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# Identification of Potentially Inappropriate Medication Utilizing the Beers Criteria Among Elderly Patients

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IDENTIFICATION OF POTENTIALLY INAPPROPRIATE MEDICATION UTILIZING THE  
BEERS CRITERIA AMONG ELDERLY PATIENTS

by

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Christine Mitchell, BSN, RN

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### Abstract

**Background:** The normal process of aging causes numerous physiological changes that affect pharmacodynamics and pharmacokinetics. Therefore, the geriatric population is more vulnerable to the effects of potentially inappropriate medication. The American Geriatric Society's Beers Criteria identifies potentially inappropriate medication to be avoided for this population and can be implemented in efforts to avoid risks associated for this population.

**Aim and Methods:** The purpose of this quality improvement project was to implement the Beers Criteria to identify potentially inappropriate medications among patients 65 years and older. The objectives were to increase the percentage of charts reviewed for inappropriate medications and to increase the use of alternative treatments based on Beers Criteria recommendations.

**Results:** During the medication reconciliation process, the Beers Criteria was implemented to assess for inappropriate medications for eligible patients. A checklist was utilized to document the intervention process and the physician's decision to continue or alter treatment. On a weekly basis, the student determined the percentage of charts reviewed and the percentage of altered treatment. Of the 112 geriatric patients included, 103 (91.3%) patients had their medications reviewed and 59 (57.2%) patients had at least one potentially inappropriate medication identified. However, only 7 (11.8%) patients had the medication altered.

**Implications for Practice:** The implementation of the Beers Criteria will assist healthcare providers in identifying potentially inappropriate medications, preventing use of these medications, and utilizing alternative treatment to promote medication safety and optimize patient outcomes in geriatric patients.

**Keywords:** Beers Criteria, geriatric, elderly, medication safety, polypharmacy, potentially inappropriate medication

### **Identification of Potentially Inappropriate Medication Utilizing the Beers Criteria Among Elderly Patients**

The prescription of inappropriate medication (PIM) is the use of medicines and herbal supplements in which the risk of an adverse drug event (ADE) outweighs its benefit when there are safer and/or more effective alternative medication or treatment options available. PIM also includes the use of medications that may increase the likelihood of drug-drug interactions, drug-disease interactions, misuse, overuse, and underuse of clinically indicated medications (Boland, Guignard, Dalleur, & Lang, 2016). Unfortunately, this is a common issue among the geriatric population 65 years and older due to the many factors that contribute to their vulnerability to PIMs. These contributing factors include age-related changes that alter pharmacokinetics and pharmacodynamics; multiple chronic conditions (MCC); polypharmacy; physical and cognitive impairment; lack of adherence to complex medication regimens; and the lack of awareness and skills of healthcare providers regarding pharmacology in the geriatric population (Boland et al., 2016).

The American Geriatric Society's (AGS) *Beers Criteria for Potentially Inappropriate Medication Use in Older Adults* is one of the leading sources of evidence-based information regarding the safety of prescription medication for elderly patients. The Beers Criteria identifies medications and classes of medications that are considered "potentially inappropriate" for use in the elderly population (Health in Aging, 2015). Therefore, healthcare providers should avoid these listed medications that present a higher risk of ADEs and consider a safer alternative medication or non-drug remedy for patients 65 years and older. By utilizing this criterion, healthcare providers can help prevent ADEs and other drug-related complications in the elderly population. However, the lack of awareness and implementation of the Beers Criteria prevents

healthcare providers from identifying PIMs and considering other alternative treatment options. As a result, the use of PIMs continues to be an issue among the geriatric population 65 years and older.

### **Statement of the Problem**

The normal process of aging lends to numerous physiological changes; therefore, the effects of medication experienced by an older adult are unpredictable. Pharmacodynamics, or the study of the effects of drugs on the human body, is often difficult to predict and may result in an alteration in the desired effects of a drug because receptor sites may lose affinity or its decrease in responsiveness to medication occurring with age (Terrery & Nicoteri, 2016). Similarly, the aging process also alters pharmacokinetics, the study of the human body's involvement and its effect on drug absorption, distribution, metabolism, and elimination (Terrery & Nicoteri, 2016). There are several physiological changes that occur in older adults that may affect pharmacokinetics including increased body fat, decreased body mass, decreased serum albumin, decreased liver size, slow cytochrome P450 reactions, inadequate renal function, and decreased cardiac output (Terrery & Nicoteri, 2016).

In addition to these physiological changes, the prevalence of MCC increases with age and is prevalent among the geriatric population (U.S. Department of Health and Human Services, 2010). Therefore, certain chronic conditions or disease states such as chronic kidney disease (CKD) may also affect pharmacodynamics and pharmacokinetics. Management of these chronic conditions may require a complex medication regimen resulting in polypharmacy, a common phenomenon in the aged population that is associated with PIM use and ADEs (Zeenny, Wakim, & Kuyumjian, 2017). Due to the geriatric population's increased risk and vulnerability to PIMs, the Beers Criteria was designed for the identification of PIMs and prevention of ADEs in this

population. The problem occurs when healthcare providers fail to utilize and implement the Beers Criteria into practice resulting in the continued use of PIMs for this vulnerable population.

### **Background and Significance**

The rapid aging and current increase in the number and proportion of the older adult population is an unprecedented event in United States' history. It is predicted that the American geriatric population aged 65 or older will more than double, numbering approximately 89 million people by 2050 (Centers for Disease Control and Prevention [CDC], 2013; Ortman, Velkoff, & Hogan, 2014). Despite the public health strategies and advances in medical treatment that have increased the life expectancy of older adult by 30 years, the risk of developing a chronic disease increases as an individual ages (CDC, 2013). The root causes of these diseases are associated with unhealthy behaviors from an early age and the natural physiological changes that occur with the aging process (CDC, 2013). According to the CDC (2013), more than a quarter of all Americans or two out of every three older Americans have been diagnosed with MCC. The burden of MCC often results in a gradual decline in activities of daily living, diminished quality of life, and increased health care costs (CDC, 2013). It is estimated, that the geriatric population accounts for approximately 66% of the health care budget and 95% of all health care costs for older adults are used to treat MCC (CDC, 2013).

Although heart disease and cancer pose the greatest risk for the older adult, CKD is another chronic condition that the older adult is at risk for developing as one ages. CKD is defined as an abnormality in renal structure or function that results in a glomerular filtration rate (GFR) of less than 60 ml/min/1.73m<sup>2</sup> for a duration of at least three months or longer (National Kidney Foundation, 2014). Common risk factors for developing CKD include hypertension, diabetes mellitus, hyperlipidemia, and elevated uric acid; therefore, adults with diabetes mellitus

and/or hypertension are at higher risk for developing CKD than those without these conditions (CDC, 2017). According to the CDC (2017), it is estimated that 30 million people or 15% of adults suffer from CKD. Specifically, in the United States, it is estimated that approximately 661,000 individuals have been diagnosed with CKD (National Institute of Diabetes and Digestive and Kidney Diseases, 2016). Not only can CKD lead to other health complications, but also the lack of renal function results in ineffective metabolism and elimination of medication. Therefore, the geriatric population with CKD is at higher risk of medication overdose, toxicity, and ADEs.

As the prevalence of MCC increases with age, the geriatric population has a high likelihood of being administered and/or consuming a wide variety of medications to manage their conditions. Based on a survey taken in 2002, approximately 25% of the overall United States population takes at least five or more medications per week (Rambhade, Chakarborty, Shrivastava, Patil, & Rambhade, 2012). For the geriatric population 65 years and older, this percentage significantly increases to approximately 50% consuming five or more medications and 12% taking 10 or more prescriptions per week (Rambhade et al., 2012). Hence, polypharmacy is a substantial concern among this population and is associated with increased drug costs, poor adherence to medication regimens, ADEs, and hospitalization (Terrery & Nicoteri, 2016; Rambhade et al., 2012). Across the United States, polypharmacy and its ADEs were responsible for approximately 100,000 emergency hospitalizations in the elderly population 65 years and older between the years 2007 to 2009 (Terrery & Nicoteri, 2016). Approximately \$136 billion of medical costs are expended on the treatment of the over 2 million ADRs that occur each year (Terrery & Nicoteri, 2016).

As one of the leading sources of information regarding medication safety for the geriatric population, the AGS' *Beers Criteria for Potentially Inappropriate Medication Use in Older Adults* identifies medications that are considered "potentially inappropriate" and should be avoided if alternative treatment options such as a safer medication, lifestyle changes, or non-medication therapy are available for use in the elderly population (Health in Aging, 2015). These PIMs pose a greater risk than the benefits for the older patient 65 years and older. The Beers Criteria is regularly updated as new research is published regarding new medication and the safety of already existing treatment methods (Health in Aging, 2015). Utilizing a time-testing method for treatment guideline development and following the Institute of Medicine, the Beers Criteria was last updated in 2015 after 6,700 high-quality research studies regarding certain PIMs prescribed for older adults were reviewed by the AGS' expert panel (Health in Aging, 2015). Although it may be utilized to identify PIMS and prevent ADEs in the elderly population, the Beers Criteria is a reference tool and should not replace the healthcare provider's clinical judgment since it does not take into consideration the patient's unique circumstances.

