy and potentially inappropriate medication. In completing this, a reduction of potentially inappropriate medications will take place, ensuring safe and effective medication use.

Chapter Six: Evaluation of the Practice Change Initiative

Polypharmacy is most common among older adults. The reduction of polypharmacy and inappropriate medications among older adults in long term care facilities is imperative to improving patient safety. This chapter will discuss project results and areas of provider education that need enhancement. This chapter will also examine the demographics of the participants, evaluation of the project outcomes, and significant findings related to the DNP QI project.

Participant Demographics

During this DNP project implementation cycle, three LPNs and five RN team leaders, including the CNO and quality nurse, were trained to use the STOPP/START tool and applied the tool for completing medication reconciliation. Demographics about the staff were obtained through verbal questions and conversation. All the clinical staff received education on medication reconciliation and STOPP/START tool. All the participants were females with different years of nursing expertise, ranging from 7 to 49 years. Each nurse had varying levels of training, as it relates to education.

The provider, an adult-gerontology nurse practitioner (AGNP), was not included in this process of the quality improvement project. The AGNP did not receive education on medication reconciliation or trained on the STOPP/START tool. However, the AGNP was aware of the QI project being implemented.

The DNP project lead completed chart reviews on pre-implementation and post-implementation. There were no changes in patient demographics during those implementation phases. The patient demographics were obtained through data collection using an Excel spreadsheet. All the patients were 65 years and older, ranging from 66 to 85 years of age (*M* =

72). Of the patients that were 65 years and older, 55% were male (*n* = 6), and the other 45% were female (*n* = 5) (see Figure 2). Ethnicity was not studied; however, observation showed that 73% of the participants were African American presented with polypharmacy (see Figure 3).

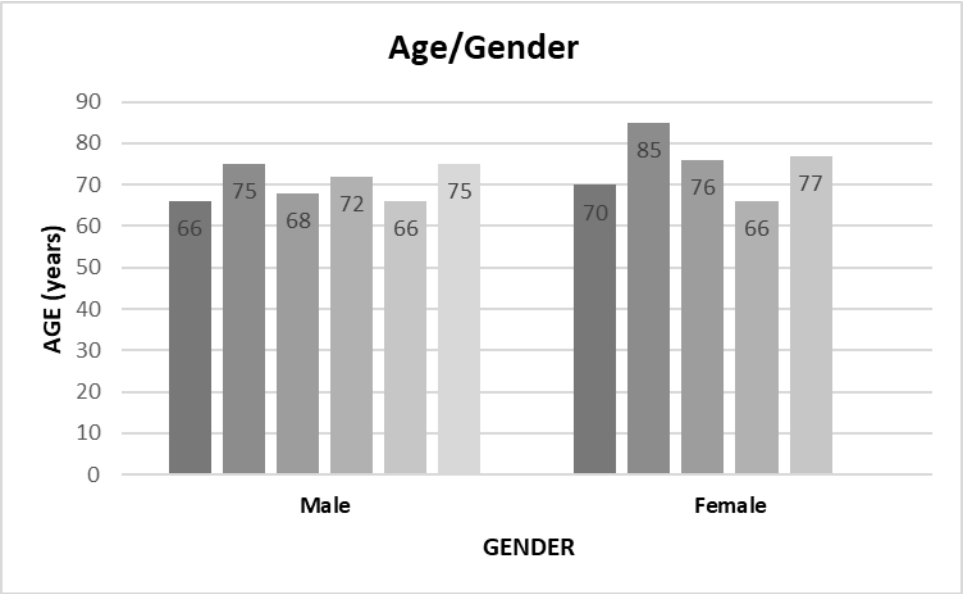

Figure 2. Demographics of Patients (Age/Gender)

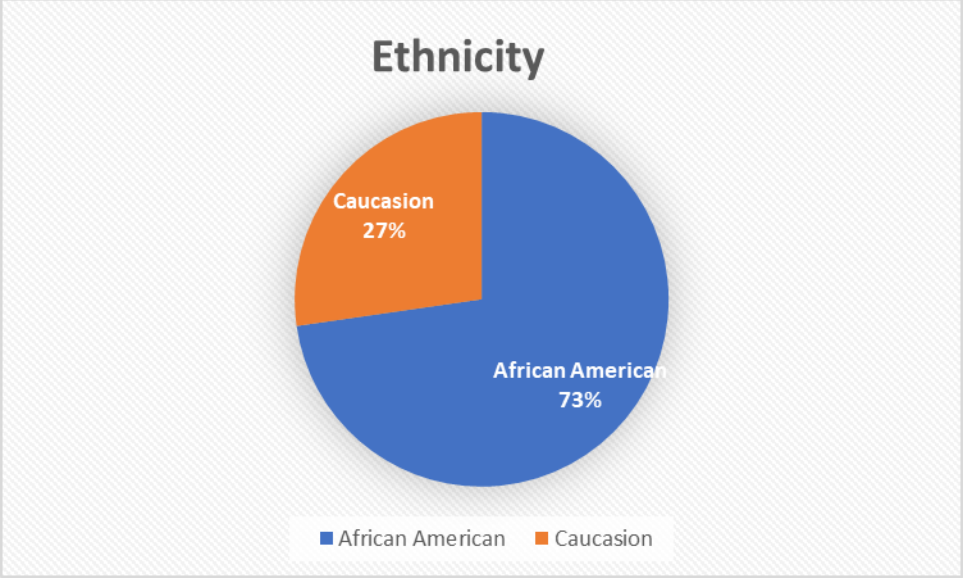

Figure 3. Demographics of Patients (Ethnicity)

Intended Outcome(s)

This DNP project short term outcomes were to introduce an evidence-based practice tool kit to complete medication reconciliation. The DNP project leader projected that the occurrences of polypharmacy and inappropriate medication among adults that were ≥ 65 years would decrease with the use of the STOPP/START criteria.

The intermediate project goal was for the clinical staff to change how and when they completed medication reconciliation. The plan was to change the previous behaviors of the clinical team while adopting new ones. The clinical would use the education and training related to the STOPP/START guidelines to complete accurate medication reconciliation.

The long-term goal was to increase comprehensive medication reconciliation after the nurses received educated on medication reconciliation. The safety of older adults expected to increase after reducing polypharmacy through medication reconciliation.

Findings. During the pre-implementation phase of the project, 100% of older adults (*N* = 11) in the long-term care facility recognized to have polypharmacy and potentially inappropriate medications. Between the two long-term care facilities, eleven patients were ≥ 65 years old at the pre-implementation phase of August 2019. These eleven patients were prescribed more than five medications, with a least half of those specified potentially inappropriate medications per STOPP/START criteria (see Figure 4).

The project implementation phase took place over eight weeks from September 2019 to November 2019. Two of the eleven patients diagnosed with gastroesophageal reflux disease (GERD) at one of the locations were discussed with the provider about being prescribed a proton pump inhibitor long-term without deprescribing and trying an H2 Blocker. The STOPP/START tool recommends that a proton pump inhibitor dose should be reduced or discontinued if ordered

for maintenance or prophylactic treatment of GERD (O'Mahony et al., 2015). The provider was unwilling to discontinue Nexium, a proton pump inhibitor due to ranitidine (H2 Blockers) recall. However, many other H2 Blockers are on the market, including famotidine and cimetidine. It was evident that the provider needs more education on the utilization of evidence-based practice. By the end of post-implementation, there was one patient of the eleven that had a decrease in the number of medications ordered and potentially inappropriate medications (see Figure 5). The post-implementation score (M =12.64, SD = 4.08).

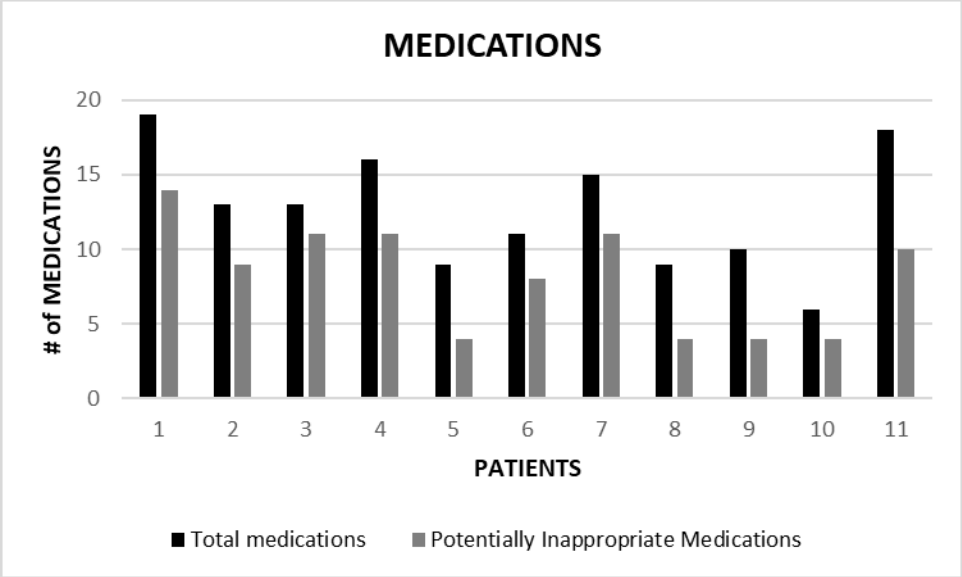

Figure 4. Total number of medications with the number of potentially inappropriate medications.

