Evidence Based Practice Improvement: Nursing and Beers Criteria: An Intervention to Reduce Potentially Inappropriate Medication Use for Patients in a Long-Term Care Facility

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**Pico Question**

Would educating nursing staff to use Beers Criteria as an assessment tool increase nursing awareness and documentation of the use of potentially inappropriate medication (PIM), thus decreasing the likelihood of adverse events, in adults 65 and over during a six-month intervention in a long term care setting, as compared with a long term care setting in which nurses are not educated to use Beers Criteria?

**Background**

 Medication error is a Centers for Medicare and Medicaid (CMS) Never Event (Mckeon and Cardell, 2011). In inpatient facilities, medication error rates range from 4.8% to 5.3%, while in long-term care settings, also known as nursing homes, medication error rates have been measured at 12.2% (Wittich, Burkle, and Lanier, 2014). Patients over the age of 65 are considered a vulnerable population and are more susceptible to harmful medication errors, resulting in higher percentages of adverse drug events and drug-related hospital admissions. (Curtain et al., 2013; Desai, Williams, Greene, Pierson, and Hansen, 2011; Kojima et al., 2012). This increased susceptibility is largely due to age associated physiological changes that alter pharmacokinetics, increasing older adults’ risk of suffering from drug-drug-interactions, polypharmacy, and drug-disease interactions, in addition to often having comorbidities (Ryan et al., 2009; Momin et al., 2013). Additionally, it has been noted “that the most important predictors for PIM prescribing were patients aged >80 years, male sex, number of diagnoses more than three, number of medications prescribed more than five and longer length of stay in hospital” (Undela, Bansal, D’Cruz, Sachdev, and Tiwari, 2014). More often than not, medication errors are preventable, and research supports this: 42% of adverse drug events (ADEs) in long-term care were preventable, with most problems occurring at the ordering and monitoring stages of care (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012).

 The American Geriatrics Society (AGS) further suggests that “if a provider is not able to find an alternative and chooses to continue to use a drug on this list in an individual patient, designation of the medication as potentially inappropriate can serve as a reminder for close monitoring so that ADEs can be incorporated into the electronic health record and prevented or detected early” (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). Adverse drug events occur in 15% or more of older patients with up to 50% of these being preventable (Patterson, Cadogan, Kerse, Cardwell, Bradley, Ryan, and Hughes, 2014). The risk of an ADE is 13% with the use of two medications, 58% with the use of five medications and as high as 82% with the use of seven or more medications (Patterson et al., 2014).

Potentially inappropriate medications impact older adults and can cause serious consequences. Among those consequences we may see an increase in falls, numbers of fractures, incidence of delirium, and gastrointestinal bleeding (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). Use of PIM’s in older adults can even lead to death in some instances. Caring for the older population is increasingly difficult; patients above 65 years old usually require multiple medications. The presence of chronic conditions puts a patient at an increased risk for drug-drug interactions (Undela et al., 2014).

Beers Criteria is a tool used to identify potentially inappropriate medications (PIM) in older adults (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). Training physicians to use Beers Criteria has been shown to reduce the incidence of medication errors as well as overall healthcare costs (Kojima et al., 2012). Medication errors are a problem for various reasons; not only do they cost hospitals and health care facilities a lot of money, but they also often have negative effects on patients. The use of Beers Criteria can help to decrease healthcare costs related to inappropriate prescribing (Ryan et al., 2009). Inappropriate prescribing can lead to increased hospital admissions, health care provider staff times, medication costs, and costs to the patients and their families (Ryan et al., 2009). According to the American Geriatric Society, the estimated cost of healthcare issues related to PIM use was $7.2 billion (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). This cost, along with the health risks for patients, demonstrates that the Never Event of medication errors should be taken seriously; decreasing the use of PIMs would have profound effects within our health care system.

