Implementation of a Suspected Urinary Tract Infection Decision Support Tool to Improve Antibiotic Stewardship in a Long-Term Care Facility

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Table of Contents

Dedication

I dedicate this Doctor of Nursing Practice project to my beloved husband, Bryan, who has been a constant source of support and encouragement for 22 years. I am truly thankful for having you in my life. You are my best friend and soulmate. I also dedicate this project to my children, Kerry and Rose. Time with them was sacrificed throughout this doctoral program. I am forever grateful for your understanding. I love you all.

Acknowledgment

To my project advisor, Dr. Angela Kabbe, thank you for your continued encouragement, support, and guidance throughout this process.

Abstract

Background: Inappropriate antibiotic use in long-term care (LTC) facilities contributes to antibiotic resistances which impact mortality, care, and healthcare costs. Antibiotic stewardship seeks to optimize infection treatment and reduce adverse events associated with antibiotic use. Asymptomatic bacteriuria occurs in 15-50% of LTC residents. Nontreatment of asymptomatic bacteriuria (ASB) is a sustainable strategy for reducing inappropriate antibiotic utilization.

Purpose: The purpose of this quality improvement (QI) project was to implement a decision support tool (DST) and evaluate its effectiveness in promoting antibiotic stewardship in a LTC facility. The project's goal was to decrease inappropriate treatment of ASB using the suspected urinary tract infection (UTI) DST. **Methods**: A quasi-experimental quantitative design was used to provide education and implement the suspected UTI DST to support antibiotic prescribing and promote best practice guidelines at a 100-bed LTC facility in the southeastern United States. The convenience sample included 68 adults with median age 84. **Results**: Statistical analysis revealed a 66.67% decrease in urinalysis orders and modest decrease in antibiotic rates for suspected UTI after implementation of the suspected UTI DST. The suspected UTI DST improved antibiotic stewardship by decreasing urinalysis rates and decreasing unnecessary antibiotic use. Reduction in urinalyses performed decreased treatment of ASB. **Recommendations and Conclusions**: Longitudinal data is needed to validate these results. Continued use of the suspected UTI DST at LTC facilities has the potential to yield long-term improvements in antibiotic stewardship while concurrently improving healthcare quality and healthcare costs.

Key Words: long-term care, antibiotic resistances, antibiotic stewardship, urinary tract infection

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Background and Significance

In recent years, there has been increased emphasis on the inappropriate use of antibiotics and its contribution to antibiotic resistance. Antibiotic resistance profoundly affects bacterial infection management. Regardless if antibiotics are appropriately or inappropriately prescribed, antibiotic resistances have increased significantly and have become more widespread. Additionally, providers are unable to utilize common antibiotic regimens due to resistances. Negative outcomes of antibiotic resistances include increased mortality, delays in care, and increased healthcare costs.

Research demonstrates that most of the antibiotic use in LTC facilities is not needed (Furuno & Mody, 2020). Following an executive order for regulatory changes in antibiotic stewardship in LTC, the Centers for Medicare and Medicaid (CMS) mandated that LTC facilities establish and maintain antibiotic stewardship programs (ASPs) (Katz et al., 2017; Furuno & Mody, 2020). ASPs are programs in healthcare settings that coordinate interventions which are designed to improve and measure the appropriate use of antibiotics (North Carolina Department of Health and Human Services [NCDHHS], 2020). Additionally, ASPs ensure that each patient receives the correct drug, dose, duration of therapy, and route of administration. Although antibiotic stewardship in LTC is a CMS requirement for reimbursement, Furuno and Mody stress that LTC facilities must overcome challenges to improve antibiotic prescribing.

Inappropriate antibiotic use occurs in most healthcare settings. Inappropriate antibiotic use is an ongoing crisis in LTC facilities. Antibiotic stewardship seeks to optimize infection treatment while concurrently reducing adverse events associated with antibiotic use (Centers for

Disease Control and Prevention [CDC], 2020). Focusing on the inappropriate treatment of ASB is a sustainable strategy for decreasing inappropriate antibiotic utilization (Nicolle et al., 2019). ASB is occurrence of bacteria in the urine without urinary symptoms (Colgan et al., 2020). ASB is often misdiagnosed as UTI (Brown et al., 2020).

UTI is the most common infectious process in the older adult (Nicolle, 2016). Yet, a high prevalence of ASB occurs in LTC residents (Nicolle, 2019). ASB occurs in 25-50% of women and 15-50% of men residing in LTC facilities (Nicolle, 2016). Moreover, ASB occurs in greater than 90% of individuals with a chronic in-dwelling catheter (Agency for Healthcare Research and Quality [AHRQ], 2019). Therefore, the presence of bacteria on urinalysis and/or culture does not certainly confirm UTI.

The Infectious Diseases Society of America (IDSA) advises against screening for and treating ASB in functionally impaired older residents in LTC facilities (Nicolle et al., 2019). Furthermore, the IDSA recommends that providers assess for alternate causes for fall and/or delirium without localized genitourinary symptoms (GU) or systemic signs of infection (2019). Additionally, the IDSA recommends careful observation rather than initiation of antibiotic therapy in this population (2019). Localized GU symptoms include dysuria, increased frequency, urgency, and flank pain while systemic signs of infection include fever, hypotension, and tachycardia (Stone et al., 2012).

The AHRQ also recommends against the treatment of ASB as research has demonstrated that treatment does not prevent UTI (2019). Additionally, treatment of ASB is associated with adverse events related to antibiotic use and the possible occurrence UTIs with antibiotic resistance afterward (2019). Prevention of unnecessary treatment of ASB is complex in LTC. A potential resolution is the implementation of a suspected UTI DST for nursing staff to utilize prior to contacting providers to request urinalysis with culture and sensitivity.

Purpose

The purpose of this QI project was to implement a suspected UTI DST and evaluate its effectiveness in promoting antibiotic stewardship in a LTC facility. The DST was utilized as a decision-making tool for nurses and providers to determine need for urinalysis. The DST was also used as a surveillance tool that assessed urinalysis rates and antibiotic use rates to evaluate the effectiveness of an ASP. Treatment of asymptomatic bacteriuria with antibiotics in LTC facilities is a prevalent problem. This project's goal was to decrease ASB treatment using the UTI DST; thus, improving antibiotic stewardship in the LTC setting.

Review of Current Evidence

This review of current evidence aimed to assess the current knowledge regarding ASPs and their outcomes to implement an infection specific DST for suspected UTI. This review of current evidence identified rationale, interventions, and outcomes of ASPs in LTC facilities to reduce inappropriate antibiotic use for asymptomatic bacteriuria.

This review of literature was performed using two academic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete and PubMed. Search terms used in combination using Boolean operators included long-term care facility, elderly, urinary tract infection, asymptomatic bacteriuria, antibiotics, and antibiotic stewardship.

Inclusion criteria included publication date (2015-2020), language (English), and type of literature (evaluations, studies, systematic reviews, and meta-analyses). The search did not limit type of ASP intervention or outcome. Nineteen articles were reviewed for this review of current evidence. In addition, references of pertinent articles were appraised to identify possible literature of significance that had not been identified using the databases. This additional review yielded three sources.

