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## **Promoting Antibiotic Stewardship for UTI Management in Long Term Care Residents through Standardized Clinical Practice Guidelines.**

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## **Introduction of the Problem**

The rising prevalence of antimicrobial resistance (AMR) and widespread growth of multiple drug resistant (MDR) pathogens is a growing global concern that threatens treatment of infections that were once responsive to antibiotic therapy (Goldsmith et al., 2015; While, 2016). Urinary tract infections (UTIs) are the most diagnosed infections requiring antibiotics in long-term care (LTC) facilities; however, these are becoming less responsive because of inappropriate use (Goldsmith et al., 2015; Nace, Drinka & Crnich 2014; Rowe & Juthani-Mehta, 2014; Rummukainen et al., 2012; While, 2016). This investigator identified a high rate of antibiotics use among the residents of a Midwestern long term care (LTC) facility that could lead to increased risk of multiple drug resistance organisms (MDROs). This inappropriate use of antibiotics provided the impetus for developing and implementing evidence-based protocol for diagnosing and selecting appropriate drug regimen for UTIs in LTC settings.

## **Literature Review**

Long term care (LTC) facilities provide a home to a diverse group of elderly patients with over 25% in LTC facilities at some point (Nicolle, 2001). Study findings suggest a high prevalence of asymptomatic bacteriuria (ASB) among LTC residents that is treated inappropriately (Ajayi & Radhakrishnan, 2016; CDC, 2012; Colgan, Nicolle, McGlone & Hooton, 2006; Lin & Brown, 2010; Nace, Drinka & Crnich, 2014; Nicolle, 2006). Despite solid evidence refuting the treatment of ASB, the disorder continues to be overtreated in LTC settings partly because of the vague presentation of UTI symptoms among the LTC residents, comorbid conditions, variation in diagnostic algorithms or protocols, and the cognitive impairment among the residents (Buhr, Genao, & White, 2011; Cooper, Titler, Struble & Redman 2017; Nace, Drinka & Crnich 2014; Nelson & Good, 2015).

Antibiotic prescribing in LTC facilities is common with a high prevalence rate of 47% to 79 % annually (van Buul et al., 2012). Rummukainen et al. (2012) indicated that most antibiotic prescribing in LTC settings occur over the phone after the nurse describes the patient's symptoms to the provider, usually without any diagnostic testing. Based upon studies conducted in LTC settings, the authors concluded that ASB is a common reason for overutilizing antimicrobials leading to undesirable consequences such as infections with MDR pathogens; unwanted outcomes (such as C-diff); and higher morbidity, mortality, and healthcare costs (Genao & Buhr, 2012; Rowe and Juthani-Mehta, 2013).

The 2013 Centers for Disease Control and Prevention (CDC) report indicated that MDROs and C-diff infections driven by exposure to antibiotics are responsible for more than 2 million infections each year. Improving appropriate use of antibiotics in the LTC setting is crucial to combat AMR and to decrease unnecessary antimicrobial exposure as well as minimize unwanted outcomes from antibiotic use in the elderly population. Parish and Holliday (2012) suggested that AMS minimizes the occurrence of AMR in managing UTIs in LTC residents as well as conserving antimicrobial sensitivities.

### **Project Methods**

The purpose of this quality improvement project was to develop and implement an evidence-based protocol that could help reduce inappropriate antibiotic use in LTC residing adults with UTIs. This project was implemented at a Midwestern for-profit institution that provides long term care to elderly patients as well as rehabilitation services (physical, occupational and speech therapy). The LTC unit has a 60-bed capacity for residents. The health care providers within the LTC unit included the following: five physicians, six nurse practitioners (NPs), a director of nursing (DON), four directors of care delivery (DCD), eleven registered nurses (RNs), twenty

licensed practical nurses (LPNs), certified nurse assistants (CNAs) and the rehab team ((physical, occupational and speech therapy).

The project was submitted to the Institutional Review Board (IRB) at Southern Illinois University of Edwardsville (SIUE). With IRB approval, pre-intervention chart audits were conducted retrospectively over a 12-week period to obtain baseline data for UTI diagnosis and treatment among residents in the LTC unit as well as post CPG implementation.