**Search Strategy**

 To find evidence supporting our practice improvement project, online databases, peer-reviewed journals, and professional publication searches were used. The databases used included CINAHL, PubMed, and Medline. Each database was explored expansively, and keywords and phrases including “Beers Criteria,” “medication error,” “geriatrics,” “long-term care facility,” “nursing home,” and “morbidity and mortality” were utilized. Searches were limited strictly to publications from the past five years, and publications were only included if they were relevant to the topic and used appropriate statistical analyses. More extensively, publications were included that described: the prevalence of medication errors, the prevalence of medication errors in long-term care facilities, the cost of medication errors, reduction in medication error, reduction of medication error in long-term care, prevalence and predictors of PIMs in the elderly, beers criteria use, beers criteria use in long-term care, beers criteria use in the identification of PIMs, beers criteria compared to other tools, and beers criteria compared with itself. Exclusion criteria included acute-care or short-term stay, and samples where patients were less than 65 years of age. A total of fourteen references were located, including 5 systematic reviews and 2 guidelines.

**Research Literature Review**

 The literature demonstrates that using the Beers Criteria can decrease the incidence of adverse drug events through identification of potentially inappropriate prescribing (Ryan et al., 2009; Kojima et al., 2012; Kanaan et al., 2013). Through the use of Beers a correlation between potentially inappropriate prescribing and ADEs has resulted in: higher probability of hospitalization with 2 or more PIMs, increased risk for ADRs with use of at least one PIM, increased risk of hospitalization and death and increased risk of falling (Kaufmann, Tremp, Hersberger, and Lampert, 2014). A study examining the incidence of PIMs in an Indiana Medicare long term care facility found a one-year incidence of 42.1%, with potentially inappropriate medication users more likely to be hospitalized and more likely to die in the 12 months after starting a potentially inappropriate medication (Dedhiya, Hancock, Craig, Doebbeling, and Thomas, 2010). Additionally, another study examining the involvement of Beers Criteria medications in adverse drug events found that Beers Criteria medications were involved in 16.5% of adverse drug events following hospital discharge (Kanaan et al,. 2013). Beers 2012 has been found to be more comprehensive than Beers 2003 and competent in identifying potentially inappropriate medications. Beers 2012 identifies 4.8% of potentially inappropriate medications, while Beers 2003 identified only 2.9% (Momin et al., 2013).

The Beers Criteria has been found to be more effective than other prescription screening tools (Ryan et al., 2009; Vishwas et al., 2012). In a study comparing Beers to the Improving Prescribing in Elderly Tool (IPET), another inappropriate prescribing screening tool, Beers Criteria identified 38.6% of potentially inappropriate prescribing in a hospital setting, while the IPET only identified 22% (Ryan et al., 2009). Beers Criteria was found to be more sensitive and specific than the Screening Tool of Older Persons’ potentially inappropriate Prescription (STOPP) screening tool in detection of potentially inappropriate medications (Vishwas et al., 2012). In addition, Stafford et al. found Beers criteria to identify more inappropriate prescribing errors than the McLeod criteria **(**Stafford, Alswayan, and Tenni, 2011**).**

 The American Geriatrics Society guidelines recommend using Beers Criteria to identify PIMs in older adults (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). The Beers criteria should be used in instances of planning medication initiation, reviewing established drug regimens, or changing an existing drug regimen **(**Bergman-Evans, 2012**)**. The guidelines state using this criteria would be especially beneficial for those experiencing polypharmacy, multiple providers, multiple or recent transfers between long term or acute care facilities, complicated drug regiments or unclear goals **(**Bergman-Evans, 2012**)**. According to the guidelines, the best way to use Beers Criteria is as an educational tool and a quality measure (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). The criteria, however, should be used as a guideline. It should not substitute multi-disciplinary clinical decision-making. The Beers Criteria strived to encompass many complex cases into its recommendations, although it is not meant to cover every case. The use of this tool should be individualized to each patient’s particular case in accordance with professional judgment to deem which benefits outweigh the risks. Potentially inappropriate medications found in the Beers Criteria should be discontinued or adjusted unless deemed necessary and substituted with an alternative medication or non-pharmacological therapy **(**Bergman-Evans, 2012**)**. If a patient continues to take a Beers Criteria medication the staff should be aware to monitor for ADEs more frequently.