Synthesis of the evidence demonstrated the following themes: rationale of antibiotic stewardship, antibiotic stewardship interventions, and outcomes of ASPs.

Rationale for Antibiotic Stewardship Programs

Inappropriate Use of Antibiotics

Antibiotics are highly used in LTC (McMaughan et al., 2016). Antibiotic prescribing for a suspected UTI is often followed by inappropriate urinalysis (UA) with culture and sensitivity (Brown et al., 2020). Research suggests that up to 75% of antibiotic use in LTC facilities is inappropriate or unwarranted (Furuno & Mody, 2020). Harms of antibiotic use include Clostriodiodes difficile infection (CDI), gastrointestinal upset, antibiotic resistances, allergic reactions, and unnecessary costs (Daneman et al., 2015; Khatri & Burrows, 2021). Due to these harms, CMS has required that LTC facilities establish and maintain antibiotic stewardship programs (Lubell, 2017; Katz et al., 2017).

One study found that providers displayed knowledge gaps related to CDI diagnosis, management, and prevention (Patel et al., 2016). This study found that noncompliance with infection control guidelines was widespread. Greater than half of study participants followed isolation measures that differed from facility standard practices (2016). Furthermore, providers which had more face-to-face contact with patients possessed greater knowledge regarding CDI epidemiology and were more likely to understand and follow national epidemiology and infectious disease guidelines (Patel et al., 2016). Development and implementation of educational programs targeted at LTC providers are essential in increasing CDI epidemiology, transmission, and prevention awareness. ASPs aid in the reduction of CDI in LTC facilities. Strong guideline implementation is essential to reduce inappropriate antibiotic use, antibiotic resistances, and CDI in LTC residents (Bradley & Sheeran, 2017).

Provider and nursing home related factors compellingly correlate with increased antibiotic use (Brown et al., 2020). Nursing staff influence provider decisions to initiate orders for UAs, cultures, and antibiotic treatment (Brown et al., 2020). In the assessment of suspected UTI, nurses and providers often identify UA as the first request or order and report that they would treat ASB without the presence of clinical or systemic symptoms (Brown et al., 2020; Juthani-Mehta et al., 2005). This demonstrates a gap in knowledge regarding when to order UA and indication for treatment.

Challenges of Antibiotic Stewardship

Although antibiotic stewardship in LTC is a CMS requirement for reimbursement, LTC facilities face many challenges to improve antibiotic prescribing (Furuno & Mody, 2020). Challenges include knowledge gaps, insufficient LTC facility standard infection control practices, antibiotic overtreatment, limited literature, weak design diversity, interventions, outcomes, deviance from national practice guidelines, and cognitive biases (Bradley & Sheeran, 2017; Cooper et al., 2017; Feldstein et al., 2018; Grigoryan et al., 2016; Patel et al., 2016). ASPs have been studied extensively in hospitals, but less studied in LTC facilities (Wu et al., 2019). Furthermore, acceptance, implementation, and continuation of ASPs in LTC facilities can be problematic due to LTC characteristics: population, atypical infection signs and symptoms, impaired communication, laboratory testing access, pharmacy staff availability, and provider availability (Daneman et al., 2015). Limited availability and access of diagnostics often leads to empirical initiation of antibiotics (McMaughan et al., 2016).

Negative Effects of Antibiotics

Inappropriate and overuse of antibiotics in strongly associated to adverse events in LTC residents including CDI, antibiotic resistance, and antibiotic allergic reaction (Brown et al., 2020). Lack in provider knowledge about negative effects such as CDI and gaps in compliance with CDI prevention guidelines can lead to antibiotic resistances (Patel et al., 2016). Antibiotic overuse and misuse in LTC facilities are leading to increased multi-drug resistant organisms and CDI in an already vulnerable population (Bradley & Sheeran, 2017). High urine culture rates correlate with increased antibiotic use and CDI rates (Brown et al., 2020). Evidence demonstrates deviation from national practice guidelines for UTI treatment and inappropriate treatment of mixed growth and contaminated UAs (Bradley & Sheeran, 2017). Antibiotic stewardship seeks to decrease inappropriate infection treatment and adverse events associated with antibiotic use (Brown et al., 2020; CDC, 2020). ASPs can positively affect prescribing, patient, microbial, and cost outcomes (Drekonja et al., 2015). The IDSA states that antibiotic stewardship programs have associated nontreatment of ASB with decreasing inappropriate antibiotic utilization (Nicolle et al., 2019). LTC facilities face many challenges in improving antibiotic stewardship including but not limited to a lack of best practice guidelines for nurses and providers (American Nurses Association & CDC, 2017).

Antibiotic Resistances

LTC facilities are settings of concern for the development of antibiotic resistance as antibiotics are commonly prescribed for residents who do not exhibit clinical criteria for UTI (Pasay et al., 2019). Improved knowledge and assessment of UTI signs and symptoms in LTC patients is needed (Cooper et al., 2017). Identification of bacteriuria in a patient necessitates that providers make a decision about possible initiation of antibiotic therapy. Treatment of ASB potentially increases antibiotic resistance. Also, it has been identified that there is insufficient assessment of LTC patients with suspected UTI which can lead to inappropriate initiation of antibiotics (Cooper et al., 2017). This presents as a diagnostic challenge because it often leads to overdiagnosis of UTI and inappropriate treatment with antibiotic therapy (Petty et al., 2019). Improving the use of inappropriate antibiotics in LTC residents with suspected UTI can decrease adverse effects, CDI rates, antibiotic resistance, and state citations (Cooper et al., 2017). Of note, the NCDHHS cites and may fine LTC facilities that do not maintain ASPs.

Types of Antibiotic Stewardship Interventions

ASP interventions include broad, pharmacy-driven, and infection specific (CDC, 2020). Broad interventions are antibiotic “time outs,” prior authorization, and pharmacy reviews and feedback. Antibiotic “time outs” reassess the indication and antibiotic used when more clinical data becomes available. Pharmacy-driven interventions include route changes, dose adjustments, dose optimization, duplicate therapy alerts, automatic stop orders, and detection drug-drug interactions (CDC, 2020). Infection specific interventions focus on CDI, methicillin-resistant Staphylococcus aureus infections, pneumonia, skin and soft tissue infections, and UTIs (CDC, 2020).

Review of the literature demonstrated single interventions as well as multiple intervention ASPs. Patel et al. (2016) used an infection specific intervention to provide educational programs for providers about CDI and its prevention. Bradley and Sheeran (2017), Cooper et al. (2017), and McMaughan et al. (2016) used an UTI evaluation tool for decision-making assistance. Grigoryan et al. (2016) used a questionnaire that measured nursing and provider knowledge of catheter associated bacteriuria. Pasay et al. (2019) used pharmacy driven and UTI specific interventions of interdisciplinary education and an UTI clinical decision tool.