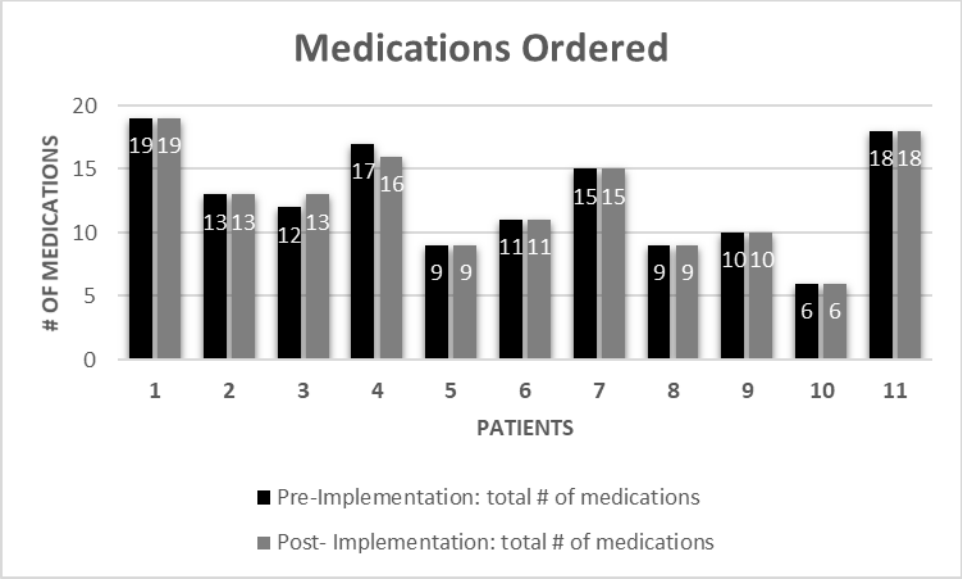

Figure 5. Total number of medications ordered Pre- & Post- Implementation.

Summary

In summary, 100% of the eleven patients aged ≥65 years deemed to have polypharmacy. After pre-implementation, all the patients (N = 11) were considered to have polypharmacy; therefore, many medications were identified as potentially inappropriate medications according to the STOPP/START guidelines. The STOPP/START criteria can be effectively used to reduce potentially inappropriate medications in older adults that have polypharmacy to ensure patient safety. Although the provider a non-participant, information was supplied to promote changes per the evidence-based tool. Implementing this QI project in the future, the provider should be included in any education and training to increase the findings of the project.

Chapter Seven: Implications for Nursing Practice

The American Association of Colleges of Nursing (AACN) defines the eight *Essentials* or core curriculum elements used to complete the Doctor of Nursing Practice (DNP) Program. The eight DNP *Essentials* aided to create and implement quality improvement for this project. The following chapter will define each essential as it aligned with this DNP project and implications for practice.

Practice Implications

Essential I: Scientific underpinnings for practice. The DNP *Essentials* I is aligned with how a DNP graduate uses the knowledge of science and theory as the foundation for advanced nursing practice. According to AACN (2006), the DNP program prepares the graduate to integrate nursing science, utilize science-based theories and concepts, and to be able to establish and evaluate new practice initiatives. Theory and concepts address the foundation of the DNP project.

The QI project started with a systematic literature review that provided the background and significance of polypharmacy among older adults in long-term care facilities. Kurt Lewin's change theory is the theoretical framework for the project to implement change among the nurses conducting medication reconciliation. The method supports changing behaviors through rejection and replacement of prior learning using an unfreezing-change-refreezing model. The DNP project was completed using the Plan-Do-Study-Act (PDSA) cycle during the implementation of the project and to evaluate possible improvements due to time limitations. The PDSA cycle provided a platform for implementation and evaluation of the project in eight weeks. A recommendation for the future would include the provider and the consultant pharmacist in the education of medication reconciliation utilizing an evidence-based tool.

Essential II: Organization and systems leadership for quality improvement and systems thinking. The DNP *Essential* II identifies how patient and healthcare outcomes show improvement through an organizational perspective. The DNP prepared nurse should be able to provide quality of care and patient safety through initiatives of quality improvement integrating business, finance, economics, and health policy with adequate budgets and cost-analysis (AACN, 2006). According to AACN (2006), the DNP graduate should be able to create and evaluate strategies that can guide ethical dilemmas among patient care, research, and organizations.

The DNP project focused on meeting the need of older adults in long-term care facilities. An assessment was completed of the organization to identify issues with plans to implement organization changes (policy); how the nurses should conduct medication reconciliation and reducing polypharmacy among the older adults. The expenses related to the project are minimal, including providing copies of the STOPP/START tool. The QI project was cost-effective, and the organization will not incur additional expenses when implemented as a standard policy.

Essential III: Clinical scholarship and analytical methods for EBP. The third DNP *Essential* encompasses being able to translate research into practice. According to AACN (2006), the DNP prepared nurse should be able to apply evidence-based knowledge from diverse sources and disciplines to solve practice problems and improve patient outcomes. The DNP graduate should possess the capability of the appropriate use of information systems with research techniques to collect data, analyze data, analyze results, and identify gaps in evidence (AACN, 2006).

The DNP graduate used the STOPP/START criteria, an evidence-based tool for medication reconciliation in long-term care facilities to reduce polypharmacy. The DNP project was able to promote safe, timely, effective, and patient-centered care was utilizing a plan of

action (AACN, 2006). Charts were reviewed before implementation to collect baseline data. The DNP graduate obtained outcome data regarding evidence-based practice and disseminated findings to the QI team to improve patient healthcare outcomes. In the future, the interdisciplinary team approach needs to be implemented, including consultant pharmacy and provider.

Essential IV: Information systems/technology and patient care technology for the improvement and transformation of healthcare. The understanding of information systems and patient care technology is a crucial component to be able to apply knowledge, manage information, and to support and improve patient care. The DNP graduate should be proficient in the use of information technology so that quality improvement initiatives can occur during implementation. The effectiveness of applying information technology/systems allows DNP graduates to be able to analyze, communicate, and evaluate healthcare and patient care (AACN, 2006).

The DNP project was able to utilize healthcare technology, including the electronic health care record utilization, which allowed data to be collected; an excel spreadsheet helped to evaluate data. The company-based email was a method to provide evidence-based education and communication with the chief executive officer, chief operating officer, chief financial officer, and chief nursing officer of the organization, as well as dissemination of outcomes. The organizations' electronic health record (EHR) provided pre-implementation and post-implementation data. The EHR was a valuable source for gathering data; however, there were days the server was not working, and data was not collected. Since the EHR was not always a reliable source, one of the facilities utilized paper charts. Information obtained from the EHR and paper chart was entered into an Excel spreadsheet to be analyzed. The information provided

relevant details about the number of potentially inappropriate medications prescribed to each older adult. The future recommendation is to obtain an electronic medication administration record with alerts of potentially inappropriate medications or adverse events.

Essential V: Healthcare policy for advocacy in healthcare. In the fifth DNP *Essential*, DNP nurses are prepared to design, influence, and implement health care policies from organizational to governmental. The DNP graduate will provide education to the stakeholders of organizations as it relates to nursing, health policy, and outcomes of patient care. The DNP prepared nurse can provide advocation through the promotion of social justice and equity in healthcare (AACN, 2006).

The DNP project completion is to implement a practice change in the organization. The organization did not have an existing policy on medication reconciliation utilizing evidence-based tools in a long-term care facility. The stakeholders of the organization received education on the importance of medication reconciliation for older adults using evidence-based tools so that a policy can be implemented in the future to provide medication reconciliation.

Essential VI: Interprofessional collaboration for improving patient and population health outcomes. DNP prepared nurses to provide an indispensable role in interprofessional collaboration, taking the leadership role as needed. The AACN (2006) states that the graduate is prepared to utilize effective communication and collaborative skills to create and implement practice changes. The DNP graduate possesses leadership qualities to be able to provide an analysis of practice or organizational issue that is complex (AACN, 2006).