Based on the complexity and challenges of managing UTIs in LTC residents, a standardized tool or clinical practice guideline was warranted in this facility. An institutional policy for antibiotic stewardship in the facility validated the use of McGeer criteria as a guideline for its antimicrobial stewardship program. The 2012 McGeer criteria update included evidence-based literature review as well as consensus opinions from infectious disease physicians, infection preventionists, epidemiologists, public health officials and geriatricians (Stone et al., 2012). The 2012 revised McGeer criteria was unanimously agreed upon to be used as the standardized CPG for UTI management to maintain consistency and promote compliance with the institution's policy contained in the antimicrobial stewardship manual. Hardcopies of the CPG were reviewed with all members of the healthcare team (physicians, nurse practitioners, RNs, LPNs, CNAs).

Physicians and NPs at the LTC facility were administered a questionnaire prior to implementation of the CPG to examine attitudes towards antibiotic use in the facility, the role of residents/family influence on prescribing decisions, compliance with evidence-based protocols (EBP) for UTI management and readiness for antimicrobial stewardship. This guideline was discussed with health care providers in the LTC unit, as well as through a staff education program called "Promoting Wise Antibiotic Use in LTC". The presentation included a power point presentation provided for the nurses and CNAs on all shifts prior to implementation. Copies of the

power point presentation were handed to the DON, DCDs (who serve as unit supervisors), infection prevention nurse, nurse practitioners and physicians. Another copy was kept on file in the LTC unit to serve a reference for the nurses and CNAs.

A data collection tool was developed for the audit that clearly identified the specific assessment criteria for UTI management and eligibility criteria for antibiotics. The data analysis tool was designed to capture UTI diagnosis (with or without indwelling catheter) among the adult residents in this Midwestern LTC facility within a 5-month period prior to implementation of the CPG. Data were collected pre- and post-implementation using this tool with data analysis conducted to evaluate the change in a 12-week period before and after intervention. An average of 51 and 52 patient charts were reviewed pre- and post intervention respectively. Each patient's record from the chart and/or computer system was coded beginning from 001 to prevent identification of subjects. Data were saved electronically with password protection that was accessible only to the investigator. All hardcopies of documents, including master list of codes, data collection forms, and completed questionnaires were scanned into the computer and hard copies were shredded.

### **Evaluation**

The primary outcome measures evaluated pre- and post-intervention included the percentage of UTIs and incidence rate of UTIs. UTI incidence rate was calculated by the number of infections per month/average monthly average resident care days x 1000. Staff and provider satisfaction with evidence-based protocol was evaluated through a questionnaire designed using a five-point Likert scale with values strongly agree, agree, neutral, disagree and strongly disagree.

### **Data Analysis and Findings**

There was a significant reduction in UTI cases as well as the incidence rates per 1000 resident days from the pre-intervention period to the post-intervention period. The percentage of UTI cases in the pre-intervention period for September, October and November 2017 were 4%, 15.4% and 8% respectively. The percentage of UTI cases post-intervention for December 2017, January 2018 and February 2018 were 7.4%, 0%, and 5.5% respectively. Overall, a total of 27.4% UTI cases was noted in the three-month pre-intervention period compared to 12.9% in the three-month post-intervention period showing a 14.5% reduction in the percentage of UTI cases. The incidence rate pre-intervention was 1.3, 5.0 and 2.7 per 1000 resident days compared to 2.4, 0.0 and 1.9 per 1000 resident days. This data suggests a total reduction by 4.7 incidence rate per 1000 resident days from pre- to post intervention. Questionnaire findings showed that the physicians and NPs at this Midwestern LTC facility recognized the need for AMS to reduce AMR and reduce adverse drug reactions. Nursing staff were 100% satisfied with the implementation of CPG.

### **Impact on Practice**

Following implementation of the revised McGeer Criteria in this LTC unit, there was a significant reduction in the number of cases of UTI diagnosis among the residents. With increased adherence to this protocol, the findings of this project indicate that the staff at this LTC facility can greatly minimize inappropriate antibiotic exposure among LTC residents over time. The protocol is adaptable and can be utilized in other institutions with minimal resources.

### **Conclusion**

The goal of minimizing inappropriate antibiotics exposure and reducing the growth in MDROs is challenging given the high prevalence of asymptomatic bacteriuria (ABS) among LTC residents coupled with other chronic comorbidities. Although this creates a diagnostic dilemma

for LTC providers, implementing antimicrobial stewardship program in the LTC facility with adherence to a standardized CPG will achieve the goal of reducing inappropriate prescribing.