Whereas in their systematic reviews, Drekonja et al. (2015), Feldstein et al. (2018), and Wu et al. (2019) examined all three types of ASP interventions. Interventions were widely variable and included provider education, patient education, provider feedback, guideline implementation, algorithms, forms, tools, delayed prescribing, communication training, electronic clinical decision support, monetary incentives, labs, and outcome evaluations. This PI's review demonstrated varied interventions may be used to promote positive outcomes (Drekonja et al., 2015; Feldstein et al., 2018; Wu et al., 2019).

Outcomes of ASPs

According to the systematic review of Drekonja et al. (2015) that included 50 articles, ASPs outside of inpatient settings can have positive effect on prescribing, patient outcomes, antibiotic outcomes, and healthcare costs. Evidence demonstrated that ASPs that incorporate communication skills training or laboratory testing or both are associated with reductions in antibiotic use (Drekonja et al., 2015). Other evidence supported that ASP interventions are associated with enhanced prescribing and decreased drug expenditures (Drekonja et al., 2015). A seminal randomized controlled trial demonstrated that algorithms reduced the number of antibiotics ordered for suspected UTIs (Loeb et al., 2005). Multiple studies demonstrated reduction in antibiotic use rates with ASPs such as educational materials, educational meetings, and guideline implementation (Feldstein et al., 2018; Loeb et al., 2005; McMaughan et al., 2016; Wu et al., 2019). An increase in guideline adherence was observed; however, a systematic review revealed no statistical significance in change of LTC residents' rates of mortality, CDI, and hospitalizations (Feldstein et al., 2018). One study identified that most antibiotic prescriptions for UTI pre-intervention were written with no documented clinical or systemic symptoms (McMaughan et al., 2016). Another study's use of an infection specific DST reduced the number of ASB prescriptions written and the odds of an antibiotic prescription being written (McMaughan et al., 2016). Thus, the DST was a key component of improving ASPs. Guideline implementation interventions that target cognitive preconceptions are fundamental for supporting ASP guideline application into practice (Grigoryan et al., 2016).

The reduction of overall antibiotic use at LTC facilities can potentially decrease antibiotic harms of those receiving antibiotics as well as those that do not as decrease in overall antibiotic use aids in resistance prevention (Daneman et al., 2015). ASPs can positively impact urine culture testing rates with statistically significant decrease in urine culture and sensitivity testing rates and antibiotic prescribing rates which improve mortality (Cooper et al., 2017; Pasay et al., 2019). This finding differs with the finding of Feldstein et al. (2018) that residents of LTC facilities with high antibiotic use rates are at an elevated risk of antibiotic-related harms although they have not directly received antibiotics. Harms include development of antibiotic resistances and CDI outbreaks. Design and resources of ASP implementation in LTC facilities vary significantly. However, review of literature suggested that ASPs have an immense ability to decrease antibiotic use in the LTC setting.

Recommendations for Successful Antibiotic Stewardship Programs

There are many paths to successful or improved ASPs. Implementation or enhancement of ASPs decrease antibiotic prescribing without adversely impacting resident outcomes (Drekonja et al., 2015). Appropriate interdisciplinary communication among nursing, providers, infection preventionists, and LTC facilities is essential to support applicable response and updates regarding resident condition and improve care (Bradley & Sheeran, 2017; Patel et al., 2016). Delivery of evidence-based education to staff, residents, and families regarding appropriate antibiotic use such as revised McGeer Criteria is essential (Cooper et al., 2017; McMaughan et al., 2016). Revised McGeer Criteria provide infection surveillance definitions for fever, leukocytosis, acute change in mental status from baseline, and acute functional decline in residents in LTC facilities as well as surveillance definitions for UTIs (Stone et al., 2012). Interdisciplinary coordination of resources such as providers, nurses, pharmacy, infection preventionists, and administration is needed to ensure that ASPs are sustainable (Pasay et al., 2019).

Importance of Antibiotic Stewardship

Antibiotic stewardship is a global safety and public health issue. Patients who receive inappropriate or unnecessary antibiotics are exposed to a greater possibility of adverse drug reactions, allergic reactions, CDI, and antibiotic resistances (Bradley & Sheeran, 2017). ASPs can optimize infection treatment as well as improve rate of negative outcomes such as adverse events. ASP interventions include broad, pharmacy-driven, and infection specific (CDC, 2020). Synthesis of the literature supports use of an UTI DST to promote antibiotic stewardship. Opportunities for decreasing inappropriate antibiotic use include prevention of urine culture orders that don't meet revised McGeer Criteria and nontreatment of ASB.

Conceptual Framework/Theoretical Model

According to Pathman et al. (1996), clinical practice guidelines exist so that providers will follow recommended guidelines so as to provide the best clinical care. However, many provider's fail to adhere to guidelines. Pathman et al. suggest that there is a sequential, cognitive, and behavioral path to practice guideline adherence - awareness, agreement, and adoption. These steps are influenced by the characteristics, policies, and features of providers, patients, and settings. To comply with guidelines, providers must become aware of the guidelines, then decide to agree with the guidelines, then use the guidelines in their practice, and finally, regularly adhere to the guidelines (Pathman et al., 1996). If a step is not attained, a provider's clinical decisions may deviate from guidelines. Interventions may be implemented to improve adherence by understanding which step the provider does not attain.

Pathman et al.'s awareness-to-adherence model guided the methods of this QI project to improve antibiotic stewardship in a LTC facility. Assessment of the antibiotic stewardship program at a rural 100-bed skilled nursing and rehab center found a lack of resources to support antibiotic prescribing as well as a lack of adherence to best practice guidelines. Inappropriate antibiotic use in LTC facilities leads to multi-drug resistant organisms. ASPs strive to improve infection treatment and decrease adverse events associated with antibiotic use (CDC, 2020). It was hypothesized that the implementation of a suspected UTI DST as a surveillance tool would facilitate improved antibiotic stewardship by decreasing inappropriate antibiotic use for asymptomatic bacteriuria or signs/symptoms that do not meet revised McGeer Criteria for antibiotic treatment. According to the awareness-to-adherence model, in order for LTC providers to comply with antibiotic stewardship guidelines, they must be aware of the guidelines, agree with the guidelines, decide to adopt the guidelines, and adhere to the guidelines. Thus, for the implementation of an UTI DST to be successful, it is necessary to examine provider awareness, agreement, and adoption.

Methods

Design

In this antibiotic stewardship QI project, a quasi-experimental quantitative design was used to implement a suspected UTI DST to support antibiotic prescribing and promote best practice guidelines. The University of North Carolina at Greensboro (UNCG) Institutional Review Board (IRB) reviewed this project and it was determined not to be research.

Translational Framework

This project used Six Sigma as a translational framework to improve the ASP at a rural

100-bed skilled nursing and rehabilitation center. The Six Sigma model applies a systematic framework to understand and improve performance via minimizing variation (Synowiez, 2021). Process improvement is also a positive product of variation reduction. Six Sigma uses a five-step method: define the problem, measure the current process, analyze the cause of the problem, improve the process, and control (DMAIC) (Polit & Beck, 2021). QI data are collected pre and post QI interventions. Although Six Sigma was initially developed as a manufacturing improvement tool, it is frequently utilized in healthcare. A significant benefit of healthcare application of Six Sigma is improved patient outcomes (Synowiez, 2021).