Implementation of the DNP project demonstrated a need to obtain input and cooperation from those on the interdisciplinary team of the organization. The DNP project utilized interprofessional collaboration for improving patient outcomes with the nurses (LPNs and RNs),

an advanced practice nurse, and a medical director. The DNP project lead assumed leadership of the team with effective communication and collaboration via telephone conferences and quality improvement meetings. In the future, the organization should consider employing a DNP prepared nurse that has expertise in quality improvement to provide early changes.

Essential VII: Clinical prevention and population health for improving the nation's health. DNP *Essential* VII consists of health promotion, reducing risk, and preventing illness as it pertains to a group of individuals. A shared characteristic classifies the group of individuals targeted in this project. According to the AACN (2006), the DNP graduate possesses knowledge of clinical prevention and population health to implement activities that improve the health status of the United States. The DNP graduate can analyze epidemiological data in the development, implementation, and evaluation of interventions to address gaps of care (AACN, 2006).

The QI project's implications for practice were to provide education to the nurses about medication reconciliation and polypharmacy. Epidemiological data were analyzed and provided pertinent information related to polypharmacy among older adults in long-term care facilities. The epidemiological data included age, gender, the total number of medications prescribed, and the amount of potentially inappropriate medicines based on the STOPP/START criteria of each individual. Polypharmacy can have a problematic effect on aging adults; it is crucial to understand the benefits or risks of medication. The DNP graduate can address gaps in care related to the process of completing medication reconciliation, reducing potential adverse events. The organization should consider policy implementation related medication reconciliation to reduce polypharmacy and adverse drug events.

Essential VIII: Advanced nursing practice. DNP *Essential* VIII encompasses the competencies of foundational practice. AACN (2006) states that the DNP program prepares the

graduate to have advanced knowledge and mastery in an area of nursing practice. The DNP program prepares each graduate to be able to utilize nursing science and (or) other science to design, implement, and evaluate therapeutic interventions. The DNP graduate provides evaluation among practice, organizational, population, fiscal, and policy issues through conceptual and analytical skills. The graduate accomplishes high achievement by providing guidance and mentorship to other nurses, with the expectation of improving patient outcomes. DNP prepared nurses to have the knowledge and competency to be able to inform practices and address clinical issues among a variety of patient care settings (AACN, 2006).

This QI project took place in a long-term care facility; however, the lessons learned through this project could provide some benefit to other healthcare settings. This competency accomplished the potential development of a new policy for completing medication reconciliation when changes are made to medication and during transitions of care. Nurses can improve medication reconciliation in different settings if the knowledge of polypharmacy and its effects on older adults when disseminated. The intervention of implementing the STOPP/START criteria could improve polypharmacy among older adults within other healthcare settings. A standard is an evidence-based approach to medication reconciliation. Employing DNP prepared nurses in the future will allow the organization to have a clinician that has the skillset to improve quality, as well as supporting other nursing to achieve excellence.

Summary

The DNP *Essentials* is a well-defined guide used by advanced practice nursing programs to guide students and faculty with core concepts of the curriculum. The DNP *Essentials* prepare nurses for a higher level of leadership. Throughout this QI project, evidence-based data supported the quality improvement interventions of this project. There was a collaboration with

the interdisciplinary team to provide education on medication reconciliation. Information technology facilitated to obtain and analyze data related to polypharmacy. This DNP project used the DNP *Essentials* during the planning, implementation, and outcomes. The DNP *Essentials* was a valuable source for providing organizations with the capabilities of DNP prepared nurses. Practice implications offer pertinent information to moving forward with this QI project and implementing it into the organization.

Chapter Eight: Final Conclusions

This chapter is the conclusion of this DNP project, which provides a discussion of the clinical significance of this project with outcomes. There will be a thorough review of the findings, learned lessons, and project strengths and weaknesses. An analysis provided how the use of the STOPP/START tool can be implemented in other settings. The project benefits will be discussed as to how the cost is minimal and project recommendations that could impact a future change of practice.

Significance of Findings

Initial findings from this project suggest that the use of the STOPP/START guidelines may decrease polypharmacy in older adults. With the PDSA cycle, there were several educational sessions. The education provided to the nurses did increase medication reconciliation as projected.

Although the Corporate or C-team, which consists of the chief executive officer, chief operating officer, chief financial officer, and the chief nursing officer, was interested in decreasing polypharmacy among the older adults. Due to insufficient staffing, the clinical staff was concerned about time. The clinical staff articulated that they would not have enough time to review the STOPP/START guidelines during each new medication order and at transitions of care. The clinical staff had many other duties, including assisting with the client's daily care at the times of short staffing. The fears of the clinical staff were reduced minimally by explaining that the STOPP/START guidelines should be used for new medication orders. An example was to ensure a medication did not cause drug-drug interaction or drug-disease interaction (such as a thiazide in a patient with a history of gout). Time constraints were consistently the issue. Being

that the staff was concerned about the time, it was apparent that the staff were not likely to complete medication reconciliation utilizing the STOPP/START guidelines.

The patients were impacted the most through the clinical staff, changing their behaviors in completing medication reconciliation. The patients' safety is affected by medication reconciliation. Medication reconciliation lessens the chance of (1) discrepancies in a patient's drug list and (2) the number of adverse drug events. The STOPP/START guidelines were simple to teach the staff and were free, other than the cost of printing. The clinical staff received evidence-based printed information related to older adult prescriptions. Medication reconciliation provides an accurate list of patient's medications; any age or population can benefit. In return, this suggests that this project can be translated into other long-term care settings and primary care as well as hospitals.

Project Strengths and Weaknesses

This DNP project was challenging to implement. The strengths of this DNP project were that the project was accepted and supported by the site clinical staff. The clinical staff had not been involved in a QI project, but they were eager to learn about medication reconciliation and the STOPP/START tool. By utilizing the STOPP/START tool without permission allows different health care settings to adapt it. The project was economical to implement, with no incurred cost for the project sites. If the organization adopts the project, minus the cost for the snacks provided, the cost should be minimal as printing can take place on-site.

Weaknesses of this project included the project sites were small, with a minimal number of adults sixty-five years or older to use the STOPP/START tool to complete medication reconciliation. Of the 30 patients between the two sites, 37% were 65 years and older during the implementation phase. The provider was absent at all education sessions. If the provider

participated in the QI project during planning, this could have possibly increased the team approach and increased a reduction of potentially inappropriate medications.

Project Limitations

The limitations of this DNP project included time constraints. The project was limited to an eight-week implementation period. The provider was not educated on the STOPP/START tool, using evidence-based data to reduce polypharmacy, affecting limitations to changes. Considering that the project sites were not entirely electronic, at times, not every medication order was recorded in the electronic health record. The DNP project lead reviewed paper charts to obtain medication data. At one of the sites, due to the limited staff time at the facility with the high demand for work, the tool was not utilized consistently.

Project Benefits

There were many benefits of this QI project at a long-term care facility. The clinical staff learned that medication reconciliation completion is more than once a month. The clinical staff learned that medication reconciliation is completed at the time a new medication is ordered and change or transitions in care, including admissions and discharges.

The clinical staff is essential to prevent polypharmacy through medication reconciliation. Providing the clinical team with an evidence-based tool and guidelines to complete medication reconciliation will improve the care and safety of patients. The cost of healthcare will decrease due to reducing polypharmacy, which reduces the possibility of an adverse drug reaction. In return, the Centers for Medicare and Medicaid Services (CMS) will spend less on preventable adverse drug events. As a result, there will be less money lost by the long-term facilities related to non-payment of CMS due to requiring a higher level of care services at a hospital for an unknown time-period (hospital stay).

Practice Recommendations

Following this quality improvement project, project recommendations include an organizational change. All long-term care facilities should have an organizational policy in which medication reconciliation completion occurs in detail. The change should consist of a procedure in which the nurses are required to use an evidence-based tool to achieve medication reconciliation. The policy should provide details with what, why, who, when, and how medication reconciliation and procedures should be performed. The what of the policy will define medication reconciliation. The why of the policy will describe why the completion of medication reconciliation is relevant- patient safety and reduce polypharmacy. The who of the policy will state that the LPN or RN completes medication reconciliation. The when of the policy will state that completion of medication reconciliation takes place when there is a new medication order or transitions of care during admission or discharge. The process of completing how medication reconciliation within the procedure includes (1) LPN or RN will verify the medication by comparing the drug name, route, dosage, and frequency according to medication history or list and (2) the medication will then be clarified by comparing to medication orders. During the reconciliation phase, the clinical staff will use the STOPP/START tool to determine if any medications may be inappropriate for the older patient and suggest recommendations to the provider. The policy should include continuous clinical staff education on medication reconciliation.

Adopting the use of the STOPP/START guidelines can be optional during medication reconciliation by the nurses or clinical staff. The organization can choose another evidence-based tool to help decrease adverse drug events related to polypharmacy, including the BEERs criteria. Providers should understand why an evidence-based tool is used to help decrease drug-

drug or drug-disease interactions, but it does not take the place of their clinical judgment or knowledge. The provider should be made aware of each drug that a patient may be consuming that is potentially inappropriate and can cause harm.