### **Assessment**

This quality improvement project was implemented at a nephrology specialty practice clinic. This practice is currently being operated by a physician and three support staff including an office manager, a medical assistant, and a front desk receptionist. Medicare and Medicaid are accepted, as well as all other commercial and private insurances. The clinic refers and collaborates with primary care and other various specialty practices in order to provide comprehensive disease management and care plans for patients aged 65 years and older with MCC.

**Stakeholder Engagement**

A stakeholder may be defined as an individual or a group of individuals with an interest in clinical decisions and improvements related to the evidence supporting these changes (Agency for Healthcare Research and Quality, 2014). At this specialty clinic, the main stakeholders would consist of the patients and their families, the health care provider and support staff, and payers such as employers and insurance companies. The patients' interests in the clinic as a stakeholder stems from concerns in relation to the severity of their conditions, most effective treatments, and feasible treatment options in regards to cost, ease of implementation, and maintenance (Agency for Healthcare Research and Quality, 2014). Healthcare providers are the decision-makers who identify gaps in the literature and utilize the existing research regarding evidence-based practices to implement safe and effective treatment options while avoiding harmful interventions (Agency for Healthcare Research and Quality, 2014). In order to implement best practice and make safe treatment recommendations, a healthcare provider must maintain an appropriate knowledge-base and stay current with recent evidence-based guidelines for quality patient care (Agency for Healthcare Research and Quality, 2014). Payers attempt to ensure that patients are provided quality and evidence-based treatment to expedite healing, optimize normal function, and prevent complications that increase direct and indirect medical costs (Agency for Healthcare Research and Quality, 2014). Therefore, each and every stakeholder is involved and has a vested interest in the use of evidence-based practices, quality improvement, and successful implementation of effective medical treatment.

**Assessment of the Organization**

There are approximately 1,500 patients attending and being seen at this clinic. On average, the physician will see approximately 10 patients per day in the afternoon. Only patients

of adult age of 18 years and older are seen. The majority of patients are older adults between the ages of 62-83 years. Approximately 40% of the patients seen at this clinic are females, and the other 60% are males. The majority of the patients are either African-American or Hispanic. Approximately 48% of the patients are African-American, 36% are Latino/Hispanic, and 16% are Caucasian (non-Hispanic). Common chronic conditions and diagnoses seen at this clinic include CKD, diabetes mellitus type 2, hypertension, hyperlipidemia, gastroesophageal reflux disease, hypothyroidism, and coronary artery disease. An estimated 80% of the patients seen at this practice have CKD. Approximately, 60% of the geriatric population 65 years and older are diagnosed with CKD with an estimated 55% of these patients with CKD stage 3 and another 10% are stage 4.

Due to the age and comorbidities of the patients seen at this clinic, polypharmacy is common. Based on a randomized review of 30 patient charts, approximately 28% of patients are taking 3-4 prescription medications and another 60% are taking 5 or more. This is in line with the national statistics (Rambhade et al., 2012). Common prescription drugs documented in the patients' charts include tramadol, levothyroxine, allopurinol, amitriptyline, aspirin, diuretics, vasodilators, antihypertensive medication, and anti-diabetic medication.

In addition to polypharmacy, PIMs were identified utilizing the AGS' Beers Criteria. The chart review revealed approximately 53% of patients seen at this clinic take at least one PIM and another 17% take two or more PIMs. Identified PIMs include amitriptyline, hydralazine, minoxidil, doxazosin, terazosin, clonidine, and diphenhydramine. Besides prescription medications, some patients also consume vitamins, electrolytes, and other supplements such as sodium bicarbonate, potassium, magnesium, and vitamin B, C, and/or D. Although PIMs have been identified, changes to an effective, safer alternative treatment option are not being made to



patients' medication regimens and treatment plans. Therefore, in order to safely and appropriately manage geriatric patients with polypharmacy and MCC, evidence-based practices indicate that PIMs should be identified and safer alternative treatment options should be recommended if the risks outweigh the benefits (Health in Aging, 2015).

### **Organizational Readiness for Change**

The Practice Improvement Capacity Rating Scale (Appendix A) is an instrument for identifying and assessing an organization's readiness to change and to conduct quality improvement (QI) activity (Robert Wood Johnson Foundation, 2014). The instrument scores an organization or practice with one of the three following colors: red meaning the practice is not ready for QI measures, yellow that the practice has limited capacity for change but may in the future, and green for the practice being ready and capable for immediate QI implementation (Robert Wood Johnson Foundation, 2014). When utilizing this instrument, the first step is to determine whom to interview at the chosen organization. Based on the responses from the interview, each question is scored based on the criterion and weighted on a scale of 1 to 3 with 1 being of lowest importance and 3 being of highest importance (Robert Wood Johnson Foundation, 2014). All criteria with a weight of 3 is considered a "must-pass" area and must receive a green level in order to have a final score in green (Robert Wood Johnson Foundation, 2014). As the only patient care provider and owner of the clinic, the physician was interviewed. Based on his responses, the clinic received an overall score of 250, which was determined by multiplying the scored questions by the weighted criterion and adding each category to equal the final score. The final score of 255 was at the green level according to the scale indicating that the clinic was ready and capable for immediate QI implementation (Robert Wood Johnson Foundation, 2014).

### **Project Identification and Focus**

The purpose of this QI project was to implement the AGS' Beers Criteria to promote medication safety by the identification of potentially inappropriate medications and the prevention of medication-related complications among the geriatric population 65 years and older with MCC. By implementing the Beers Criteria into the medication reconciliation process, the primary objective was to increase the number of charts for geriatric patients 65 years and older being reviewed for potentially inappropriate medications from 0% to 80% over a 6-week period. The second objective was to increase the number of PIMs that are changed to alternative medication or treatment options based on the recommendations of the Beers Criteria from 0% to 25% over a 6-week period.

### **Summary and Strength of the Evidence**

A literature review was conducted on the topic of the implementation of the AGS' Beers Criteria, polypharmacy, and the identification of PIMs. The literature reviewed was focused on the elderly population 65 years and older in various settings and subpopulations to include acute, hospitalized patients and outpatient, community-dwelling patients. The overall strength of the articles and the AGS' Beers Criteria are acceptable and reliable sources to be used as evidence in support of this QI project.

### **Prevalence of PIMS**

Narayan and Nishtala (2015) conducted a cross-sectional analysis with 559,625 participants to examine the prevalence of PIMs among the elderly population aged 65 and older in the country of New Zealand. Based on this study, PIMs are prevalent in this the geriatric population with approximately 40% of patients being prescribed at least one PIM (Narayan & Nishtala, 2015). The results of this study identified the highest exposure of PIMs among 65 to 74

year old patients and the most commonly identified PIMs to be nonsteroidal anti-inflammatory drugs (NSAIDs), benzodiazepines, and amitriptyline (Narayan & Nishtala, 2015). Another study conducted by Skaar & O'Connor (2017) concluded with similar results that approximately 57% of dental patients aged 65 years and older were prescribed at least one PIM. It was identified that the most prevalent PIMs were proton pump inhibitors, NSAIDs, and benzodiazepines with common adverse effects of xerostomia, sedation, gastrointestinal bleeding, orthostatic hypotension, and falls (Skaar & O'Connor, 2017). Women and patients of lower socioeconomic status were also associated with an increased number of PIM prescriptions (Skaar & O'Connor, 2017). A retrospective study with 523,811 elderly subjects age 65 years and older was conducted by Nam, Han, Kim Bae, and Lee (2016) in South Korea. This study identified that common predictors of PIM prescriptions included the age of 65 years and older, the female sex, polypharmacy, MCC, and the severity of these chronic conditions (Nam et al., 2016). Nam et al. (2016) also identified a potential cause for the high prevalence of PIM prescription to be “doctor-shopping” from one physician to another without a system or process to inhibit such patient activity. Therefore, based on these studies, there is an issue with the prevalence of PIMs among the geriatric population with increased risk based on gender, socioeconomic status, MCC, polypharmacy, and poor health conditions.

### **AGS' Beers Criteria vs. STOPP/START**

Boland et al. (2016) conducted a randomized control trial with 20 patients aged 65 years and older at a teaching hospital in Ireland to compare the Beers criteria and Screening tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment (STOPP/START) in terms of the tools' impact on the incidence and identification of PIMs among older adults. The findings indicated the Beers Criteria to be highly effective in identifying PIMs and reducing

polypharmacy among older adults; however, the STOPP/START showed to be slightly more superior in identifying PIMs in this population (Boland et al., 2016). A similar study was conducted in China to compare the Beers Criteria with the STOPP criteria in assessing and identifying PIMs among older adults. This retrospective cross-sectional study with 6,337 participants showed the Beers Criteria had a higher detection rate of PIMs and was more sensitive in assessing PIM use (Li et al., 2017). Despite the conflicting results of these two studies, both studies show that the Beers Criteria is an effective and reliable tool for the screening and identifying of PIMs in the geriatric population 65 years and older.