Defining the problem, measuring the problem, identifying the cause of the problem, implementing and verifying a solution, and maintaining the solution will lead to measurable improvement in antibiotic stewardship through a focus on improving processes and outcomes at this LTC facility (Synowiez, 2021). A review of the facility's antibiotic use rates found that some medical providers were not effectively and consistently using evidence-based practice in their use of antibiotics (defining the problem). It was found that providers were ordering UAs based on nursing requests. For this project, current antibiotic use will be measured via retrospective review of medical records over a six-month period (measuring the problem). Review of documentation revealed that providers were not using revised McGeer Criteria when ordering a urinary tract infection work-up and/or treatment. Furthermore, discussions with nursing staff demonstrated lack of knowledge of revised McGeer Criteria.

Setting

The project setting was a rural, for-profit, 100-bed skilled nursing and rehabilitation center in the southeastern United States. This facility served Medicare, Medicaid, and private pay residents. The LTC facility provided long-term skilled nursing care and short-term rehabilitation services for adults.

Sample

The facility population included long-term care adult residents. The convenience sample for this project included adult male and female residents. Residents were not excluded based on age, gender, race, or ethnicity. Short-term rehabilitation residents were excluded as average length of stay was 21 days and many residents admitted with an active diagnosis of UTI. All residents who met inclusion criteria were included in the sample. The sample size was planned to be 65. A power analysis using power = 0.80 and Type 1 error alpha=0.05 for a two-tailed test yielded an appropriate sample size of 68.

Intervention

Prior to implementation of the suspected UTI DST for nursing use, face-to-face and electronic inservices were held for 20 nursing staff and the medical director. Education included revised McGeer Criteria, evidence-based practice guidelines of UTI treatment, ASB, and rationale for the DST (see Appendix A). Face-to-face education was performed on two separate occasions and included all nursing shifts. For nursing staff that could not attend a face-to-face session or desired additional information, video conferences were offered. This education schedule ensured that all nursing staff attended a session. All nurses attended at least one face-to-face session. No video conferences were necessary. In addition to visual and audio presentations, each nursing staff member received written educational material for reference. Much time was spent with education as successful implementation of the intervention required support from nursing staff. One-on-one education to inform and solicit project buy-in was completed with the medical director. Educational materials were adapted from the AHRQ (AHRQ, 2016). Suspected UTI DST instructions were also placed at each nursing station, breakroom, restroom, and time clock.

Once all nursing staff received education, the suspected UTI DST was implemented. In addition to the PI, nursing unit managers served as champions to review the rationale of the intervention and to communicate expectations of its use when a nurse suspected UTI in a resident. The suspected UTI DST (see Appendix B) was adapted from AHRQ Nursing Home Antimicrobial Stewardship Guide and UTI Toolkit (AHRQ, 2016). The AHRQ Toolkit provided a simplified, one-page Situation-Background-Assessment-Recommendation (SBAR) editable form. Using the AHRQ form, the suspected UTI DST was created using other formatting and fonts. Blank, paper copies of the DST were placed at each nursing station. Directions were included (see Appendix C). When a DST was completed, the nurse placed the completed form in a secure mailbox accessible by only the PI. The completed DSTs were then collected by the PI three times weekly. Upon retrieval, the PI transcribed non-identifying information onto the antibiotic tracking spreadsheet. After transcription, the DSTs were securely shredded by the PI. DSTs were in the possession of the PI at all times. The intervention continued over a three-month period.

Data Collection

Procedures

Prior to implementation of the intervention, retrospective data for three months prior to implementation date were collected from the electronic health record (EHR) including antibiotic orders, indication for antibiotic, and urinalysis with culture and sensitivity results. Only antibiotics prescribed for indication of UTI were recorded. This information was entered on a spreadsheet to calculate rate of antibiotic use (see Appendix D). Access to all electronic records was approved and granted by the facility's information technology department. The EHR data were collected by the PI.

Once the suspected UTI DST was implemented, data were collected using the EHR and completed DSTs. Data was collected on a daily basis via EHR reports. The reports included all new orders for the previous 24 hours. Once the reports were generated, non-identifying resident information was entered into an antibiotic tracking spreadsheet (see Appendix D). The electronic report files were immediately deleted after data collection. Reports were not printed, saved, or exported. Data collected included new UA orders, new antibiotic orders, indication for antibiotic, urinalysis with culture and sensitivity results, and/or completed DSTs. DSTs did collect personal health identifiers such as initials; however, DSTs were securely destroyed via shredding by the PI once non-identifying information was entered in the antibiotic tracking spreadsheet by the PI.

The facility EHR was accessed over a secure network connection requiring two-factor authentication. All spreadsheets and data were locked under password protection in accordance with UNCG computing accounts. Data was stored in Box at UNCG. Excluding resident initials on the DST form, no other PHI was collected to protect and minimize risk of accidental disclosure of information of residents and staff members.

Instruments

The AHRQ provides an online toolkit for nursing facilities to implement and maintain ASPs (AHRQ, 2016). The UTI toolkit is guided by the revised McGeer Criteria (Stone et al, 2012). The toolkit is for public use and access. The AHRQ Suspected UTI SBAR was revised to develop the Suspected UTI DST. A prior study in 12 Texas nursing homes validated the SBAR. The study reported that antibiotic orders for ASB decreased by approximately one-third with use of the UTI SBAR (AHRQ, 2016).

The McGeer criteria were developed to provide standardized guidance and definitions for infection surveillance in LTC facilities (McGeer et al., 1991). The original criteria were created for use in LTC facilities with the elderly who required “(1) supervision and care for impaired cognition, (2) assistance with activities of daily living (ADLs), or (3) skilled nursing care, such as the use of indwelling devices (eg, urinary catheters or enteral feeding tubes)” (Stone et al., 2012, p. 2). The McGeer Criteria were revised in 2012. The revised McGeer Criteria provided updated, highly specific definitions for constitutional criteria: fever, leukocytosis, acute change in metal status from baseline, and acute functional decline (Stone et al., 2012). Additionally, the revised McGeer Criteria outlined surveillance definitions for UTIs (Stone et al., 2012). The revised McGeer criteria is highly specific (Juthani-Mehta et al, 2007). Furthermore, a positive urine culture is required for UTI diagnosis in the absence of positive blood cultures with the same organism (High et al., 2009).

The Suspected UTI DST included vital signs, background questions, and assessment questions. Directions were explicitly included on the form. The assessment questions were completed either for residents with or without an indwelling catheter. Adapting the AHRQ UTI toolkit, for residents with an indwelling catheter, criteria are met to initiate antibiotics if one of the following criteria is present: fever, new back or flank pain, acute pain, rigors, new dramatic change in mental status, or hypotension (AHRQ, 2016). Hypotension was defined as systolic blood pressure less than 100. Using the AHRQ UTI toolkit, ror residents without an indwelling catheter, criteria are met to initiate antibiotics if one of the three situations are met: 1.) acute dysuria alone; 2.) or single temperature of 100 degrees Fahrenheit and at least one new or worsening symptoms of urgency, frequency, back or flank pain, suprapubic pain, gross hematuria, urinary incontinence; 3.) or no fever but two or more symptoms of urgency, frequency, incontinence, suprapubic pain, gross hematuria (AHRQ, 2016) (see Appendix B).