Final Summary

Polypharmacy is a relevant issue in long-term care facilities, affecting those that are sixty-five years of age and older. Polypharmacy in this population is increasingly rising, which, in return, increases older adults' need for care. Increased morbidity, adverse drug events, or even mortality, can be an effect of polypharmacy, raising patient safety issues.

This DNP project implemented the use of the STOPP/START criteria to reduce polypharmacy among those that sixty-five years and older in long-term care, intermediate care facility for developmentally disabled adults in eastern NC. The project was challenging, although inexpensive to implement. The project did have limitations with time but was able to be completed as scheduled with minimal modifications.

The implementation of this QI project helped to implement evidence-based proposals into best practice and polypharmacy implications. Providing nurses with education on medication reconciliation helped to close the gap between knowledge and evidence-based nursing practice.

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APPENDIX A

Literature Matrix

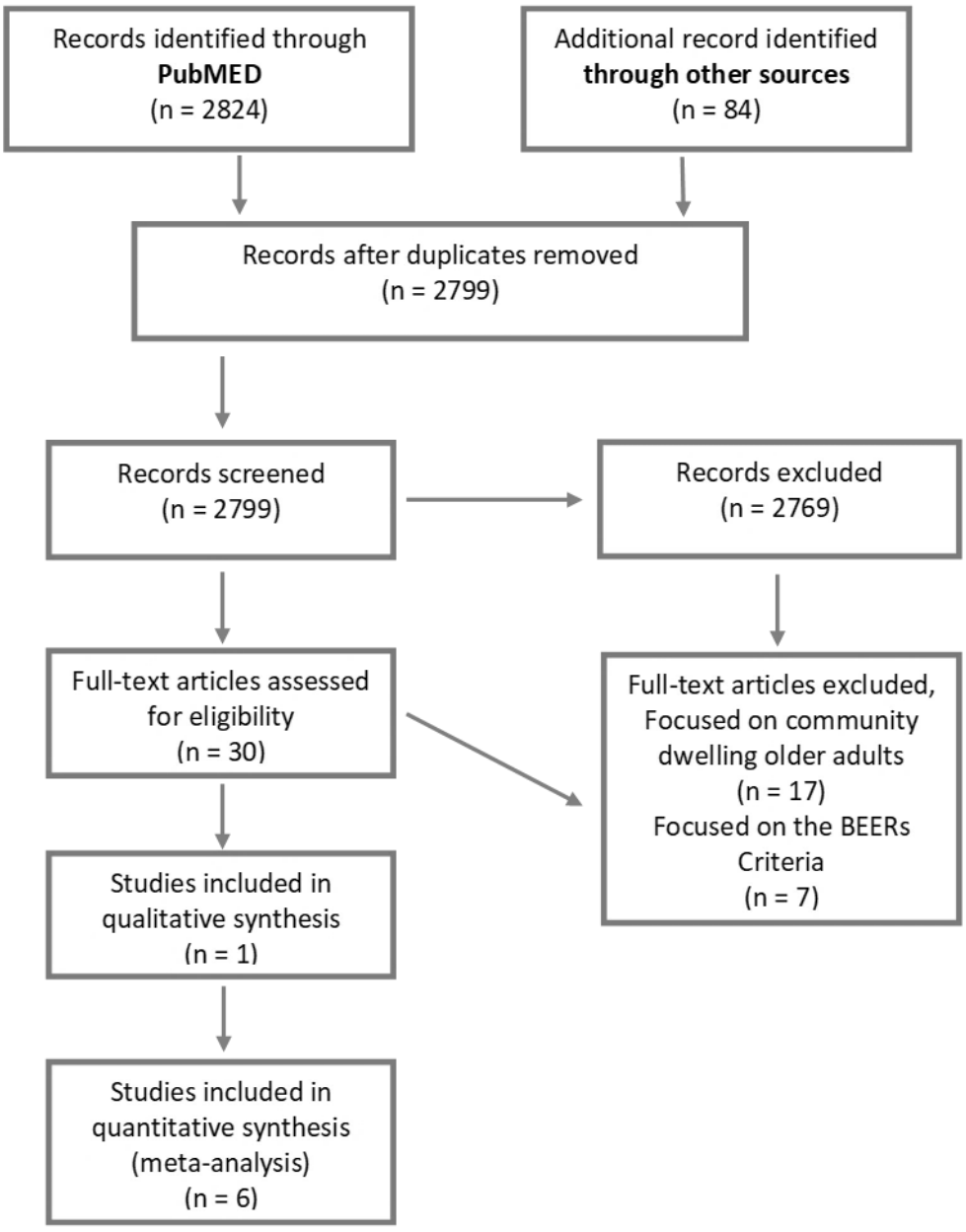
Article	Level of Evidence	Data/Evidence Findings	Conclusion or Summary	Use of Evidence in EBP Project Plan
Charlesworth, C. J., Smit, E., Lee, D. S. H., Alramadhan, F., & Odden, M. C. (2015). Polypharmacy among adults aged 65 years and older in the United States: 1988-2010. The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 70(8), 989-995. doi:10.1093/gerona/glv013	Level I	Utilizing the updated BEERS criteria reduced potential inappropriate medications in older adults.	Medications that are prescribed to older adults has increased. Indicating that polypharmacy means that older adults have bad health.	Utilizing the updated BEERs Criteria has decreased the number of inappropriate medications in older adults. Polypharmacy is an important issue that should be addressed by stakeholders.
Morin, L., Johnell, K., Laroche, M., Fastbom, J., Wastesson, J. W., Stockholms Universitet, . . . Samhällsvetenskapliga fakulteten. (2018). The epidemiology of polypharmacy in older adults: Register-based prospective cohort study. Clinical Epidemiology, 10, 289-298. doi:10.2147/CLEP.S153458	Level IV	Over 40% of older adults are exposed to polypharmacy, 10% are taking more than ten drugs.	Polypharmacy increases as a person get older and have comorbidities.	Interventions should include reducing polypharmacy as well as prevention before an older adult receives more medication than needed.
Alpert, P. T., & Gatlin, T. (2015). Polypharmacy in older adults. Home Healthcare Now, 33(10), 524-529. doi:10.1097/NHH.0000000000000299	Level IV	There are tools used to address polypharmacy such as STOPP/START, Beers Criteria, ARMOR	A medication review should be completed continually	There are many strategies used to address polypharmacy. Validated tool is a strategy for completing medication reviews.
Jokanovic, N., BPharm (Hons), Tan, E. C. K., PhD, Dooley, M. J., PhD, Kirkpatrick, C. M., PhD, & Bell, J. S., PhD. (2015). Prevalence and factors associated with polypharmacy in long-term care facilities: A systematic review. Journal	Level 1	Increase in polypharmacy in older adults living in LTC than community-dwelling.	Polypharmacy has a high prevalence in long-term care facilities	Polypharmacy is common in Long Term Care Facilities. Polypharmacy needs to be studied more due to the multiple definitions that are different.

of the American Medical Directors Association, 16(6), 535.e1-535.e12. doi:10.1016/j.jamda.2015.03.003				
Brown, L. G. (2016). Untangling polypharmacy in older adults. Medsurg Nursing, 25(6), 408-411. Retrieved from http://search.proquest.com.jproxy.lib.ecu.edu/docview/1849701008?accountid=10639	Level I	Polypharmacy increases adverse drug reactions and adverse drug events in older adults	The healthcare team should work together to reduce polypharmacy. The nurse's role is important.	STOPP Tool is used to complete medication reviews. Nurses role is important
Arnoldo, L., Cattani, G., Cojutti, P., Pea, F., & Brusaferro, S. (2016). Monitoring Polypharmacy in Healthcare Systems Through a Multi-Setting Survey: Should We Put More Attention on Long Term Care Facilities?. Journal of public health research, 5(3), 745. doi:10.4081/jphr.2016.745	Level IV	PIP increases with the number of drugs taken. The setting in which the elderly lives have an impact on PIP.	Long-Term Care Facilities should receive more education on medication reconciliation due to the issue of polypharmacy	Polypharmacy is prevalent in LTCFs.
Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions. BMC Geriatrics, 17(1), 230-10. doi:10.1186/s12877-017-0621-2	Level I	Polypharmacy is not defined precisely, making it hard to address patient safety issues.	Multiple definitions for polypharmacy. Healthcare systems should consider one definition of polypharmacy	Many definitions for polypharmacy.
Dagli, R. J., & Sharma, A. (2014). Polypharmacy: A global risk factor for elderly people. Journal of International Oral Health, 6(6), I.	Level I	Medication reviews should be completed using tools such as STOPP/START and ARMOR.	It is important to complete medication reviews to decrease adverse effects related to polypharmacy.	Polypharmacy should be evaluated to reduce ADE.
Centers for Disease Control and Prevention. (2018). Medication Safety Program: Adverse Drug Events in Adults. Retrieved from https://www.cdc.gov/medicationsafety/adult_adve	Level VII	There is an increase in adverse events in older adults	Adverse events in older adults cause more visits to the emergency department and hospitalizations	Adverse events increase the cost of health care