Zeenny et al. (2017) conducted a cross-sectional observation study with a secondary objective to compare PIM prevalence rates as per the Beers Criteria 2003 and 2012 version. In this study consisting of 248 patients aged 65 years and older, a high prevalence of PIMs was identified utilizing both the 2003 and 2012 version of the Beers Criteria (Zeenny et al., 2017). However, the study results identified the Beers Criteria of 2012 to be the more effective version of this tool in identifying PIMs due to its significantly higher percentage of PIM identification among the sample in comparison to the 2003 version; 45.2% with the Beers Criteria 2012 versus 27% with the 2003 (Zeenny et al., 2017). Unlike the 2003 version, the effectiveness of the Beers Criteria of 2012 in PIM identification is associated with its classification of PIMs in the following three categories: 1) PIMs and the classes of medication to avoid in the older adult population, 2) PIMs and medication classes to avoid in older adults with certain disease and syndromes that the medication may exacerbate, and 3) medications to be used with caution in the older adult population (Alhmoud, Khalifa, & Bahi, 2015; Zeenny et al., 2017).

**Benefits and Limitations of the Beers Criteria**

Although there are no national guidelines requiring the utilization and implementation of the AGS' Beers Criteria in the treatment and management of geriatric patients 65 years and older, the evidence supports the effectiveness of the Beers Criteria in identifying PIMs and the need to implement it due to the prevalence of PIM use and PIM predictors in the geriatric population. The PIMs listed on the Beers Criteria are associated with more risks and adverse health outcomes such as increased hospitalization, mortality, gastrointestinal bleeding, falls, fractures, and other ADEs (Narayan & Nishtala, 2015).

Although the Beers Criteria is a valuable reference tool for the promotion of medication safety, this tool does have limitations. One limitation is that the Beers Criteria is a reference tool to identify PIMS and to prevent ADEs in the elderly population that does not take into consideration the patient's health status and unique circumstances. Therefore, this tool should not replace the healthcare provider's clinical judgment. According to Alhmoud et al. (2015), another limitation is the Beers Criteria's inclusion of medications that are not considered to be contraindicated in the geriatric population by other updated and evidence-based drug formularies such as the British National Formulary. Despite these limitations, the Beers Criteria remains a valuable tool in the identification of PIMs in order to prevent health complications and ADEs among the vulnerable population of elderly patients 65 years and older with MCC.

**Methods****Project Intervention**

In order to properly implement the Beers Criteria and identify PIMs in the geriatric population aged 65 years and older at this nephrology specialty clinic, the physician and office staff were educated regarding the QI measure and their designated role in the implementation

process. Before the intervention plan was initiated, a 30-minute education session was scheduled during the clinic's lunch hour when all staff members were gathered in one location. During this education session, the staff was educated via a PowerPoint presentation regarding the prevalence and identification of PIMs in the elderly population 65 years and older with additional risk factors such as MCC and polypharmacy increasing this population's risk of experiencing ADEs. Hence, the staff was made aware of the need to implement the AGS' Beers Criteria in order to promote patient safety and improve quality of care. The Beers Criteria and its purpose as a reference tool to guide a healthcare provider's treatment plan to promote medication safety was explained. Although the physician was not required to change a medication that was identified as a PIM by the Beers Criteria if deemed unnecessary, the physician was prompted to review all identified PIMs and validate the need to continue or change. The staff was also instructed and trained to fulfill their designated role in the implementation process. Education materials were provided to each staff member, which included a flow sheet of the intervention process (Appendix B), a pocket guide of the Beers Criteria, and a copy of the PIM Identification checklist (Appendix C). In addition to providing the Beers Criteria pocket guide to each staff members, the DNP student placed a copy of the pocket guide in each of the patient rooms in order for it to be readily accessible to both the MA and physician. See Appendix D for additional details regarding the intervention process and the estimated costs of education materials.

The intervention process began with the patient attending their regularly scheduled appointment. At the start of each patient's appointment, the front desk receptionist checked-in the patient and determined if the patient is eligible to participate in the QI project. The eligibility criterion was the geriatric patient 65 years or older with all current medications and herbal supplements. The clinic requires that all patients bring all medications and supplements that they

are currently consuming. If the patient met this criterion, the front desk receptionist placed the PIM Identification checklist with the patient's name and date of birth in the patient chart to be filled out by the medical assistant and physician. The PIM Identification checklist was designed by the DNP student and utilized as a documentation tool to note the medical assistant's completion of tasks and to document the physician's clinical judgment regarding a patient's medication regimen.

Once the patient was checked-in, the medical assistant proceeded with the normal process of weighing, obtaining vital signs, and documenting the patient's current medications and supplements in the chart. Documentation of all medications included the medication name, dose, frequency, and route that the medication was being taken. After the patient's medications were documented, the medical assistant compared the list of the patient's medications with the Beers Criteria. All medications that met the Beers criteria were noted identifying these medications as PIMs that needed to be reviewed by the physician. Once the MA completed these tasks, he placed a check next to each of the tasks that were completed documenting on the checklist that the intervention process was followed as planned.

After entering the patient room, the physician received the patient's chart with the checklist and the patient's medication documented inside the chart. Based on the patient's medical history, health status, and the awareness of any PIMs that the patient was consuming, the physician evaluated the patient's treatment plan and determined whether to continue with the current medication regimen or recommend an alternative treatment option. In addition to the physician's SOAP note documented in the chart, his decision regarding treatment was documented on the checklist by circling one of the following options: "Continue with same treatment" or "Recommend alternative treatment." If the physician chose to continue with the

same treatment plan and medication regimen, the checklist provided a section for the physician to indicate the rationale for his decision or why the patient will continue with the same therapy. Similarly, if the physician changed medications or chose an alternative treatment option, the physician documented these changes and his rationale for the change in the patient's treatment plan. All changes in the patient's treatment plan or medication regimen were documented on either the patient's chart or the checklist documented on the patient's chart. It was essential to document these changes in the patient's chart for the physician's use to recall the change that was made and for the office's use to provide refills as needed. Later, for data collection and analysis, the DNP student noted any changes in treatment that were made at the time of the visit and documented these changes onto the checklist for data collection. For the physician's convenience, the checklist included rationales that simply needed to be circled to document the physician's rationale for choosing one of the above-mentioned options. If the rationales on the checklist did not pertain to his decision, the physician manually documented his decision and wrote out his rationale on the "Other" option.

At the end of the patient's scheduled appointment, the front desk receptionist received the patient's chart and checked-out the patient. The PIM identification checklist was removed from the patient's chart and placed in a designated folder for data collection and analysis. At the end of each week, the DNP student collected the checklists and formulated a census of all eligible patients scheduled for an appointment at the clinic during the week. Utilizing the patient identification on the checklists, the DNP student pulled all the charts of each eligible patient who participated in the QI measure and had a checklist completed regarding their treatment plan. Once the charts were pulled, the census was used to determine the percentage of patients who were scheduled, met the eligibility criteria, and were provided a checklist to review their



medication list with the Beers Criteria. In addition to determining the percentage of patients' medication regimens reviewed with the Beers Criteria, the checklist was utilized to evaluate the number of PIMs that are changed to an alternative treatment based on the Beers Criteria recommendations. The DNP student conducted a weekly review of the patient's charts and PIM Identification checklist to assess the patient's medications, chronic conditions, and notation of PIMs. For each PIM that was identified, the DNP student assessed if the physician chose to maintain or alter the patient's treatment plan. See Appendix E for data collection table.

In order to confirm that the QI measure was progressing as planned and sustainable, a 30-minute staff meeting was scheduled at the halfway point of the implementation process to review progress, answer questions, and improve processes of the project as needed. The staff meeting was held during the office's lunch hour to ensure that all staff members are present. During this meeting, the DNP student presented the results gathered since the start of implementation, suggested methods to improve the implementation process, and addressed any questions or concerns that the staff had. During the implementation process if the DNP student identified an issue with the QI project or the implementation process, the DNP student addressed the issue by reminding the staff member regarding their role in the process and be willing to schedule additional staff meetings as needed to address any issues or concerns. The last staff meeting was held at the conclusion of the QI measure when the DNP presented the final results of the project and thanked the staff for their endeavor in improving patient care.

### **Organizational Barriers and Facilitators**

This specialty clinic possesses numerous strengths that facilitated the successful completion and sustainability of this quality improvement measure. The physician recognized the issue of PIMs in the geriatric population, acknowledged the relevancy of this QI measure in his

practice, and was willing to participate in the project intervention. The clinic is a small practice with only one physician and three office personnel that collaborate with one another to effectively operate the clinic and to provide safe, quality care to patients. In addition to being a small practice, trust is apparent in the strong relationship between each of the members of the healthcare team at this clinic, which promotes collaboration and improves overall patient care. The office staff is well-trained in their individual roles and has a strong work ethic that motivates each member to accomplish their assigned tasks. Due to the healthcare team's collaboration, the practice operates efficiently with short wait times for patients and lessened burden on the physician to micromanage his support staff. The physician is adamant regarding scheduling ample appointment time for each patient and providing each patient the time and attention needed to thoroughly assess and manage the complexity of these patients. Therefore, the clinic also has a strong and positive reputation in the community and among patients; there is a facilitation of trust and rapport between the patients, families, physician, and support staff.