Fever was defined as a temperature of 100°F, repeated temperatures of 99°F, or a temperature 2°F above the baseline temperature.

Data Analysis

Descriptive statistics were used to describe the sample. The data were analyzed using IBM SPSS Statistics for Macintosh (Version 28) predictive analytics software. Chi-square tests were used to analyze if differences existed between the pre-intervention and post-intervention data. It was hypothesized that the intervention would decrease urinalysis and antibiotic use rates for suspected UTI. Urinalysis and antibiotic use rate pre-intervention and post-intervention were measured to identify if the intervention reduced urinalysis and antibiotic use rates. By comparing order rates pre- and post-intervention, it was determined if the use of the suspected UTI DST decreased UA orders rates and antibiotic prescribing rates.

Budget, Time, and Resources Plan

Implementation of this project incurred a cost of $135 for paper, cardstock, ink, and SPSS. The project required the use of the facility's electronic medical record to gather data. Implementation also required participation by nursing staff and administration. Implementation of the suspected UTI DST started September 2021.

Results

The purpose of this QI project was to implement a suspected UTI DST and evaluate its effectiveness in promoting antibiotic stewardship in a LTC facility. The DST fulfilled two functions: decision making and surveillance. The DST was utilized as a decision-making tool for nurses and providers to determine need for urinalysis. The DST was also used as surveillance tool that assessed urinalysis rates and antibiotic use rates. This project's goal was to decrease inappropriate treatment of asymptomatic bacteriuria using the UTI DST; thus, improving antibiotic stewardship in the long-term care setting (Synowiez, 2021).

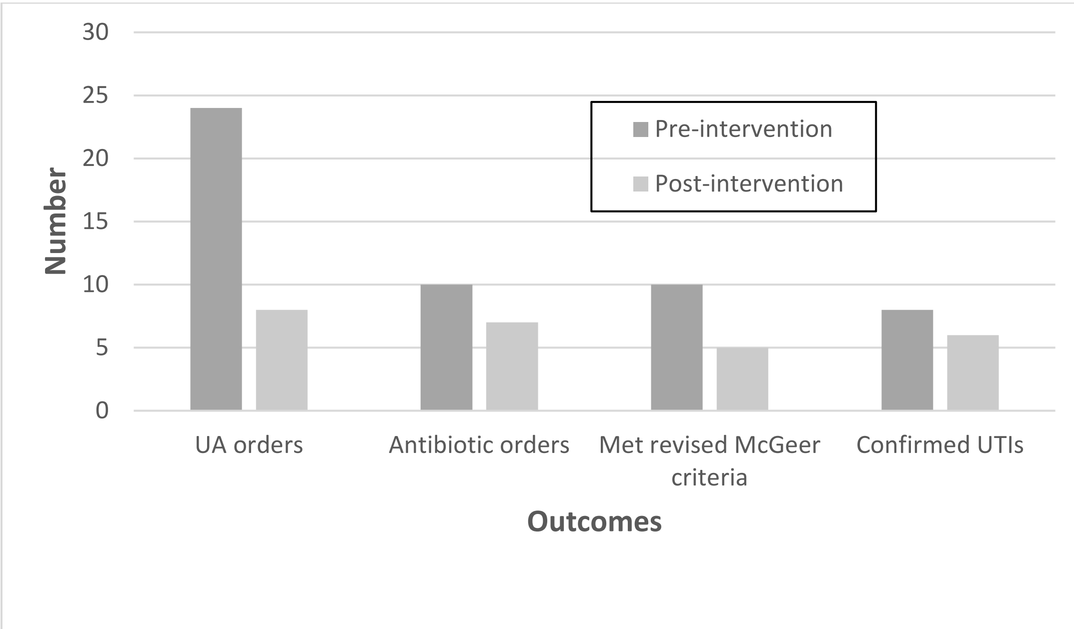
Descriptive statistics were used to describe the project sample by age, sex, and race. The convenience sample included long-term care adult residents ($N = 68$). The sample ranged in age from 68 to 102 with a mean age of 83.91 years ($SD = 7.66$). The median age was 84. The sample was majority female ($n = 53$). The project sample was overwhelmingly White (97%).

Analysis of pre-interventional and post-interventional data results demonstrated improvement in urinalysis order rates for suspected UTI. Prior to intervention implementation, urinalysis with culture and sensitivity order rate was 285.71 per 1,000. This prevalence included 58.33% which did not meet revised McGeer criteria, 12.5% with asymptomatic bacteriuria, 50% with no growth on culture, and 33.33% with positive UTI per revised McGeer criteria and culture (see Figure 1). Furthermore, 100% of post-intervention confirmed UTIs met revised McGeer criteria.

Post-intervention analysis revealed a 66.67% decrease in urinalysis orders and minimal decrease in antibiotic rates for suspected UTI after implementation of the suspected UTI DST (see Figure 1). After intervention implementation, urinalysis with culture and sensitivity order rate was 95.24 per 1,000. This prevalence included 37.5% which did not meet revised McGeer criteria, 12.5% with asymptomatic bacteriuria, 25% with no growth on culture, and 75% with positive UTI per revised McGeer criteria and culture (see Figure 1). Furthermore, 83.33% of post-intervention confirmed UTIs met revised McGeer criteria.

Figure 1

Outcome Data Pre- and Post-intervention



Inferential statistical analysis was used to compare pre- and post-intervention data to evaluate the effect of the suspected UTI DST on urinalysis and antibiotic rates. A chi-square test for proportions was performed at the level of $p = .05$ with critical value 3.84 to determine if difference existed among observed and expected frequencies of 1) number of urinalyses ordered; 2) number of antibiotic orders; 3) number of confirmed UTIs after intervention implementation; and 4) number of residents that met revised McGeer criteria.

The primary outcomes of this project were the frequency difference of UA and antibiotic rates pre- and post-intervention. A chi-square test for proportions was used to test the null hypothesis that there is no association between the intervention and UA order rates and antibiotic rates. A total of 184 observations were analyzed. The observed frequency of UA orders pre-intervention was 24 (13.04%). The observed frequency of UA orders post-intervention was 8 (4.35%). The proportion of UAs performed pre-intervention that resulted in antibiotic orders were 10 out of a total of 24 UAs whereas the proportion of UAs performed post-intervention that resulted in antibiotic orders were 7 out of a total of 8 UAs. Thus, 41.67% of pre-intervention UAs indicated initiation of antibiotics while 87.5% of post-intervention UAs indicated initiation of antibiotics. Furthermore, the null hypothesis that no association exists between the intervention and the proportion of antibiotic orders per UAs obtained was rejected (see Tables 1 and 2).