rsedrugevents.html				
Wooten, J. M. (2015). Rules for improving pharmacotherapy in older adult patients: Part 1 (rules 1–5). Southern Medical Journal, 108(2), 97-104. doi:10.14423/SMJ.0000000000000243	Level I	Using evidence-based practice can save money within the healthcare system. Also, limit adverse drug events in the elderly population	Using evidence-based practice as guidelines to improve drug therapy in older patients prevents polypharmacy.	Improving therapy related to drugs to prevent older adults from polypharmacy.
Bokhof, B., & Junius-Walker, U. (2016). Reducing polypharmacy from the perspectives of general practitioners and older patients: A synthesis of qualitative studies. Drugs & Aging, 33(4), 249-266. doi:10.1007/s40266-016-0354-5	Level V	That communicating with patients about plans regarding drugs helps with handling issues of polypharmacy	To ensure that approaches or tools used to reduce polypharmacy is effective.	Evaluate qualitative studies in reducing polypharmacy in older adults with the knowledge of general practitioners

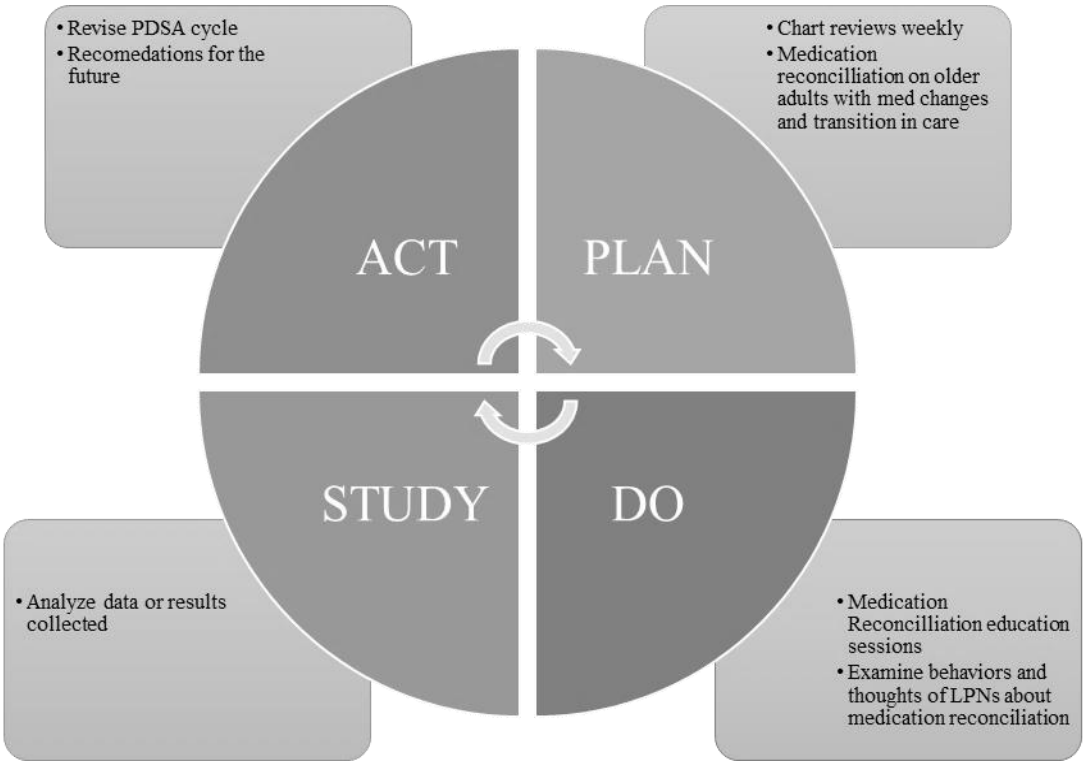
Appendix B

Flow Diagram of Study Selection



APPENDIX C

PDSA Cycle



APPENDIX D

[redacted]

"Creating Life Skills With Those We Serve"

Date: April 1, 2019

To East Carolina University College of Nursing:

We at [redacted] Inc. have reviewed Tiara Green's DNP Project Proposal Polypharmacy among older adults in Long Term Care Facilities". Ms. Green has organizational support and approval to conduct their project within our institution. We understand that the timeframe for this project is from the date of this letter through April 30, 2020. Implementation at the project site will occur August/September 2019 through November 30, 2019, unless otherwise negotiated. We understand that for Ms. Green to achieve completion of the DNP program, dissemination of the project will be required by the University which will include a public presentation related to the project and a manuscript submission will be encouraged.

Our organization has deemed this project for potential policy & procedure development. Our organization is aware that this project will be processed first through our internal organizational equivalent of an IRB; specifically, our C-Team Risk Management and Ethics Committee. Then, we further understand that this project will be reviewed through the University and Medical Center Internal Review Board of East Carolina University (UMCIRB). Our organization does not have an Internal Review Board (IRB).

Thank you.

[redacted]
Medical Consultant

[redacted]
CEO

[redacted]

APPENDIX E

DNP Project Budget

LINE ITEM	UNIT COST	QUANTITY	TOTAL
Educational			
Printing and Photocopying	$0.13	30	$3.90
Laminating (evidence-based tool)	$1.89	20	$37.80
Educational Seminar Snacks			
Water (24 pack)	$3.98	1	$3.98
Fruit Tray	$25.99	1	$25.99
Granola Bars (6 pack)	$2.98	2	$5.96
Supplies			
Pens (10 count)	$2.29	1	$2.29
Total			$79.92

APPENDIX F

EAST CAROLINA UNIVERSITY
University and Medical Center Institutional Review Board (UMCIRB)
Brody Medical Sciences Building, 4N-64• 600 Moye Boulevard • Greenville, NC 27834
Office 252-744-2914 • Fax 252-744-2284 • www.ecu.edu/irb

TO: Tiara Green, ECU College of Nursing, DNP Program
FROM: UMCIR
DATE: July 15, 2019

TITLE: Doctor of Nursing Practice (DNP) Scholarly Project
Polypharmacy among older adults in Long Term Care Facilities

This activity has undergone review on 7/12/2019 by the UMCIRB office. A Doctor of Nursing Practice candidate is planning a quality improvement initiative at two Skill Creations Incorporated facilities in Eastern NC. The purpose of this project is to provide LPNs and RNs education and training on validated tools for use in an effort to reduce polypharmacy and potentially inappropriate medication among adults in the long-term care facility.

This activity is deemed outside of UMCIRB jurisdiction because it does not meet the current federal descriptions for human subject research. Therefore, this activity does not require UMCIRB approval. Contact the office if there are any changes to the activity that may require additional UMCIRB review or before conducting any human research activities.

Relevant Definitions for Human Subject Research:

- Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes. For example, some demonstration and service programs may include research activities
- Human subject means a living individual about whom an investigator (whether professional or student) conducting research:
  (i) Obtains information or biospecimens through intervention or interaction with the individual, and uses, studies, or analyzes the information or biospecimens; or
  (ii) Obtains, uses, studies, analyzes, or generates identifiable private information or identifiable biospecimens.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.