Although the physician does not speak the Spanish language, the office manager and medical assistant are proficient in the language. The clinic is located in an area with a large Hispanic population; and there is a large percentage of Hispanic patients seen at this practice. The office staff's proficiency in the Spanish language facilitates trust and builds rapport between patients seen at the clinic who may speak English as a second language or are only Spanish-speaking. Lastly, this QI measure was easily implemented into the practice' medication reconciliation process and was also cost-effective with minimal expenses needed to fund the intervention.

Despite these strengths, there were also weaknesses and barriers that hindered this QI measure. There was a lack of awareness and familiarity regarding the Beers Criteria. The initial

implementation of the Beers Criteria in the practice's medication reconciliation process was a change that required supervision, reminding, and short period of adjustment for this transition. The practice has not transitioned to electronic health records (EHR) and still utilizes the paper chart. In comparison to the EHR, paper charting is a time-consuming process of locating, sorting, and organizing these patient charts that prolonged the implementation and data collection process.

As a small practice, the healthcare team has strong relationships with one another and effectively collaborates; however, this also presents an issue. With only one physician to provide patient care and three support staff with differing roles to operate the office, the absence of one member will short-staff the office. The physician is only available at the clinic in the afternoon; therefore, patients can only be scheduled between 2:00 p.m and 5:00 p.m.

The staff's proficiency in the Spanish language may facilitate communication with Spanish-speaking patients; however, they are not professionally certified medical translators. This may be an issue as the staff may be unable to translate the physician's instructions to the patient with complete accuracy.

As a specialty practice that cares for chronically ill patients with MCC, many of these patients have been attending this practice and receiving care from the physician for several years. Therefore, these patients have been stabilized and compliant with the same medication regimen with no ADEs. The physician and patients were hesitant to alter a medication regimen that has effectively and safely improved and stabilized a patient simply due the Beers Criteria identifying a PIM in the patient's regimen. In addition to the hesitancy to alter an effective medication regimen, the physician is a nephrologist that operates a specialty practice for treating and managing renal disorders. The physician was reluctant and uncomfortable with discontinuing a

medication prescribed by another physician and altering the treatment for a condition that is not within his specialty. Other potential issues of switching to a newer or safer alternative treatment option included patient refusal, the cost of purchasing a new medication, insurance coverage for the medication, availability of the medication, and the effectiveness of this alternative option.

### **Ethical Considerations**

During the implementation of this QI measure, it was essential to identify and address any and all ethical concerns. The primary ethical consideration of this QI measure was patient confidentiality. The intervention process required that the patient's name and date of birth be written on the checklist in order for the DNP student to identify the patient and pull the appropriate chart to evaluate the project outcomes. In order to maintain patient confidentiality, a confidentiality form was signed by the physician and the DNP student granting access to patient information and charts. Also, all material containing patient information was only accessible to the office staff and those granted permission by the physician via the confidentiality form. During the intervention process, the folder containing the checklist was kept by the front desk reception during office hours and stored in the chart room that was locked for closing hours. All checklists with the patients' personal information were properly disposed of in the practice's paper shredder at the conclusion of the QI measure. In addition to the confidentiality form, the physician also wrote and signed a letter of support allowing the DNP student to utilize the facility as a site for this QI measure (see Appendix F).

In addition to patient confidentiality, the patient's socioeconomic status was another ethical concern taken into consideration. For this QI measure, an objective was to promote safety by altering PIMs for a safer alternative treatment option. Although an alteration of treatment may promote safety, it may also raise financial concerns for patients of low socioeconomic status.

Therefore, when evaluating the patient's treatment plan, the physician took into consideration the patient's safety, current health condition, socioeconomic status, and insurance coverage. If the patient was unable to access the alternative treatment option due to cost, lack of insurance coverage, or unavailability of medication, the physician often had to continue with the same treatment plan if the patient was content and not experiencing ADEs. Besides cost, another ethical consideration was the effectiveness of alternative treatment. If the patient was on a stable treatment plan or alternative treatment was not as effective as the PIM, the physician often deemed that the benefits outweighed the risk and chose to continue with the same treatment plan. The alternative treatment option was only recommended if the treatment was effective and benefits outweighed the risk for the patient's health and safety.

**Budget**

Unfortunately, there are no national guidelines requiring the implementation of the Beers Criteria in the treatment and management of geriatric patients. The physician and his practice were unable to charge and receive reimbursement for this intervention. Therefore, there was no financial incentive for physician and the office staff's participation in this QI measure. There were minimal costs associated with the implementation of this QI measurement. The expenses for this project included the teaching material (4 flow sheets, 6 Beers Criteria pocket guides, 4 PIM Identification checklists), 120 PIM Identification checklist for the intervention process, the confidentiality folder, and meals for the education sessions and staff meetings. The costs for the purchase and printing of materials necessary for this intervention are as follows:

- \$50 for each meal provided at the education session and staff meetings
  - Three scheduled meetings at the start, mid-way point, and conclusion of this project.

- Cost of purchasing and printing material for intervention
  - \$2 for the Confidentiality folder
  - \$10 for the paper and cost of printing material
- Total cost equaled \$162.00

In comparison to the cost of hospitalization or treatment of other ADEs, this project was a cost-effective intervention that served as a QI measure to promote patient health outcomes and prevent ADEs.

### **Results**

A total of 112 eligible patients aged 65 years and older with all current medications and a scheduled appointment at the time of the intervention were included in this QI measure. Patients who failed to attend their scheduled appointment or bring all current medications to their appointment were excluded from this intervention. Among the 112 participants, the average age was 75.3 years. The majority of the participants seen at this clinic were of the female gender and non-Hispanic African-American patients. The most common type of insurance seen at this practice was Medicare followed by private insurance companies. Polypharmacy was a common factor among the participants; the average number of prescribed medications was 7 medications. The mean number of MCC was 5.19 chronic conditions. All (100%) of the participants were diagnosed with at least one of the following chronic conditions: hypertension, diabetes mellitus type 2, and chronic kidney disease. Of these patients, 79.61% (82/103) were diagnosed with more than one of these conditions. The demographic results are presented in Table 1.

Table 1. *Sample Characteristics*

Characteristics	
Age, mean	75.3
Age, range	65-90
Sex, <i>n</i> (%)	
Male	37.5%
Female	62.5%
Race, <i>n</i> (%)	
White, non-Hispanic	13.39%
African-American, non-Hispanic	52.68%
Hispanic	34.95%
Insurance, <i>n</i> (%)	
Medicare	58.25%
Dual Eligible (Medicare/Medicaid)	4.85%
Private Insurance	
Aetna	11.65%
Humana	6.78%
BCBS	20.39%
Multiple Chronic Conditions, mean	5.19
Multiple Chronic Conditions, range	2-9
Number of Medications/Polypharmacy, mean	7
Number of Medications/Polypharmacy, range	2-20

This QI project had two objectives for which data was collected, analyzed, and evaluated for separately. The first objective was to increase the number of eligible patients aged 65 and above having their medication list reviewed with the Beers Criteria at each office visit from 0% to 80%. The PIM Identification checklist (Appendix C) was utilized by the medical assistant and physician as a “trigger” to review the medication list with the Beers Criteria and recommend alternative treatment as needed. Of the 112 patients eligible to participate in this QI measure, 103 of these patients had their medication list reviewed by the Beers Criteria during their scheduled appointment. This is a 91.3% (103/112) increase from the baseline of 0%, which exceeds the target goal of 80%. PIMs were identified and noted in 57.2% (59/103) of the patients charts that were reviewed with the Beers Criteria. In this PIM group (patients with identified PIMs using the

Beers Criteria), 79.66% (47/59) had at least one identified PIM that the patient was currently consuming. Another 20.34% of these PIM group patients had two or more PIMs identified in their medication list. The prevalence of PIMs increased with the female gender, the number of chronic conditions, and increasing age. The most common types of PIMs identified using the Beers Criteria were benzodiazepines (15.25%), first-generation antihistamines (11.86%), sulfonylureas (11.86%), and nonsteroidal anti-inflammatory drugs (NSAIDs) (11.86%). Table 2 lists the top 10 categories of PIMs identified by reviewing the patients' medication lists using the Beers Criteria.

The second objective was to increase the number of PIMs changed to an alternative medication or treatment option from 0% to 25% based on the Beers Criteria recommendations. Of the 59 patients with PIMs identified in their medication list, only 7 of these patients had the identified PIM(s) changed to an alternative medication or treatment option. Although it does not meet the goal of the second objective, it is an 11.8% increase from the baseline of 0%. The most common rationales for not changing the PIM and utilizing an alternative treatment option were patient refusal (25%), need for consultation with the physician who prescribed the PIM (15.83%), and the effectiveness of the current medication regimen without ADEs (53.85%).