The secondary outcomes were number of confirmed UTIs per UAs performed and number of residents who underwent UA testing that met revised McGeer criteria. The proportion of UAs performed pre-intervention that were confirmed UTIs were 8 out of a total 24 UAs whereas the proportion of UAs performed post-intervention that were confirmed UTIs were 6 out of a total 8 of UAs. Thus, 33.33% of pre-intervention UAs were confirmed as UTIs while 75% of post-intervention UAs were confirmed as UTIs. Pre-intervention, antibiotic rate per all observations was 5.43%. Pre-intervention antibiotic rate for those that had UA ordered was 41.7% which demonstrates that antibiotics were ordered for two residents that did not have an UTI. Post-intervention antibiotic rate for those that had UA ordered was 87.5% which also demonstrates that antibiotics were ordered for one resident that did not have an UTI. Post-intervention, antibiotic rate per all observations was 3.8%; thus, antibiotic rate for all observations decreased by 1.63%. The null hypothesis that no association existed among the intervention and the proportion of confirmed UTIs per UAs performed was also rejected (see Table 3). The proportion of UAs performed pre-intervention that met revised McGeer criteria were 10 out of a total of 24 UAs performed whereas the proportion of UAs performed post-intervention that met revised McGeer criteria were 5 out of a total of 8 UAs performed. Thus, 41.67% of pre-intervention UAs met criteria to order a UA and consider initiation of antibiotics while 62.5% of post-intervention UAs met criteria to order a UA and consider initiation of antibiotics. Lastly, the PI failed to reject the null hypothesis as chi-square demonstrated no significant association between the intervention and the proportion of UAs performed that met revised McGeer criteria (see Table 4).

Table 1

UA Orders Pre- and Post-intervention

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.684[a]	1	.002		
Continuity Correction[b]	8.512	1	.004		
Likelihood Ratio	10.059	1	.002		
Fisher's Exact Test				.003	.002
N of Valid Cases	184				

Note. a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.00. b. Computed only for a 2x2 table

Table 2

Antibiotic Orders Pre- and Post-intervention

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.061[a]	1	.024		
Continuity Correction[b]	3.388	1	.066		
Likelihood Ratio	5.607	1	.018		
Fisher's Exact Test				.041	.030
N of Valid Cases	32				

Note. a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.75. b. Computed only for a 2x2 table

Table 3

Confirmed UTIs Pre- and Post-intervention

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.233[a]	1	.040		
Continuity Correction[b]	2.709	1	.100		
Likelihood Ratio	4.310	1	.038		
Fisher's Exact Test				.096	.050
N of Valid Cases	32				

Note. a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.50. b. Computed only for a 2x2 table

Table 4

UAs That Met Revised McGeer Criteria Pre- and Post-intervention

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.046[a]	1	.306		
Continuity Correction[b]	.376	1	.539		
Likelihood Ratio	1.050	1	.305		
Fisher's Exact Test				.423	.270
N of Valid Cases	32				

Note. a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.75. b. Computed only for a 2x2 table

Discussion

Purpose

The purpose of this project was to implement a suspected UTI DST and evaluate its effectiveness in promoting antibiotic stewardship in a LTC facility. The DST was utilized as a surveillance tool to assess UA orders and antibiotic use rates to evaluate its utility in improving antibiotic stewardship. Analysis of the results demonstrate a decrease in urinalyses performed post-intervention implementation. Thus, it can be inferred that the suspected UTI DST improved antibiotic stewardship by decreasing inappropriate treatment of ASB. Use of the DST gives providers valuable information to make decisions regarding the need for UAs. By avoiding urinalyses in those residents not meeting revised McGeer criteria, providers avoid treatment of ASB.

Outcomes

Outpatient ASPs can have positive effect on prescribing, patient outcomes, microbial outcomes, and costs (Drekonja et al., 2015; Loeb et al., 2005; Stone et al., 2012). The results of this project support that ASP interventions are associated with improved prescribing secondary to decreased UA rates and reduced treatment of ASB.

Urinalysis Rates

This project focused on education and guideline implementation to reduce urinalysis order rates. These aims reduced urinalysis order rates by 66.67%. Chi-square confirmed an association between UA order rates pre- and post-intervention, $x^2(1) = 9.68$, $p = .002$. Chi-square testing confirmed that the decrease in UA rates was not by chance. The suspected UTI DST improved the proportion of UA order rates per total observations. Thus, implementation of the suspected UTI DST and education decreased the frequency of inappropriate UA orders. ASPs have a positive impact on the rate of urine culture testing with statistically significant decrease in urine culture testing rate which improves antibiotic prescribing rates and mortality (Cooper et al., 2017; Loeb et al., 2005; Pasay et al., 2019: Rico et al., 2021). Use of the DST did not increase mortality as there were no deaths for suspected and/or untreated UTI during the three-month intervention period. The DST's benefit of decreased inappropriate urinalysis orders appears to outweigh the risk of unidentified UTI in this population.

Antibiotic Order Rates

Pre-intervention antibiotic order rate (41.7%) was greater than confirmed UTI rate

(33.33%). This demonstrates that antibiotics were prescribed for residents that did not have an UTI. Implementation of the suspected UTI DST modestly reduced UTI antibiotic order rates at this LTC facility. Additionally, the DST decreased inappropriate antibiotic use. Analysis of the data demonstrated an association between antibiotic rates per total UAs performed pre- and post-intervention, $x^2(1) = 5.06$, $p = .024$. Chi-square testing demonstrated improved proportion of antibiotic rates per total UAs performed pre- and post-intervention. A prior study identified that most antibiotic prescriptions for UTI pre-intervention were written without documented symptoms and the use of an infection specific DST decreased the number of prescriptions being written for ASB and the odds of an antibiotic prescription being written (McMaughan et al., 2016). Multiple studies demonstrate reduction in antibiotic use rates with ASPs that include educational materials and meetings and guideline implementation (Feldstein et al., 2018; Loeb et al., 2005; Wu et al., 2019).

Confirmed UTI and Revised McGeer Criteria

Education of staff on criteria for UTIs and protocols are key operational strategies of McGeer criteria (McGeer et al., 1991). Additionally, provision of constitutional definitions in LTC residents ensures consistency across disciplines (Stone et al., 2012). The suspected UTI DST had dual purpose: surveillance and clinical decision. Surveillance data was collected over three months to measure accurate incidence of UTIs. Analysis of this project's pre-intervention data revealed that greater than 50% of urinalysis orders did not meet revised McGeer criteria for UTI. Post-intervention, eight UAs were ordered. Six were confirmed as acute UTI while two had no growth on culture. No growth on culture were diagnosed as asymptomatic bacteriuria. Analysis demonstrated an association between confirmed UTIs per total UAs performed pre- and post-intervention, $x^2(1) = 4.23$, $p = .040$. Of the UAs performed, a greater percentage were confirmed as UTIs post-intervention. This is due to a greater number of UAs performed pre-intervention that were inappropriate. Revised McGeer criteria was developed as surveillance criteria to measure actual infections (Stone et al., 2012). Of note, 91.67% of all confirmed UTIs pre- and post-intervention met revised McGeer criteria. These results validate the accuracy of the criteria. Although there is minimal research regarding the specificity of the revised McGeer criteria, one seminal study demonstrated greater than 80% specificity (Juthani-Mehta et al., 2007). Although associations were demonstrated among UA, antibiotic, and UTI rates post-intervention, there was not sufficient evidence to support that there is an association between the UAs that met McGeer criteria per total UAs performed, $x^2(1) = 1.05$, $p = .306$.