 Additionally, several studies have identified a need for further research. One study suggested that further exploration of different methods to decrease medication errors in older adults using the Beers Criteria, specifically with regard to potential nursing interventions, should be conducted. It is suggested that utilizing an intervention that employs a team-based approach that involves both physicians and nurses (Kanaan et al., 2013). The study also suggests that educational initiatives aimed at preventing adverse drug events related to PIMs be targeted at all members of the health care team. An initiative that aimed to educate physicians in nursing home settings about inappropriate prescribing of PIMs was effective in reducing PIM or other contraindicated medications in older adults (Kojima et al.,2014). Another initiative carried out in a nursing home involved a polypharmacy quality improvement (QI) project aimed at educating staff on identifying PIMs and potential drug-drug interactions, resulting in a reduction in the number of PIMs prescribed. Nursing staff’s lack of knowledge around medication administration has been found to be a contributing factor to medication error (Tenhunen, Tanner, and Dahlen, 2014). Therefore, further research should be completed to determine the impact of increasing nurse education and awareness of PIMs on deceasing adverse drug events.

Further research should also focus on the incorporation of Beers Criteria into electronic health records that could provide notification of any alterations in medications during the patient’s hospitalization, recommendations for laboratory monitoring, and prompts to schedule follow-up visits (Kanaan et al., 2013). The literature shows medication errors that occur during patient transfer are more likely to result in patient harm (Desai et al., 2011). A study researching medication error in North Carolina nursing homes over a three-year period found that 11% of medication error incidents involved a patient transitioning into a nursing home, with more than half of the medication errors occurring during the documentation phase of transition (Desai et al., 2011). Further research should focus on improving documentation involved in transitions from hospitals to nursing homes, as well as to whether or not utilizing electronic records could reduce medication errors in these cases.

**Evidence-Based Practice Recommendations**

Based on the literature and the guidelines presented in this paper, it is the recommendation of this group that the long-term care facility implement a performance improvement project training staff to utilize Beers Criteria with the goal of reducing the use of potentially inappropriate medications (PIMs) in their patient population. The goal of this project is to reduce the use of PIMs thereby leading to an overall reduction in medication errors. The project best supported by the literature should involve an in-service education session with the nursing staff to instruct them on the importance of their role in reducing medication errors and how to utilize the Beers Criteria in their medication assessments for their patients.

**Methods for Practice Change**

The practice change would be two-fold and would consist of nursing staff education and of the implementation of an alert system in the electronic medical record (EMR) to signal to the nurse when a Beers Criteria high-risk medication was being used. An in-service education session could be conducted on the unit, over the course of a day in one-hour sessions. Some nurses would remain on the floor caring for patients while others attended the training; when one session finished, nurses on the floor would attend the training and those in the training would go back to work on the floor. These sessions would be held at specific, designated times to facilitate staff scheduling, e.g. 10 AM, 12 PM, etc.

A nurse from the AGS who is familiar with the criteria and has education experience would conduct the education session for the staff. Staff would be instructed on how to conduct focused medication assessments, utilizing the Beers Criteria and educated as to their role and its importance in preventing medication errors. These assessments will be conducted on the patient’s intake assessment on arrival to the facility, or any time the patient is transitioned between levels of care since medication errors are more likely to occur during patient transition (Desai et al., 2011).

The assessment itself would consist of determining the appropriateness of the medication utilizing the Beers Criteria and determining the appropriateness of the dosage for an older adult. If a medication is indicated on the Beers Criteria, the nurse should assess the patient for any signs of adverse effects. After assessing the patient, the nurse should then have a conversation with the patient’s prescribing provider reporting any signs of adverse effects and suggest potentially finding a different medication or adjusting the dosage if appropriate. Alternative medications are listed on the Beers Criteria and the nurse would use the criteria as a guide for this conversation. If the provider decides to maintain the use of the medication on the Beers Criteria for the patient, the nurse should be aware of the potential side effects and adverse effects for the patient and assess for these effects frequently, at least once per day.