Table 2. *Beers Criteria Implementation and Identification of PIMs*

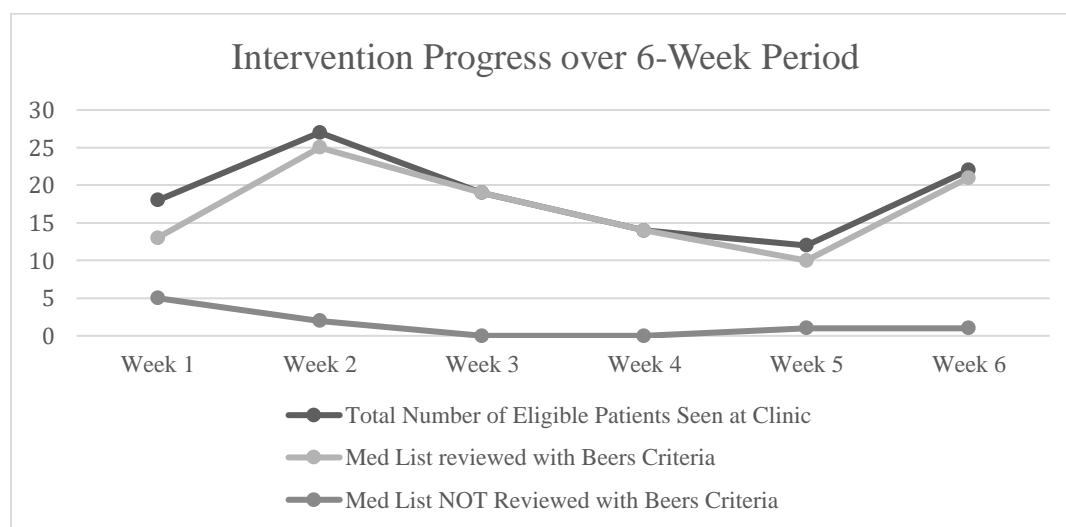
	<b>n (%)</b>
Medication List reviewed with Beers Criteria	91.3%
Medication List with Identified PIMs	57.2%
Number of Identified PIMs	
At least one PIM	79.66%
Two or more PIMs	20.34%
PIMs among Gender	
Female	54.69%
Male	48.98%
Top 10 Most Common PIMs	
Benzodiazepines	15.25%
Hormone Replacement	10.17%
Amitriptyline	8.47%
Amiodarone	3.39%
Alpha-2 Agonist	8.47%
NSAIDs	11.86%
Antidepressants	3.39%
Muscle Relaxants	8.47%
1 <sup>st</sup> Generation Antihistamines	11.86%
Sulfonylureas	11.86%
Vasodilators	3.39%

Throughout the duration of this QI measure, all data was collected for the purpose of analyzation and evaluation via a data collection spreadsheet on Microsoft Excel (Appendix E). Each of the objectives were evaluated by calculating and comparing the percentage changes from pre- and post-intervention. The mean and/or range of a variable were calculated using Microsoft Excel.

### **Discussion**

The QI intervention aimed to promote medication safety and to prevent medication-related complications by implementing the Beers Criteria into the medication reconciliation process to identify PIMs in geriatric patients aged 65 years and older. The Beers Criteria was not utilized prior to this intervention. A total of 103 patients (91.3%) had their medication list

reviewed with Beers Criteria, which is a significant increase that surpassed the goal of the first objective. At the start of the intervention, the practice struggled with the change of implementing a new step into their medication reconciliation process and failed to review the medication list of five eligible patients. Once the staff was able to adjust to the change, there was improvement in placing the PIM Checklist in patient charts to trigger the medical assistant to utilize the Beers Criteria and the physician to review the patient's treatment plan. According to the front desk receptionist, the failure to review an eligible patient's medication list with the Beers Criteria was her fault for not placing the PIM Checklist in the patient's chart. She stated this failure to fulfill her task was due to patients that were worked into the evening schedule that morning and she was unable to prepare the patients' charts with the PIM checklist the evening before, which is her usual process of patient chart preparation. Recommendations for addressing this concern would be to maintain the current process, but also have the PIM checklist readily available for last minute schedule additions. See Figure 1 for the weekly progression of this QI intervention.



*Figure 1. Intervention Progress over 6-Week Period.* This figure illustrates the weekly census of eligible patients and the weekly progression of implementing the AGS' Beers Criteria to review the patients' medication lists for PIMs.

The prevalence of PIMs was relatively high; 57.2% of patients had at least one PIM identified in their medication list. This prevalence increased with the increasing number of chronic conditions, the increasing age of a patient, and among the female gender. These findings are consistent with previous studies conducted by Narayan & Nishtala (2015), Skaar & O'Connor (2017), and Nam et al. (2016). The study conducted by Narayan & Nishtala (2015) identified the most common types of PIMs to be NSAIDs, benzodiazepines, and amitriptyline. Similarly, for this QI intervention, the top four most commonly identified PIMs were benzodiazepines, NSAIDs, first generation antihistamines, and sulfonylureas. As an individual ages, the older adult experiences numerous age-related physical changes leading to the diagnosis of more chronic medical conditions and the need for more medication to manage these conditions. Therefore, it is essential for healthcare providers to seriously consider medication safety, drug-disease interactions, and non-drug treatment options for this vulnerable population before prescribing additional medications.

The use of alternative medication or treatment options were relatively low in comparison to the prevalence of PIMs. The most common rationale for not changing the PIM to an alternative treatment was the effectiveness of the current medication regimen without ADEs and the benefits of the regimen outweighing the risks. Due to the complexity and chronicity of these patients' conditions, the physician was limited in the selection of treatment and unable to alter the patient's medication regimen. In such cases, the physician would not change the PIM that has stabilized and effectively managed the patient's conditions for years. Increasing age was another factor that contributed to the lack of alternative treatment use. The older the patient's age, the more reluctant the patient became to alter a medication regimen that was effective in managing the chronic conditions. Therefore, patient refusal was another common reason for not altering a

medication regimen. There were various reasons for patient refusal including financial concerns, lack of insurance coverage, familiarity with the current regimen, or simply due to the years of effective management with their current treatment plan. The physician is a nephrologist that specializes in the treatment and management of renal disorders and other chronic conditions associated with renal disease such as hypertension, diabetes mellitus, and hyperlipidemia. The physician was reluctant to discontinue a medication prescribed by another physician and treat a condition that was not within his specialty. Instead, the physician chose to consult the physician who prescribed the PIM or have the patient discuss with that physician regarding the PIM and other alternative treatment options.

### **Limitations**

Several limitations should be noted in this QI intervention. First, the health conditions of the patients that participated in this intervention. Due to the complex nature of these patients' health conditions, treatment and management of their various conditions were often intense and individualized for each patient. As a result, the physician was unable to change to the PIM to an alternative medication for several patients because the PIM was vital in stabilizing the patient's chronic condition and optimizing health outcomes. Second, the clinic was a specialty practice. Although the physician did collaborate and consult with the physicians who prescribed the PIM, this intervention may have been more effective in a primary care setting that functions as the "gatekeeper" of the various specialties seen by a patient.

### **Recommendations**

Based on the results of this QI measure, it is recommended to implement the intervention of reviewing the medication lists of all patients aged 65 years and older with the Beers Criteria in a primary care setting. Although an effective intervention when implemented in a specialty

practice, the physician deemed this intervention would be more effective in a primary care setting due to his reluctance to discontinue medication for a condition that was not within his specialty. The physician did consult with the prescribing physician regarding alternative treatment or advised the patient to discuss alternative treatment options with the physician. However, the role of a primary care provider (PCP) is to provide treatment and preventive care across a life span. If the Beers Criteria were implemented in a primary care setting, a PCP could prevent the use of PIMs before reaching the age of 65 years and older. In situations where a PIM was identified for a geriatric patient, the PCP could alter the PIM as appropriate or function as the gatekeeper promoting collaboration with the various physicians and specialties caring for the patient in order to promote wellness and prevent complications.

In terms of continuing this project at the current practice, it was a relatively easy and simple intervention that added one additional step to the practice's already-existing medication reconciliation process. The additional step was to review the medication list documented in the patient's chart with the Beers Criteria and notate any PIMs that were identified. Due to this simplicity and the easy adaptability into the medication reconciliation process, the intervention should be easily sustainable at this practice. Furthermore, after this 6-week period, the intervention has become embedded into the practice's culture. The PIM Identification Checklist served as a trigger to remind the medical assistant of the process until it became a part of the culture. However, it is recommended that the practice format the PIM Checklist according to their needs, such as removing the requirement for physician rationale that was pertinent to only this project, and continue to utilize the checklist for the sustainability of this intervention.

**Implications for Practice**

The purpose of the Beers Criteria is to identify potentially inappropriate medications that present a higher risk for ADEs and other medication-related complications when used in the geriatric population. By increasing awareness of the Beers Criteria and implementing it into the medication reconciliation process, healthcare providers are able to identify PIMs and consider safer alternative medication or non-drug treatment options. These actions of identifying potential harm and considering alternatives promote medication safety in this vulnerable population. Alteration of treatment for any identified PIM is not required; however, this intervention promotes patient safety by identifying the potential hazards and reminding the healthcare provider to carefully consider the risks and benefits of treatment for the patient. Overall, this project was implemented as quality improvement intervention to increase the quality of patient care, promote patient safety through safe medication use, and optimize patient outcomes by preventing ADEs.