Frameworks

Conceptual

Clinical practice guidelines exist so that providers will follow recommended guidelines to provide the best clinical care (Pathman et al., 1995). Pathman et al. awareness-to-adherence model guided the methods of this QI project to improve antibiotic stewardship in a LTC facility. Awareness of revised McGeer criteria and the suspected UTI DST, agreement with revised McGeer criteria and use of the suspected UTI DST, decision to adopt the suspected UTI DST, and adherence to suspected UTI guidelines were critical to implement the suspected UTI DST. Through examination of guideline awareness, agreement, and adoption, this project was able to reduce urinalysis order rates. Thus, the suspected UTI DST facilitated improved antibiotic stewardship via decreased inappropriate use of antibiotics for asymptomatic bacteriuria and signs and/or symptoms that do not meet revised McGeer Criteria for antibiotic treatment.

Translational

Six Sigma was used as the translational framework. According to Polit and Beck (2021), the Six Sigma model applies a systematic framework to understand and improve performance via minimizing variation (Synowiez, 2021). Furthermore, process improvement is a positive product of variation reduction. Using the Six Sigma five-step method, the PI was able to: define the problem (inappropriate antibiotic use), measure the current process (retrospective data collection including antibiotic orders, indication for antibiotic, and urinalysis with culture and sensitivity results), analyze the cause of the problem (antibiotic stewardship program), improve the process (education and implementation of intervention), and control (Polit & Beck, 2021). This project yielded a measurable improvement in antibiotic stewardship through a focus on improving processes and outcomes at the LTC project site (Synowiez, 2021).

Recommendations for Future Study

The PI recommends long-term data collection of the suspected UTI DST's use at the primary project site. Ideally, at least one year would provide a greater representation of the DST's benefit. Also, implementation while not in a pandemic may alter data. Data collection and analysis once the COVID-19 pandemic has improved can be compared to data collection during the pandemic. It is hypothesized that use of the suspected UTI DST will yield increased improvement in UA and antibiotic order rates post-pandemic. Additionally, other data such as healthcare provider and nursing provider demographics could prove useful in further analysis. Furthermore, implementation and analysis at other LTC sites may identify other variables.

Relevance and Recommendations for Clinical Practice

The suspected UTI DST has great potential in LTC facilities. Results of this DNP project demonstrate decreased urinalysis and antibiotic rates with the suspected UTI DST. As final project results demonstrate improved antibiotic stewardship, ongoing use of the suspected UTI DST at the project site should be continued as use of this intervention has the potential to yield long-term improvements. As the project has already produced significant UTI DST acceptance among administration, pharmacy, and nursing staff, permanent use is highly probable. The PI believes acceptance at the project site correlates with type of organization. The project site is a small, family-owned facility.

Once the suspected UTI DST effectiveness is further validated at the project site with long-term data, the intervention can then be implemented at other facilities. The PI would first implement the DST at her other assigned facility which is part of a large corporation. Acceptance may prove more difficult at large corporations. Implementation of practice changes and knowledge translation can be challenging. Successful DST implementation will require effective interdisciplinary collaboration and administrative support. Organizations with hierarchal management and poor flexibility will experience innovation challenges as successful translation of evidence into practice requires a team, organizational, or systems approach (White et al., 2016). Potentially, the DST could be implemented in LTC facilities managed by an institutional special needs program throughout the state.

Barriers

On March 11, 2020, the novel coronavirus (COVID-19) was declared a global pandemic by the World Health Organization (Cucinotta & Vanelli, 2020). Since then, COVID-19, has impacted the world and healthcare in innumerable ways. COVID-19 altered healthcare availability, utilization, and delivery (Roy et al. 2021). The pandemic presented multiple barriers to implementation of this project. Of utmost significance, frequent COVID-19 outbreaks delayed project education and implementation. It was difficult for nursing staff to focus on new policy and procedure while dealing with overwhelming death and dying. Also, facility restrictions limited in person learning opportunities. Finally, COVID-19 created nursing shortages across the nation (Buerhaus, 2021). Local nursing shortages created frequent turnover and heavy workloads. These shortages affected small and large healthcare settings.

Facility staffing presented a major issue. Due to administration change and staffing limits, the project site was changed in May 2021. The original site experienced multiple resignations including administrator, staff educator/infection control nurse, unit managers, and staff nurses. Most nursing positions were staffed by agency who demonstrated poor buy-in and lack of ownership of the suspected UTI DST. This resulted in a lack of support for the project and implementation of the intervention. This necessitated a change in project site to a facility with stable staffing.

Although the new project site had stable staffing, nursing remained a challenge. Nurses were resistant to change. Initially, the PI found that it was difficult to change nurses' way of practice. However, continued education and reiteration of rationale and evidence improved resistance. Also, the majority of this facility's nurses are licensed practical nurses (LPNs). Few LPNs access nursing and research journals (Phillips & Neumeier, 2018). This can lead to a lack of trust in the evidence. It was vital to develop education and information that was easily understandable and accessible to nursing. Finally, there were two occasions where nurses forgot to use the DST. The residents were not excluded from the data.

Limitations

Project limitations include intervention, sample, site, and data. Intervention included both education and the implementation of the suspected UTI DST. It would be beneficial to examine the extent of each intervention's influence on the outcomes. The sample was predominantly White females without indwelling catheters. Including more diverse sample demographics may yield different results. Also, the site was a small family-owned facility. Type of ownership, for profit versus not for profit may influence results. Finally, this project presents no longitudinal data and pre-intervention data was collected retrospectively.

Conclusions

ASPs seek to improve infection treatment and decrease adverse events associated with antibiotic use. The reduction of overall antibiotic use at LTC facilities can potentially decrease antibiotic harms of those receiving antibiotics as well as those that do not as decrease in overall antibiotic use aids in resistance prevention (Daneman et al., 2015). ASPs can also have a positive impact on urine culture testing rates with statistically significant decrease in urine culture testing rate which improves antibiotic prescribing rates and mortality (Cooper et al., 2017; Pasay et al., 2019). The purpose of this QI project was to implement a decision support tool and evaluate its effectiveness in promoting antibiotic stewardship in a LTC facility. The DST was utilized as a surveillance tool that assessed urinalysis and antibiotic use rates. As treatment of ASB in LTC facilities is an ongoing problem, this project's goal was to decrease inappropriate treatment of ASB using the suspected UTI DST. Implementation of the UTI DST at the project site yielded statistically significant improvement in UA rates and antibiotic use. Continued use of the suspected UTI DST at this site and other LTC facilities has the potential to yield long-term improvements in antibiotic stewardship while concurrently improving healthcare quality and healthcare costs.