IRB00000705 East Carolina U IRB (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB (Behavioral/SS) IORG0000418

APPENDIX G

Screening Tool of Older Persons' Prescriptions (STOPP)	
Indication of Medication	
Drug prescribed without evidence-based indication	**STOP**
Drug prescribed beyond the recommended duration, where treatment duration is well defined	**STOP**
Duplicate drug class	**STOPP:** Utilize single drug, before considering a new drug/agent
Cardiovascular System	
Heart failure with normal systolic ventricular function	**STOP** Digoxin- no evidence of benefit
New York Heart Association (NYHA) Class III or IV heart failure	**STOP** Verapamil or Diltiazem- may worsen heart failure
Beta-blocker in combination with Verapamil or Diltiazem	**STOP** one Verapamil or Diltiazem- risk of heart block
Beta-blocker with bradycardia (< 50/min), type II heart block or complete heart block	**STOP-** risk of complete heart block, asystole
Amiodarone as first-line antiarrhythmic therapy in supraventricular tachyarrhythmias	**STOP-** higher risk of side-effects than beta-blockers, digoxin, verapamil, or diltiazem
Loop diuretic as first-line treatment for hypertension	**STOP** safer, more effective alternatives available
Loop diuretic for dependent ankle edema without clinical, biochemical evidence or radiological evidence of heart failure, liver failure, nephrotic syndrome, or renal failure	**STOP-** leg elevation and /or compression stockings usually more appropriate
Thiazide diuretic with current significant hypokalemia (serum K+ < 3.0 mmol/l), hyponatremia (serum Na+ < 130 mmol/l) hypercalcemia (corrected serum calcium > 2.65 mmol/l) or with a history of gout	**STOP**- hypokalemia, hyponatremia, hypercalcemia, and gout can be precipitated by thiazide diuretic
Loop diuretic for treatment of hypertension with concurrent urinary incontinence	**STOP**- may exacerbate incontinence
Centrally acting antihypertensives (methyldopa, clonidine, moxonidine, rilmenidine, guanfacine)	**STOP**- unless clear intolerance of, or lack of efficacy with, other antihypertensives (centrally acting antihypertensives are generally less tolerated by older people than younger people)
ACE inhibitors or Angiotensin Receptor Blockers in patients with hyperkalemia	**STOP**
Aldosterone antagonists (spironolactone, eplerenone) with concurrent potassium conserving drugs (ACEI's, ARB's, amiloride, triamterene) without monitoring of serum potassium	**STOP-** risk of dangerous hyperkalemia > 6.0 mmol/l; or serum K should be monitored six months

Phosphodiesterase type-5 inhibitors (sildenafil, tadalafil, vardenafil) in severe heart failure characterized by hypotension (systolic BP < 90 mmHg), or concurrent nitrate therapy for angina	**STOP**- risk of cardiovascular collapse
Antiplatelet/Anticoagulant Drugs	
Long-term aspirin at doses greater than 160mg per day	**STOP-** increased risk of bleeding, no evidence for increased efficacy
Aspirin with a history of peptic ulcer disease without concomitant Proton Pump Inhibitor	**STOP-** risk of recurrent peptic ulcer
Aspirin, clopidogrel, dipyridamole, vitamin K antagonists, direct thrombin inhibitors or factor Xa inhibitors with concurrent significant bleeding risk (severe uncontrolled hypertension, bleeding diathesis, recent non-trivial spontaneous bleeding)	**STOP-** high risk of bleeding
Aspirin plus clopidogrel as secondary stroke prevention, unless the patient has a coronary stent(s) inserted in the previous 12 months or concurrent acute coronary syndrome or has a high grade symptomatic carotid arterial stenosis	**STOP-** no evidence of added benefit over clopidogrel monotherapy
Aspirin in combination with vitamin K antagonist, direct thrombin inhibitor or factor Xa inhibitors in patients with Chronic A. Fib	**STOP-** no added benefit from aspirin
Antiplatelet agents with vitamin K antagonist, direct thrombin inhibitor or factor Xa inhibitors in patients with stable coronary, cerebrovascular or peripheral arterial disease	**STOP-** no added benefit from dual therapy
Ticlopidine in any circumstances	**STOP-** clopidogrel and prasugrel have similar efficacy, stronger evidence, and fewer side-effects
Vitamin K antagonist, direct thrombin inhibitor or factor Xa inhibitors for first deep venous thrombosis without continuing provoking risk factors (thrombophilia) for > 6 months	**STOP-** no proven added benefit
Vitamin K antagonist, direct thrombin inhibitor or factor Xa inhibitors for first pulmonary embolus without continuing provoking risk factors (thrombophilia) for > 12 months	**STOP-** no proven added benefit
NSAID and vitamin K antagonist, direct thrombin inhibitor or factor Xa inhibitors in combination	**STOP-** risk of major gastrointestinal bleeding
NSAID with concurrent antiplatelet agent(s) without PPI prophylaxis	**STOP-** increased risk of peptic ulcer disease
Central Nervous System and Psychotropic Drugs	
Tricyclic Antidepressants (TCAs) with dementia, narrow-angle glaucoma, cardiac conduction abnormalities, prostatism, or history of urinary retention	**STOP-** risk of worsening these conditions

Initiation of Tricyclic Antidepressants (TCAs) as first-line antidepressant treatment	**STOP-** higher risk of adverse drug reactions with TCAs than with SSRIs or SNRIs
Neuroleptics with moderate-marked antimuscarinic/anticholinergic effects (chlorpromazine, clozapine, flupenthixol, fluphenazine, pipotiazine, promazine, zuclopenthixol) with a history of prostatism or previous urinary retention	**STOP-** high risk of urinary retention
Selective serotonin re-uptake inhibitors (SSRI's) with current or recent significant hyponatremia (Na+ < 130)	**STOP-** risk of exacerbating or precipitating hyponatremia).
Benzodiazepines for ≥ four weeks	**STOP-** no indication for longer treatment; risk of prolonged sedation, confusion, impaired balance, falls, road traffic accidents; wean gradually to reduce withdrawal
Antipsychotics (except quetiapine or clozapine) in those with parkinsonism or Lewy Body Disease	**STOP-** risk of severe extra-pyramidal symptoms
Anticholinergics/antimuscarinics to treat extra-pyramidal side-effects of neuroleptic medications	**STOP-** risk of anticholinergic toxicity
Anticholinergics/antimuscarinics in patients with delirium or dementia	**STOP-** risk of exacerbation of cognitive impairment
Neuroleptic antipsychotic in patients with behavioral and psychological symptoms of dementia (BPSD)	**STOP-** unless symptoms are severe and other non-pharmacological treatments have failed (increased risk of stroke)
Neuroleptics as hypnotics, unless sleep disorder is due to psychosis or dementia	**STOP-** risk of confusion, hypotension, extra-pyramidal side effects falls
Acetylcholinesterase inhibitors with a known history of persistent bradycardia (< 60 beats/min.), heart block or recurrent unexplained syncope or concurrent treatment with drugs that reduce heart rate (beta-blockers, digoxin, diltiazem, verapamil)	**STOP-** risk of cardiac conduction failure, syncope, and injury
Phenothiazines as first-line treatment (sedative)	**STOP-** safer and more efficacious alternatives exist
Levodopa or Dopamine agonists for benign essential tremor	**STOP-** no evidence of efficacy
First-generation antihistamines	**STOP-** safer antihistamines available
Renal System	
"the following drugs are potentially inappropriate in older people with acute or chronic kidney disease with renal function below particular levels of eGFR."	
Digoxin at a long-term dose greater than 125mcg/day, if eGFR < 30 ml	**STOP-** risk of digoxin toxicity if plasma levels not measured
Direct thrombin inhibitors (dabigatran), if eGFR < 30 ml	**STOP-** risk of bleeding
Factor Xa inhibitors (rivaroxaban, apixaban) if eGFR < 15 ml	**STOP-** risk of bleeding
NSAID's, if eGFR < 50 ml	**STOP-** risk of deterioration in renal function

Colchicine, if eGFR < 10 ml	**STOP-** risk of colchicine toxicity
Metformin, if eGFR < 30 ml	**STOP-** risk of lactic acidosis
Gastrointestinal System	
Prochlorperazine or metoclopramide with Parkinsonism	**STOP-** risk of exacerbating Parkinsonian symptoms
PPI for uncomplicated peptic ulcer disease or erosive peptic esophagitis at full therapeutic dosage for > 8 weeks	**STOP-** or reduce dosage
Drugs likely to cause constipation (antimuscarinic/anticholinergic drugs, oral iron, opioids, verapamil, aluminum antacids) in patients with chronic constipation where non-constipating alternatives are available	**STOP-** risk of exacerbation of constipation
Oral elemental iron doses greater than 200 mg daily	**STOP-** no evidence of enhanced iron absorption
Respiratory System	
Theophylline as monotherapy for COPD	**STOP-** safer, more effective alternative; risk of adverse effects due to narrow therapeutic index
Systemic corticosteroids instead of inhaled corticosteroids for maintenance therapy in moderate-severe COPD	**STOP-** unnecessary exposure to long-term side-effects of systemic corticosteroids and effective inhaled therapies are available
Anti-muscarinic bronchodilators (ipratropium, tiotropium) with a history of narrow-angle glaucoma or bladder outflow obstruction	**STOP-** may exacerbate glaucoma; may cause urinary retention
Non-selective beta-blocker (whether oral or topical for glaucoma) with a history of asthma requiring treatment	**STOP-** risk of increased bronchospasm
Benzodiazepines with acute or chronic respiratory failure	**STOP-** risk of exacerbation of respiratory failure
Musculoskeletal System	
Non-steroidal anti-inflammatory drug (NSAID) other than COX-2 selective agents with history of peptic ulcer disease or gastrointestinal bleeding, unless with concurrent PPI or H2 antagonist	**STOP-** risk of peptic ulcer relapse
NSAID with severe hypertension or severe heart failure	**STOP-** risk of exacerbation of hypertension; risk of exacerbation of heart failure
Long-term use of NSAID (>3 months) for symptom relief of osteoarthritis pain where Acetaminophen has not been tried	**STOP-** simple analgesics preferable and usually as effective for pain relief
Long-term corticosteroids (>3 months) as monotherapy for rheumatoid arthritis	**STOP-** risk of systemic corticosteroid side-effects
Corticosteroids for osteoarthritis	**STOP-** risk of systemic corticosteroid side-effects
Long-term NSAID or colchicine (>3 months) for chronic treatment of gout where there is no contraindication to a xanthine-oxidase inhibitor (allopurinol)	**STOP**