In addition to promoting overall patient safety and optimizing health outcomes, this project promotes inter-professional collaboration and facilitates communication between the patient and physician. The identification of a PIM prompted the physician to discuss treatment options and compare the risk versus the benefits of the PIM with the patient. If the patient was willing to consider alternative treatment not within the physician's specialty, he would advise the patient to discuss these options with the physician who prescribed the PIM or he would personally consult with that physician regarding the PIM. Although a simple intervention implemented to promote safety and improve health outcomes, this project demonstrated the potential of improving communication and collaboration among PCPs, specialty practices, pharmacists, dietitians, and other members of a healthcare team.

A Doctorate of Nursing Practice (DNP) prepared nurse is trained to be leader who possesses a wide array of knowledge in the sciences and translates this knowledge into practice to improve patient care (American Association of Colleges of Nursing [AANC], 2006). At the doctorate level, a nurse should possess the ability to assess an organization, identify issues within a system, and facilitate change within an organization's processes (AANC, 2006). According to the AANC (2006), the facilitation of change should originate from the knowledge of diverse sources and disciplines that is translated into practice in order to solve practice problems and improve health outcomes. In addition to assessing for the need for change and facilitating change, the DNP-prepared nurse should also be able to develop an intervention process, implement the intervention, and evaluate the process through observation, data collection, and analysis. The DNP-prepared nurse is also trained to possess leadership skills to establish and facilitate collaboration among a healthcare team. It is essential for the DNP-prepared nurse to possess this wide array of knowledge and these various skills sets in order to implement QI measures within an organization and effectively promote change. For this project, the DNP student had to demonstrate knowledge in the areas of physiological changes in the aging process, pharmacologic safety in the geriatric population, and the evidenced-based practices utilizing published clinical guidelines, in this case, the Beers Criteria. The AANC's DNP essentials and role were also exemplified by the DNP student when the problem was identified, an action plan was developed, the intervention was implemented, and progress of the intervention was evaluated via data collection and analysis. The project took coordination and collaboration between various areas of clinical practice in order to have a successful implementation, evaluation of results, and working to develop sustainability for the practice change. This is the definition of the doctoral nursing practice.

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# Appendices

## Appendix A

### Practice Improvement Capacity Rating Scale

Question	Weight	Criteria	Scripted Questions	Red (0 points)	Yellow (5 points)	Green (10 points)	Score	Comment
1	3	<b>Commitment: Senior Leadership: QI Champion/ sponsor</b>  <i>Senior leadership: person or group that has responsibility for designation of time, finances, and resources</i>  <i>(Physician, RN, office manager)</i>	Can you tell me about the commitment that senior leadership (the administration/ the practice) has made to the project?	No designated leader for quality improvement or if designated, not actively engaged.	Leader designated for quality improvement work—however quality improvement team non-existent, or if exists, not meeting regularly to review project status/data.	Leader designated for quality improvement work and quality improvement team meets regularly to review project status/data and discuss improvement opportunities.		
			<ul style="list-style-type: none"> <li>Do you have a designated leader?</li> <li>Is there a team that meets regularly?</li> <li>In terms of time, finances, resources?</li> </ul>					
2	3	<b>Commitment: Financial Resources</b>	IF NOT ANSWERED ABOVE:  How do the leader and the QI team fit in QI work with their other responsibilities in the practice?	No time budgeted for QI activities. No specific funding to support QI activities.	Insufficient amount of FTE allocated for QI activities and/or limited/small amount of funding for QI activities.	Sufficient amount of dedicated FTE and funding allocated to QI activities.		
			<ul style="list-style-type: none"> <li>Are they paid for working on a QI project or is it volunteer work?</li> </ul>					
3	3	<b>Level of Physician Leader Support</b>	Do you have a physician leader who supports this effort?	Physician leader has not been engaged in discussions regarding QI initiatives or has not yet confirmed their formal support.	Physician leader has confirmed their formal support of QI initiatives, but there are no regular meetings or interactions to discuss/review progress.	Physician leader demonstrates behaviors consistent with actively supporting QI efforts—this includes convening regular meetings with QI team leaders to review progress and help address issues/challenges.		
			(Physician leader is one whom the other clinicians and staff look up to and identify as a leader.)  <ul style="list-style-type: none"> <li>What is the relationship between this person and the QI team?</li> </ul>					
4	3	<b>Level of Practice Administrator Support</b>	Does your practice administrator or office manager support this effort?	Practice administrator has not been engaged in discussions regarding QI initiatives or has not yet confirmed formal support.	Practice administrator has confirmed formal support of QI initiatives, but there are no regular meetings or interactions to discuss/review progress.	Practice administrator demonstrates behaviors consistent with actively supporting QI efforts—this includes convening regular meetings with QI team leaders to review progress and help address issues/challenges.		
			<ul style="list-style-type: none"> <li>How do they demonstrate this to the staff? (How does the staff know they support it?)</li> <li>Do they meet with the QI team?</li> <li>How do/will they help the QI team with this effort?</li> </ul>					

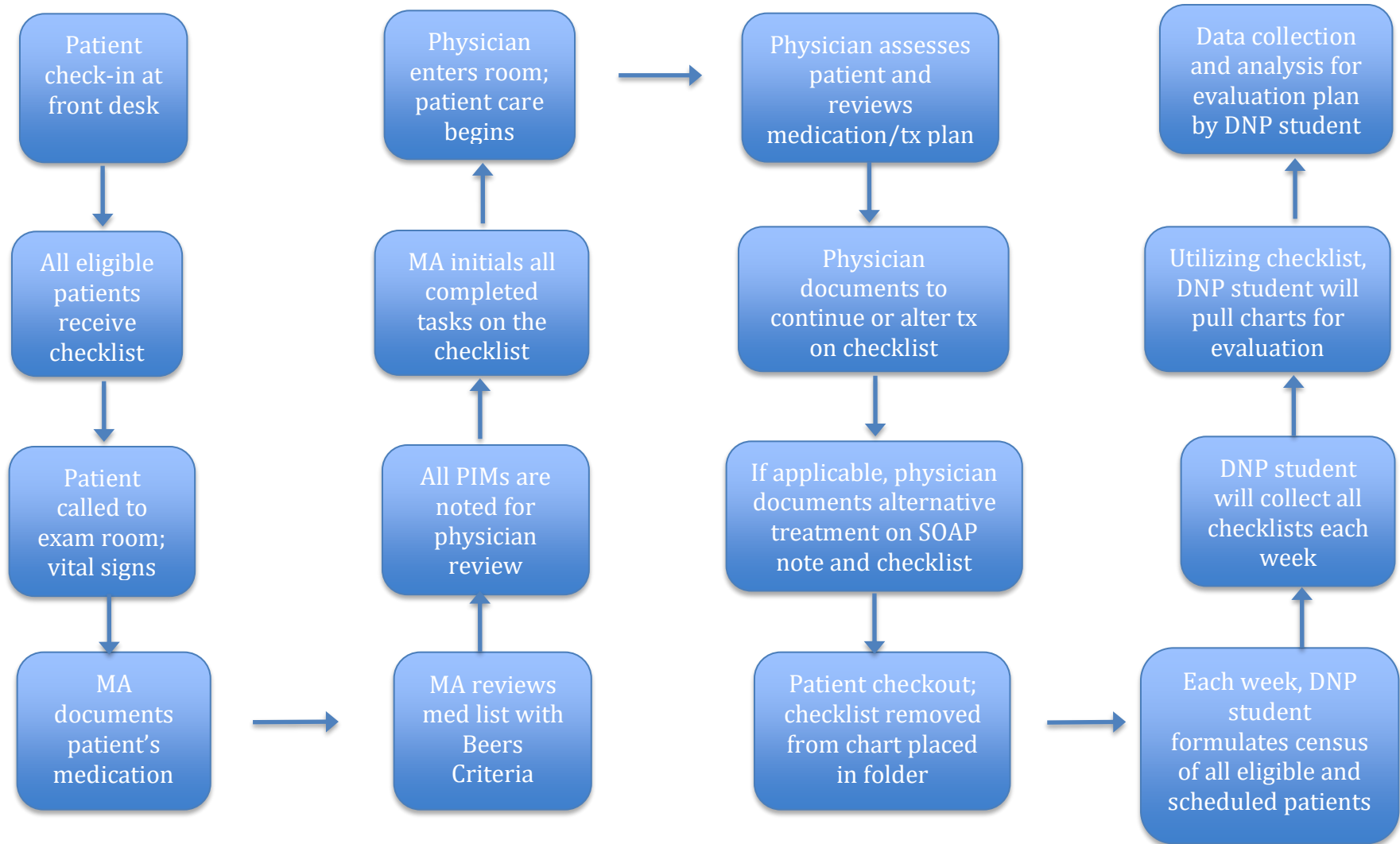
5	3	Competing priorities	<p>Are there any changes that have occurred/are going to occur that may have an effect on this project?</p> <p>Are there any other projects the practice will be working on while this QI project is going on?</p> <ul style="list-style-type: none"> <li>How do you see them affecting this QI project?</li> <li>Do they overlap in terms of goals or data collection?</li> </ul>	<p>Currently converting to an EMR</p> <p>OR</p> <p>Significant staff turnover/changes</p> <p>OR</p> <p># of QI projects competing for time of staff and resources</p> <p>OR</p> <p>Change in leadership expected or imminent</p> <p>OR</p> <p>Merger or acquisition anticipated in near future.</p>	<p>Modest competing priorities, such as end phase of EMR conversion</p> <p>OR</p> <p>Other QI projects, but winding down soon</p> <p>OR</p> <p>Relatively stable staff and leadership structure.</p>	<p>No significant competing priorities</p> <p>OR</p> <p>Significant issues/challenges impacting execution of QI activities</p> <p>AND</p> <p>Stable staff and leadership structure.</p>
	2	Communication	<ul style="list-style-type: none"> <li>Does the rest of the staff know about this effort?</li> <li>How have you kept the staff up to date with the progress of other projects in the past?</li> <li>How are you communicating the work being done by the QI team to the rest of the practice?</li> </ul>	<p>Project not discussed at regular staff meetings, limited knowledge among practice physicians/staff, no data/information posted or distributed</p>	<p>Some effort devoted to sharing project information and updates with practice physicians/staff</p>	<p>Project information and updates discussed with practice physicians and staff at regular practice meetings, data/information shared, input/feedback recruited. Data posted in visible place.</p>
7	2	Access/Use of QI Infrastructure/  Resources Available in the Community	<p>Does your practice participate in any community improvement efforts?</p> <p>Any EMR sponsored or trade industry sponsored improvement efforts?</p>	<p>No practice awareness of QI infrastructure or resources available in the community.</p>	<p>Some awareness of QI infrastructure and resources available, but not yet accessing/using.</p>	<p>Practice is accessing/using QI infrastructure/resources available in the community.</p>