The nurse would be alerted to the fact that the medication is on the Beers Criteria by a pop-up alert in the EMR software. The alert would come up when the nurse is initially entering the medications into the EMR on patient’s admission to the facility. The nurse will need to document her assessment, conversation with the provider, and any other intervention take and the outcome in order to close the pop up and continue charting. The alert would also pop up if a patient is prescribed a new medication that is on the Beers Criteria. Once the nurse addresses the pop-up and documents any steps she has taken, if the provider decides to have the patient continue taking the Beers Criteria medication, the medication will appear with a gray dot next to it in the medical record. This dot will alert nursing staff that this medication carries potential risks for the patient, and staff can monitor the patient accordingly.

Potential variables could include patient turnover rate: if the facility experiences a higher or lower patient turnover rate than usual, this may affect medication errors since medication error likelihood increases with facility transfer. If the facility happens to admit an unusually high rate of acute patients who take a large number of high-risk medications, this may raise error rates. Additionally, if there is staff turnover during the intervention year and new staff do not receive the same training as the staff they are replacing, this could affect the integrity of the intervention.

**Evaluation**

Each incidence of documentation of steps taken by nursing staff to avoid the use of PIMs of Beers Criteria will count as a “good catch.” The project will measure the incidence of “good catch” notes. The notes will be analyzed to see what steps were taken by the nurse and by the provider and what the outcome was, e.g., if the medication was changed or not. Since the number of “good catch” PIMs are not currently being measured, the baseline rate will be zero. Ideally, all PIMs will be flagged and discussed. Upon evaluation of this six-month intervention, the goal is for this project to demonstrate a marked improvement in the number of PIMs flagged in the EMR and in the documentation of instances interdisciplinary communication around PIM use. These improvements in documentation and communication will lead to a reduction of PIM use and, therefore, a reduction in overall adverse drug events.

**Change Process**

As discussed above, our practice improvement idea involves implementing a high-risk medication alert as part of the medical electronic record to allow nurses to check their patients and be aware if their patient’s medications are part of the criteria. In this way, nurses can decrease medication errors specifically in a long term care facility for the elderly since the elderly are more prone to adverse drug events due to polypharmacy (Stafford et al., 2011). In order to implement our project we would initially present our idea to an institutional review board to obtain their approval, as well as, Arch Care information technology to confirm that we will be able to use this system. Additionally, we would discuss with the nurse manager of our facility to encourage the usage and education of this idea amongst the nurses of the floor. Once permission is granted, we can begin implementing the pop-up system installed on the computer. The pop-up would appear as a Beers criteria medication is initially entered into a patient’s EMR. If a nurse identifies a high-risk medication, he or she should contact the physician to perhaps change the medication regimen. Additionally, the AGS is in the middle of updating the Beers criteria, and in order to have the best care, we encourage the most recent Beers Criteria to be attached to the chart and used with the pop up system.

It is the goal of this project to decrease the use of potentially inappropriate medications in older adults, thereby decreasing medication errors. In decreasing PIMs and medication errors, we hope to increase good outcomes for patients and decrease overall healthcare costs.

**References with Levels of Evidence:**

Level of Evidence I: EBP Guidelines and Systematic Reviews:

The American Geriatrics Society 2012 Beers Criteria Update Expert Panel (2012). American Geriatrics Society Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. *Journal of the American Geriatrics Society, 60*, 616–631. doi: 10.1111/j.1532-5415.2012.03923.x

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Level of Evidence II: Randomized controlled trials:

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Level of Evidence IV: Non-Experimental Research

Curtain, C.M., Bindoff, I.K., Westbury, J. L., & Peterson, G.M. (2013). A comparison of prescribing criteria when applied to older community based patients. *Drugs & Aging, 30*, 935-943. doi: 10.1007/s40266-013-0116-6

Desai, R., Williams, C.E., Greene, S.B., Pierson, S., and Hansen, R.A. (2011). Medication errors during patient transitions into nursing homes: characteristics and association with patient harm. *American Journal of Geriatric Pharmacotherapy, 9*(6), 413-422. doi: 10.1016/j.amjopharm.2011.10.005

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Level of Evidence V: Narrative Literature Review

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Level of Evidence VII: Evidence from the Opinion of Authorities and/or Reports of Expert committees:

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