COX-2 selective NSAIDs with concurrent cardiovascular disease	**STOP-** increased risk of myocardial infarction and stroke
NSAID with concurrent corticosteroids without Proton Pump Inhibitor prophylaxis	**STOP-** increased risk of peptic ulcer disease
Oral bisphosphonates in patients with a current or recent history of upper gastrointestinal disease (dysphagia, esophagitis, gastritis, duodenitis, or peptic ulcer disease, or upper gastrointestinal bleeding	**STOP-** risk of relapse/exacerbation of esophagitis, esophageal ulcer, esophageal stricture
Urogenital System	
Antimuscarinic drugs with dementia, or chronic cognitive impairment, or narrow-angle glaucoma, or chronic prostatism	**STOP-** risk of increased confusion, agitation; risk of acute exacerbation of glaucoma; risk of urinary retention
Selective alpha-1 selective alpha-blockers in those with symptomatic orthostatic hypotension or micturition syncope	**STOP-** risk of precipitating recurrent syncope
Endocrine System	
Sulfonylureas with a long duration of action (Glyburide, chlorpropamide, glimepiride) with type 2 diabetes mellitus	**STOP-** risk of prolonged hypoglycemia
Thiazolidinediones (rosiglitazone, pioglitazone) in patients with heart failure	**STOP-** risk of exacerbation of heart failure
Beta-blockers in diabetes mellitus with frequent hypoglycemic episodes	**STOP-** risk of suppressing hypoglycemic symptoms
Estrogens with a history of breast cancer or venous thromboembolism	**STOP-** increased risk of recurrence
Oral estrogens without progestogen in patients with intact uterus	**STOP-** risk of endometrial cancer
Androgens (male sex hormones) in the absence of primary or secondary hypogonadism	**STOP-** risk of androgen toxicity; no proven benefit outside of the hypogonadism indication
Drugs that predictably increase the risk of falls in older people	
Benzodiazepines	**STOP-** sedative, may cause reduced sensorium, impair balance
Neuroleptic drugs	**STOP-** may cause gait dyspraxia, Parkinsonism
Vasodilator drugs (alpha-1 receptor blockers, calcium channel blockers, long-acting nitrates, ACE inhibitors, angiotensin I receptor blockers) with persistent postural hypotension	**STOP-** risk of syncope, falls
Hypnotic Z-drugs (zopiclone, zolpidem, zaleplon)	**STOP-** may cause protracted daytime sedation, ataxia
Analgesic Drugs	
Use of oral or transdermal strong opioids (morphine, oxycodone, fentanyl, buprenorphine, diamorphine, methadone, tramadol, pethidine, pentazocine) as first-line therapy for mild pain	**STOP**
Use of regular opioids without concomitant laxative	**STOP-** risk of severe constipation

Long-acting opioids without short-acting opioids for break-through pain	**STOP-** risk of persistence of severe pain
Antimuscarinic/Anticholinergic Drug Burden	
Concomitant use of two or more drugs with antimuscarinic/anticholinergic properties (bladder antispasmodics, intestinal antispasmodics, tricyclic antidepressants, first-generation antihistamines)	**STOP-** risk of increased antimuscarinic/anticholinergic toxicity

Screening Tool to Alert to Right Treatment (START)	
Cardiovascular System	
Vitamin K antagonists or direct thrombin inhibitors or factor Xa inhibitors in the presence of Chronic Atrial Fibrillation	**START**
Aspirin (75-160 mg Daily) in the presence of chronic atrial fibrillation, where the above is contraindicated	**START**
Antiplatelet therapy with a history of coronary, cerebral or peripheral vascular disease	**START**
Antihypertensive therapy where systolic blood pressure consistently > 160 mmHg and/or diastolic blood pressure consistently >90 mmHg; if systolic blood pressure > 140 mmHg and /or diastolic blood pressure > 90 mmHg, if diabetic	**START**
Statin therapy with history of coronary, cerebral or peripheral vascular disease, unless the patient's status is end-of-life or age is > 85 years	**START**
Angiotensin-Converting Enzyme (ACE) inhibitor with systolic heart failure and/or coronary artery disease	**START**
Beta-blocker with ischemic heart disease	**START**
Appropriate beta-blocker with stable systolic heart failure	**START**
Respiratory System	
Regular inhaled B2 agonist or antimuscarinic bronchodilator (ipratropium, tiotropium) for mild to moderate asthma or COPD	**START**
Regular inhaled corticosteroid for moderate-severe asthma or COPD, where FEV1 <50% of predicted value and repeated exacerbations requiring treatment with oral corticosteroids	**START**
Home continuous oxygen with documented chronic hypoxemia (O2 Sats <89%)	**START**
Central Nervous System & Eyes	

L-DOPA or a dopamine agonist in idiopathic Parkinson's disease with functional impairment and resultant disability	**START**
Non-TCA antidepressant drug in the presence of persistent major depressive symptoms	**START**
Acetylcholinesterase inhibitor (donepezil, rivastigmine, galantamine) for mild-moderate Alzheimer's dementia or Lewy Body dementia (rivastigmine)	**START**
Topical prostaglandin, prostamide or beta-blocker for primary open-angle glaucoma	**START**
Selective serotonin reuptake inhibitor (or SNRI or pregabalin if SSRI contraindicated) for persistent severe anxiety that interferes with independent functioning	**START**
Dopamine agonist (ropinirole, pramipexole, rotigotine) for Restless Legs Syndrome, once iron deficiency and severe renal failure have been excluded	**START**
Gastrointestinal System	
Proton Pump Inhibitor with severe gastroesophageal reflux disease or peptic stricture requiring dilatation	**START**
Fiber supplements for diverticulosis with a history of constipation	**START**
Musculoskeletal System	
Disease-modifying anti-rheumatic drug (DMARD) with active, disabling rheumatoid disease	**START**
Bisphosphonates and vitamin D and calcium in patients taking long-term systemic corticosteroid therapy and/or BMD T-scores more than -2.5 in multiple sites	**START**
Vitamin D and calcium supplement in patients with known osteoporosis and/or previous fragility fracture(s)	**START**
Bone anti-resorptive or anabolic therapy (bisphosphonate, denosumab) in patients with documented osteoporosis, where no pharmacological or clinical status contraindication exists and/or previous history of fragility fracture(s)	**START**
Vitamin D supplements in older people who are housebound or experiencing falls or with osteopenia	**START**
Xanthine-oxidase inhibitors (allopurinol) with a history of recurrent episodes of gout	**START**

Folic acid supplement in patients taking methotrexate	**START**
Endocrine System	
ACE inhibitor or Angiotensin Receptor Blocker in Diabetes with evidence of renal disease (dipstick proteinuria or microalbuminuria >30mg/24 hours) with or without serum biochemical renal impairment	**START**
Urogenital System	
Alpha-1 receptor blocker with symptomatic prostatism, where prostatectomy is not considered necessary	**START**
5-alpha-reductase inhibitor with symptomatic prostatism, where prostatectomy is not considered necessary	**START**
Topical vaginal estrogen or vaginal estrogen pessary for symptomatic atrophic vaginitis	**START**
Analgesics	
High-potency opioids in moderate-severe pain, where Acetaminophen, NSAIDs or low-potency opioids are not appropriate to the pain severity or have been ineffective	**START**
Laxatives in patients receiving opioids regularly	**START**
Vaccines	
Seasonal trivalent influenza vaccine annually	**START**
Pneumococcal vaccine at least once after age 65	**START**

Adapted from O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M. N., Ryan, C., & Gallagher, P. (2015;2014). STOPP/START criteria for potentially inappropriate prescribing in older people: Version 2. *Age and Ageing*, *44*(2), 213-218 (Appendix 3 & 4). doi:10.1093/ageing/afu145

Appendix H

Polypharmacy/Potentially Inappropriate Medications

Facility:

Date:

Use instructions on the next page

Patient	Gender (Male/Female)	Ethnicity	Age	Total # of medications	Total # of Potentially Inappropriate Medications (Use STOPP criteria)	Potentially Inappropriate Medications (Name Drug)	Interventions

Instructions

Purpose: To screen the clients within the facility for polypharmacy (5 or more prescribed drugs) and potentially inappropropriate medications (according to the STOPP criteria)

In Column A, assign a number to each client screened (Ex: Pt: 1, 2, 3, etc)

In Column B, please identify client gender (Male/Female)

In Column C, please identify client ethnicity

In Colunm D, please record client age

In Column E, record the total number of medictations taken by the client

In Column F, record the number of potential inappropriate medications according to the STOPP criteria

In Column G, record the name of the potentially inapporpriate drugs

Intervention Codes

In Column H, determine interventions using codes. { 1- Discontinue Drug; 2- Add drug; 3- Change dose/interval; 4- Change duration; 5-Change from PRN to Scheduled; 6- Change from Scheduled to PRN}

APPENDIX I

Reconciliation of Medications

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East Carolina University

Medication Reconciliation: Objectives

- Define Medication Reconciliation.
- Statistics of Medication Reconciliation.
- Identify reasons for Medication Reconciliation.
- Who completes Medication Reconciliation?
- When Medication Reconciliation is completed?
- Discuss intervention of Medication Reconciliation.