8	2	Prior Experience Executing QI Projects	<p>Tell me about the improvement work your practice has done in the past</p> <ul style="list-style-type: none"> <li>What kind of experience do the members of the QI team bring to the effort?</li> <li>Do you keep a record of what you have tried and how it went?</li> <li>How do you decide if what you try/ change is working? (You are looking for answers that indicate they use data to drive improvement.)</li> </ul>	No identifiable improvement interventions pursued to date.	Improvement interventions pursued; but no formal QI method used (Model For Improvement, Lean, Six Sigma, etc.)	Previous improvement interventions pursued using formal QI method.
9	2	QI team designated with appropriate representation	<p>Who is/will be on your QI team? Why?</p>	<p>No QI team in place</p> <p>OR</p> <p>Several team members identified for QI activities, but there is a lack of balance representing the testing to be done (e.g., no RN included on team for PCMH)</p>	<p>Team members identified for QI activities.</p> <p>Balanced representation of staff based on QI activity.</p> <p>No patient partner on QI team.</p>	<p>Team members identified for QI activities.</p> <p>Balanced representation of staff based on QI activity.</p> <p>Patient/parent part of the team.</p>
10	2	Reliability of data	<p>How reliable do you think your reports are?</p> <ul style="list-style-type: none"> <li>Does the information seem accurate to you?</li> <li>Do you compare your data to other practices or national benchmarks?</li> <li>Is there someone who looks over the reports for accuracy?</li> <li>Does the QI team review the reports?</li> </ul>	No designated point person reviewing data for accuracy.	Point person designated, but no defined process for monitoring accuracy/timeliness of data.	<p>Accuracy/timeliness of data monitored and addressed.</p> <p>Quality leadership person/team discusses data accuracy at regular intervals and identifies/pursues improvement opportunities.</p>

11	2	Reliability of data collection	<ul style="list-style-type: none"><li>Do you think the data you need are reliably entered into the EMR with each encounter?</li><li>Is there a way to tell if they are?</li><li>Does everyone follow the same process for getting info/data into the EMR?</li></ul>	Data collection solely dependent on clinicians at time of encounter.	Redundancy built into data collection process.  Point person designated, but no defined process for monitoring accuracy/timeliness of data entry.	Defined process for monitoring accuracy/timeliness of data entry.  Quality leadership person/team discusses data collection process at regular intervals and identifies/pursues improvement opportunities.
		External Payment Incentives from Commercial/	Is the practice being paid to participate in an improvement effort other than MU?	Not currently.	Currently being discussed by commercial/ governmental <u>payors</u> , but not yet in place.	Currently in place.
		Governmental Payors Linked to the QI Project	Are you being paid to report on or meet quality measures?			
12	2					
13	1	Meaningful Use	Where is your practice in terms of applying for meaningful use?	Not attested to meaningful use.	Meaningful use in design phase.	Meaningful use implemented and criteria met.
14	1	Source of IT support	What do you do when you need to add fields to collect data or run reports?	No internal or external IT support available to the practice.	Internal or external IT support available to the practice, but not meeting needs of QI initiatives.	Internal or external IT support to the practice is meeting the needs of QI initiatives.
			<ul style="list-style-type: none"><li>Do you do this in office?</li><li>Do you need to contact someone outside the office?</li><li>Does this arrangement meet your needs/the needs for the QI project and QI team?</li></ul>			
15	1	Use of EMR/Registry/ Analytic Reporting Tool for Measurement/Data Reporting	What data will you be collecting for this project?	No EMR.	EMR in place, but data fields linked to key measures not embedded, or related data reporting capabilities (EMR, registry, or <u>other</u> analytic tool) not yet in place.	EMR with data fields linked to key measures embedded, and data reporting capabilities in place.
			How do you plan to collect the data you will need for this project? <ul style="list-style-type: none"><li>Is the information currently collected in your EMR?</li><li>Can you get reports based on the data from your EMR easily?</li></ul>			
Total Score						
Must-Pass Criteria Met    Yes / No						
Final Score—Circle level		Red: 0-99	Yellow: 100-249	Green: 250 or greater and <i>all must-pass criteria met</i>		

Appendix B

Project Intervention Flow Chart



# Appendix C

## PIM Identification Checklist

### PIM IDENTIFICATION CHECKLIST

- Name: \_\_\_\_\_ Age: \_\_\_\_\_ y.o.  
 DOB: \_\_\_\_\_ Ethnicity: \_\_\_\_\_ Gender: M / F
- \_\_\_ 1. List of patient's current medications and supplements documented in the patient's chart.
- \_\_\_ 2. Patient's medications compared AGS' Beers Criteria
- \_\_\_ 3. All PIMs have been highlighted for physician evaluation.
- \_\_\_ 4. Physician's treatment plan documented with rationale.
- A. Continue with same treatment
- Treatment effective; no ADEs and benefits outweigh risks
  - Consult with physician who prescribed PIM
  - Patient refuses alternative treatment
  - OTHER: \_\_\_\_\_
- B. Recommend alternative treatment
- PIM identified; safe and effective alternative treatment available
  - Patient experiencing ADE
  - OTHER: \_\_\_\_\_

### ALTERNATIVE TREATMENT OPTION:

*\*\*Please place checklist in the folder located at the front desk. \*\**

Patient meets criteria (65 years and older): Yes // No  
 Chronic diseases: HTN / DM2 / HLD / CKD / Other: \_\_\_\_\_  
 Number of prescription medications: \_\_\_\_\_  
 Number of identified PIMs: \_\_\_\_ // Name: \_\_\_\_\_

### PIM IDENTIFICATION CHECKLIST

- Name: \_\_\_\_\_ Age: \_\_\_\_\_ y.o.  
 DOB: \_\_\_\_\_ Ethnicity: \_\_\_\_\_ Gender: M / F
- \_\_\_ 1. List of patient's current medications and supplements documented in the patient's chart.
- \_\_\_ 2. Patient's medications compared AGS' Beers Criteria
- \_\_\_ 3. All PIMs have been highlighted for physician evaluation.
- \_\_\_ 4. Physician's treatment plan documented with rationale.
- A. Continue with same treatment
- Treatment effective; no ADEs and benefits outweigh risks
  - Consult with physician who prescribed PIM
  - Patient refuses alternative treatment
  - OTHER: \_\_\_\_\_
- B. Recommend alternative treatment
- PIM identified; safe and effective alternative treatment available
  - Patient experiencing ADE
  - OTHER: \_\_\_\_\_

### ALTERNATIVE TREATMENT OPTION:

*\*\*Please place checklist in the folder located at the front desk. \*\**

Patient meets criteria (65 years and older): Yes // No  
 Chronic diseases: HTN / DM2 / HLD / CKD / Other: \_\_\_\_\_  
 Number of prescription medications: \_\_\_\_\_  
 Number of identified PIMs: \_\_\_\_ // Name: \_\_\_\_\_



## Appendix D

## Action Plan for Project Intervention

Table 1					
<i>Action Plan</i>					
<u>Task</u>	<u>Materials</u>	<u>Space</u>	<u>Finance / Budget</u>	<u>Time Frame</u>	<u>Personnel</u>
Preparation of material for education session and QI measure	Beers Criteria pocket guide, intervention plan flow sheet, checklist, designated confidentiality folder	DNP student's home/Printing store	Cost of paper and printing of teaching material for the education session <ul style="list-style-type: none"> <li>• 4 flow sheets</li> <li>• 6 Beers Criteria pocket guides</li> <li>• 4 checklists for meeting; 100 checklist total for the project</li> </ul>	WEEK 0  Complete one week before initiation of QI measure  4 hours for preparation of all materials needed; Complete one week before initiation of QI measure	DNP student