Statistics

- 82% of adults in the US take one medication and another 29% take 5 or more medications
- Annually there are nearly 1.3 million ER visits and 350,000 hospitalizations related to adverse drug events
- Annually 3.5 billion is spent on adverse drug events medical costs

(CDC, 2010)

Statistics

- In the US adverse drug reaction (ADR) is the 6th leading cause of death.
- ADR increases with age.
- More than a 20% chance of having an ADR
- Older adults have about 10% risk of being hospitalized related to an ADR.

(Gooen, 2017)

What is Medication Reconciliation?

- Medication Reconciliation is a complex process.
- According to Institute for Healthcare Improvement," medication reconciliation is the process of creating the most accurate list possible of all medications a patient is taking; including drug name, dosage, frequency, and route."

(Gooen, 2017; IHI, 2019)

Why do we complete Medication Reconciliation?

- Avoid Medication Errors
  - Omissions
  - Duplications
  - Dosing errors
  - Drug interactions
- Reduces polypharmacy in patients
- Improve Patient Outcomes
- Improve Patient Safety
- Reduce Health Care Cost

(Gooen, 2017; Mohiklia & Majeed, 2017)

Why?

The Joint Commission

- Behavioral Health Care National Patient Safety Goal effective January 2019
  - Goal 3: Improve the safety of using medications
    - Making medication reconciliation an important safety issues for the individual we serve
    - Maintain and Communicate accurate medication information for the individual served

(The Joint Commission, 2019)

Who is responsible for medication reconciliation?

Medication Reconciliation:

- requires a team approach
- a shared responsibility among the healthcare providers
  - Nurses- LPN, RN
  - Providers- Physicians, NP
  - Pharmacists

(Lee, Hartridge, Corbett, Vittinghoff, & Auerbach, 2015)

When is medication reconciliation completed?

- Medication Review/Reconciliation should be completed
  - At the time in which new medication orders are written
  - At each patient transition of care

** With every patient encounter**

(IHI, 2019; Gooen, 2017)

How is Medication Reconciliation is completed?

3-step process

- Verification
- Clarification
- Reconciliation

There are many tools that can be used to complete medication reconciliation:

- Electronic Health Record (EHR)
- BEERs Criteria
- Assess, Review, Minimize, Optimize and Reassess
- STOPP/START Criteria

(Alpert & Gatlin, 2015; IHI, 2019)

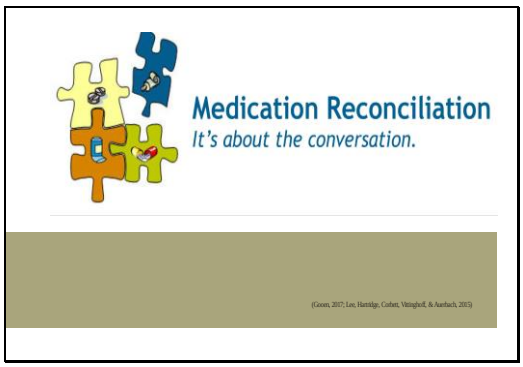
Intervention

- Utilize the Screening Tool of Older Person's Prescriptions (STOPP)/ Screening Tool to Alert Doctor of Right Treatment
  - Used for older adults (65 years and older)
  - Identify potentially inappropriate medications or medication combination

(Mohshin & Majeed, 2017)

Nursing: Best Practice Related to Medication Reconciliation

Don't forget to compare the over-the counter (OTC) medications, vitamins, topicals, injections


Medication Reconciliation
It's about the conversation.
(Goom, 2017; Lee, Hartridge, Corbett, Vittinghoff, & Auerbach, 2015)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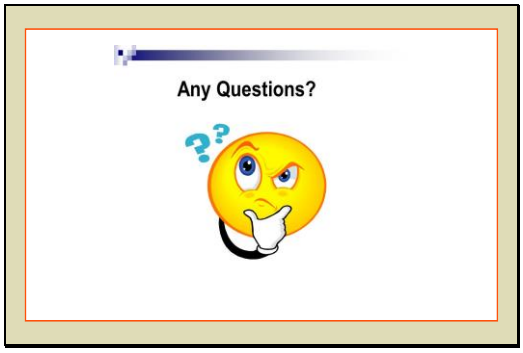
Any Questions?

APPENDIX J

PDSA Cycles

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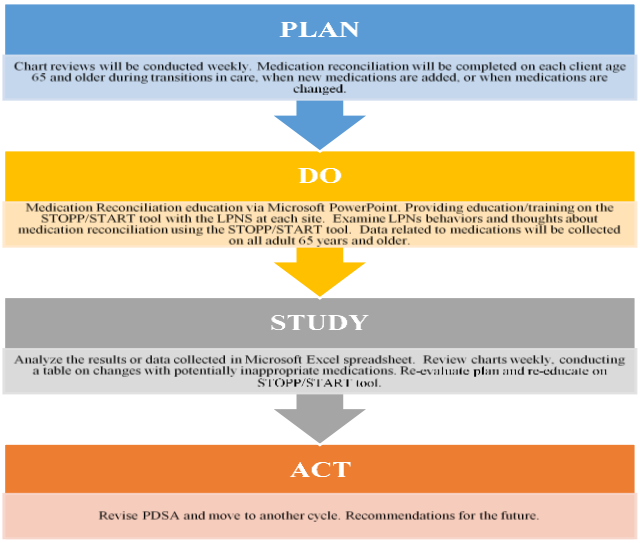

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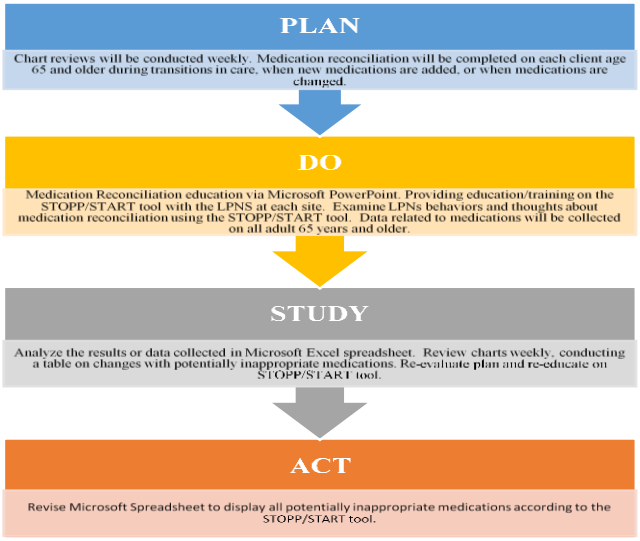

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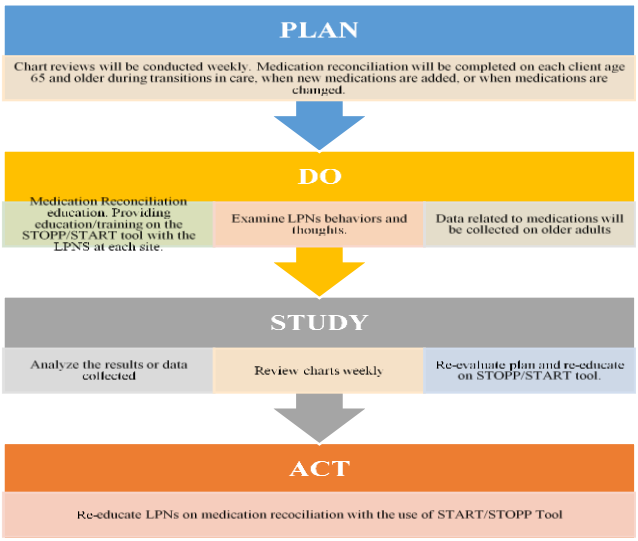

Interval 4