			Cost for printing-\$10.00		
Arrange an education session/meeting to introduce QI measure to staff	N/A—inform staff of the upcoming meeting	Office	No associated cost	WEEK 0 Complete one week before initiation of QI measure  Verbally inform staff of meeting; 1 min	DNP Student
Obtain buy-in and input of staff regarding QI measure	N/A—communication with staff	Office	No associated cost	WEEK 0 Complete one week before initiation of QI measure  Communication with staff regarding QI project; 20 mins	DNP student and staff
Education Session/Introduction of QI measure to staff	Beers Criteria pocket guide, intervention plan flow sheet, checklist	Office's break room during the staff's lunch hour	Meal (\$50 each meal); Cost of paper and printing of teaching material for the education session <ul style="list-style-type: none"> <li>• 4 flow sheets</li> <li>• 6 Beers Criteria</li> </ul>	WEEK 0 Complete 3 days before initiating QI measure  30-min education session before initiating QI project	All staff members—MD, MA, OM, and front desk receptionist

			pocket guides <ul style="list-style-type: none"> <li>• 4 checklists for meeting; 100 checklist total for the project</li> <li>• Cost for printing- \$10.00</li> </ul>		
Place copies of checklist at the front desk for patient check-in	Checklist	Lobby/Front Desk	Cost of printing the checklist	WEEK 0 Complete one day before initiating QI project; 1 min	DNP student
Place copies of Beers Criteria pocket guide in patient exam room for MA	Beers Criteria pocket guide	Patient exam room	Cost of printing the Beers Criteria pocket guide	WEEK 0 Complete one day before initiating QI project; 1 min	DNP student
Place confidential folder for checklist at front desk	Designated folder for confidentiality of checklists	Lobby/Front Desk	Cost of folder (\$2.00)	WEEK 0 Complete one day before initiating QI project; 1 min	DNP student
Patient Intervention Process	Sign-in sheet, patient chart, PIM	Office	Employee payment; cost	WEEK 1-6	DNP student and all staff

	Identification checklist, appointment book		of purchasing and print of materials—checklist, Beers Criteria pocket guide, folder	<ul style="list-style-type: none"> <li>• Week 1: Jan 29-Feb 1</li> <li>• Week 2: Feb 5-Feb 8</li> <li>• Week 3: Feb 12-15</li> <li>• Week 4: Feb 19-22</li> <li>• Week 5: Feb 26-March 1</li> <li>• Week 6: March 4-March 8</li> </ul> <p>6-week period of the intervention process</p>	members—MD, MA, OM, and front desk receptionist
<ul style="list-style-type: none"> <li>• Check-in patient</li> </ul>	<ul style="list-style-type: none"> <li>• Sign-in sheet, patient chart, copy of insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Lobby/Front Desk</li> </ul>	<ul style="list-style-type: none"> <li>• N/A—already a process practiced and funded by the clinic</li> </ul>	<ul style="list-style-type: none"> <li>• At the start of every appointment; 10 mins</li> </ul>	<ul style="list-style-type: none"> <li>• Front Desk Receptionist</li> </ul>
<ul style="list-style-type: none"> <li>• Placement of checklist in chart</li> </ul>	<ul style="list-style-type: none"> <li>• Checklist</li> </ul>	<ul style="list-style-type: none"> <li>• Lobby/Front Desk</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of paper and printing of checklist</li> </ul>	<ul style="list-style-type: none"> <li>• After determining if patient meets eligibility criteria, checklist is placed in chart; 1 min</li> </ul>	<ul style="list-style-type: none"> <li>• Front Desk Receptionist</li> </ul>
<ul style="list-style-type: none"> <li>• Call back to patient room and obtain patient's vital signs</li> </ul>	<ul style="list-style-type: none"> <li>• Chart with labs and SOAP note, medical</li> </ul>	<ul style="list-style-type: none"> <li>• Hallway and patient exam room</li> </ul>	<ul style="list-style-type: none"> <li>• N/A—process of the clinic;</li> </ul>	<ul style="list-style-type: none"> <li>• After receiving patient chart; the start of the patient</li> </ul>	<ul style="list-style-type: none"> <li>• Medical Assistant</li> </ul>

	equipment— stethoscope, BP cuff, etc.		MA paid by physician	care process; 10 mins	
• Documentation of patient’s medication and supplements	• SOAP note and checklist	• Patient exam room	• Cost of paper to print checklist	• At the beginning of patient’s appointment; 5 mins.	• Medical Assistant
• Comparison of patient’s meds with Beers Criteria	• SOAP note, checklist, Beers Criteria	• Patient exam room	• Cost of paper and printing of Beers Criteria pocket guide	• During patient’s appointment; 5 mins	• Medical Assistant
• Notation/Highlight all PIMs that meet Beers Criteria	• Beers Criteria, checklist, SOAP note with med list	• Patient exam room	• Cost of paper to print checklist and Beers Criteria	• During patient’s appointment; 1 min.	• Medical Assistant
• Physician enters room; assesses patient and evaluate treatment plan	• SOAP note, checklist	• Patient exam room	• Cost for checklist	• During patient’s appointment; 20 mins	• Physician
• Physician documents treatment plan—to continue or alter therapy	• SOAP note, checklist	• Patient exam room	• Cost for checklist	• During patient’s appointment; 5 mins	• Physician
• Patient check-out; Patient chart given to receptionist	• Patient chart with SOAP note and checklist inside	• Hallway/ Front Desk	• N/A	• Conclusion of patient’s	• Medical Assistant,

				appointment; 5 mins	Front Desk Receptionist
• Checklist removed and placed in folder	• Checklist, folder	• Front desk	• Cost of checklist and folder	• 1 minute	• Front Desk Receptionist
• Formulate census of all scheduled patients 65 years and older	• Appointment book	• Hallway desk area	• N/A	• Census formulated each week; 30 mins	• DNP student
• Collection of checklists	• Folder with checklists	• Front desk and hallway desk area	• Cost of checklists	• Collection will occur every week; 1 min.	• DNP student
• Pulling charts for all patients that received checklist	• Checklists to pull charts	• Chart room	• N/A	• Charts will be pulled each week; 20 mins	• DNP student
• Data collection & Analysis/Evaluation <ul style="list-style-type: none"> <li>○ % of patients' medication lists that were reviewed based on the Beers Criteria recommendations</li> <li>○ % of treatment plans that are changed to a safer and effective</li> </ul>	• Chart with SOAP note, checklist <ul style="list-style-type: none"> <li>○ Checklist filled out—MA initialed indicating all tasks (mediation documentation and review of this list with Beers Criteria) were completed</li> </ul>	• Hallway desk	• N/A	• Data collection and analysis will occur every week; 5 hrs	• DNP student

<p>alternative treatment option</p> <ul style="list-style-type: none"> <li>○ PIMs, type of PIM, MCC, polypharmacy</li> </ul>	<ul style="list-style-type: none"> <li>○ Physician's documentation of his decision regarding patient's treatment—to continue or alter</li> <li>○ If treatment is changed, alternative treatment documented on either or both the SOAP note or checklist</li> </ul>				
<ul style="list-style-type: none"> <li>• Additional staff meetings and education sessions</li> </ul>	<ul style="list-style-type: none"> <li>• Results of the QI measure</li> </ul>	<ul style="list-style-type: none"> <li>• Office's break room</li> </ul>	<ul style="list-style-type: none"> <li>• Meal; costs of any paper to print out visual diagrams of the results of QI measure</li> </ul>	<ul style="list-style-type: none"> <li>• 30 min. meetings/education session during the staff's lunch hour <ul style="list-style-type: none"> <li>○ A meeting will be scheduled at the half-way point (Week 3) of the QI project</li> <li>○ Additional meetings may be scheduled if there are any</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• DNP student; all staff members including MD, MA, OM, and front desk receptionist</li> </ul>

				issues, questions, or concerns <ul style="list-style-type: none"><li>○ The last staff meeting will be scheduled at the conclusion of this QI measure (Week 6)</li></ul>	
<i>Note</i> (only if applicable)					



### Data Collection Table

[illegible]

Appendix F  
Letter of Support

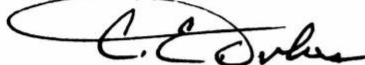
October 31, 2017

Christine Mitchell  
University of the Incarnate Word  
4301 Broadway, CPO #285  
San Antonio, TX 78209

To Whom It May Concern:

I have reviewed your request regarding your study and am pleased to support your quality improvement project entitled "A Quality Improvement Initiative to Identify Potentially Inappropriate Medication Utilizing the Beers Criteria among Elderly Patients Aged 65 Years and Older". Your request to use Dr. Carl E. Dukes' office as a project site is granted. This authorization covers the time period of May 2017 to May 2018. We look forward to working with you.

Sincerely yours,

A handwritten signature in black ink, appearing to read "C. E. Dukes", with a large, stylized loop at the beginning.

Carl E. Dukes, M.D., F.A.C.P.