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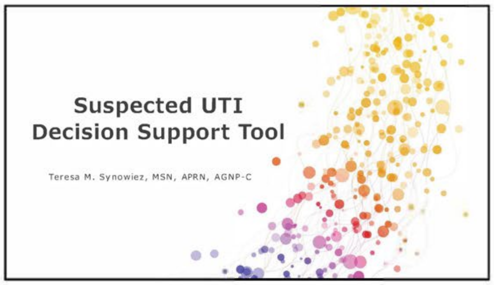
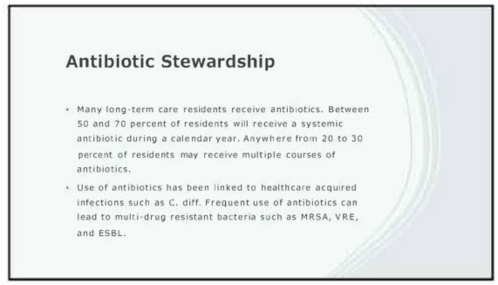
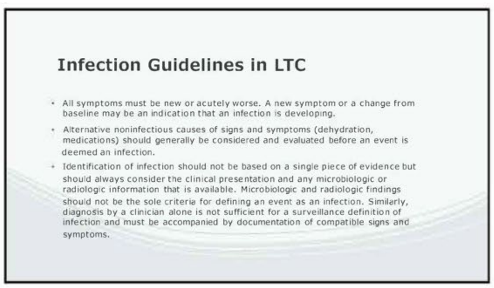
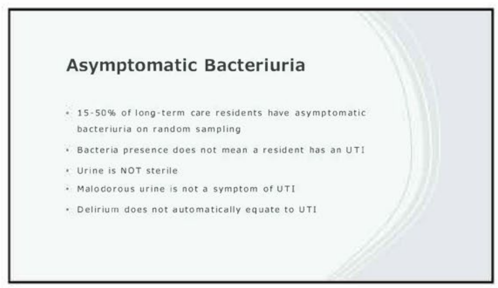
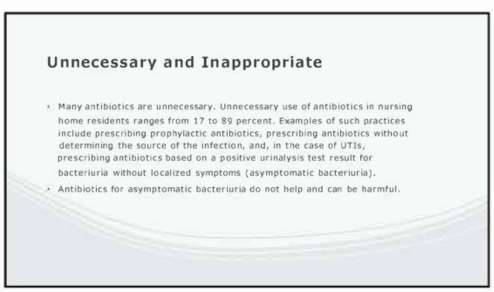
Appendix A

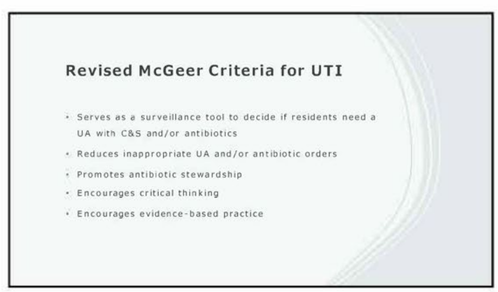

Suspected UTI
Decision Support Tool
Teresa M. Synowiez, MSN, APRN, AGNP-C


Antibiotic Stewardship
Many long-term care residents receive antibiotics. Between 50 and 70 percent of residents will receive a systemic antibiotic during a calendar year. Anywhere from 20 to 30 percent of residents may receive multiple courses of antibiotics.
Use of antibiotics has been linked to healthcare acquired infections such as C. diff. Frequent use of antibiotics can lead to multi-drug resistant bacteria such as MRSA, VRE, and ESBL.


Infection Guidelines in LTC
All symptoms must be new or acutely worse. A new symptom or a change from baseline may be an indication that an infection is developing.
Alternative noninfectious causes of signs and symptoms (dehydration, medications) should generally be considered and evaluated before an event is deemed an infection.
Identification of infection should not be based on a single piece of evidence but should always consider the clinical presentation and any microbiologic or radiologic information that is available. Microbiologic and radiologic findings should not be the sole criteria for defining an event as an infection. Similarly, diagnosis by a clinician alone is not sufficient for a surveillance definition of infection and must be accompanied by documentation of compatible signs and symptoms.


Asymptomatic Bacteriuria
15-50% of long-term care residents have asymptomatic bacteriuria on random sampling
Bacteria presence does not mean a resident has an UTI
Urine is NOT sterile
Malodorous urine is not a symptom of UTI
Delirium does not automatically equate to UTI


Unnecessary and Inappropriate
Many antibiotics are unnecessary. Unnecessary use of antibiotics in nursing home residents ranges from 17 to 89 percent. Examples of such practices include prescribing prophylactic antibiotics, prescribing antibiotics without determining the source of the infection, and, in the case of UTIs, prescribing antibiotics based on a positive urinalysis test result for bacteriuria without localized symptoms (asymptomatic bacteriuria).
Antibiotics for asymptomatic bacteriuria do not help and can be harmful.


Revised McGeer Criteria for UTI
Serves as a surveillance tool to decide if residents need a UA with C&S and/or antibiotics
Reduces inappropriate UA and/or antibiotic orders
Promotes antibiotic stewardship
Encourages critical thinking
Encourages evidence-based practice


Hypotension


Acute dysuria
OR
Single temperature of 100°F and at least one new or worsening of the following:
urgency
Frequency
back/flank pain
urinary incontinence
OR

Appendix B

Suspected UTI DST

Complete this form before contacting the resident's provider for suspected UTI. Date/time: ______________________

Resident initials: ____

Provider: ____

DST submitted via: ☐ Phone ☐ Fax ☐ Face-to-face

I am contacting you about a suspected UTI for the above resident. Vital signs are:

Temp: __________ RR: ____________ HR: ___________ BP: ___________ SpO2: __________

Allergies: ____

No	Yes	
☐	☐	Does the resident have an indwelling catheter?
☐	☐	Is the resident incontinent? If yes, new or worsening? ______________________________________
☐	☐	Is the resident on a blood thinner?

Resident **WITH** indwelling catheter Criteria are met to order UA with C&S and possibly initiate antibiotics if one of the following is selected:	Resident **WITHOUT** indwelling catheter Criteria are met to order UA with C&S and possibly initiate antibiotics if one of the three situations is met:
No Yes	No Yes
☐ ☐ Temperature of 100°F or repeated temperatures of 99°F	☐ ☐ Acute dysuria
	-------------------------**OR**--------------------------
☐ ☐ New back pain or flank pain	☐ ☐ Single temperature of 100°F and at least One new or worsening of the following:
☐ ☐ Acute pain	☐ Urgency ☐ Suprapubic pain
☐ ☐ Rigors/shaking chills	☐ Frequency ☐ Gross hematuria
☐ ☐ New dramatic change in mental status	☐ Back/flank pain ☐ Urinary incontinence
☐ ☐ Hypotension	-------------------------**OR**--------------------------
	☐ ☐ No fever but two or more of the following symptoms:
	☐ Urgency
	☐ Frequency
	☐ Incontinence
	☐ Suprapubic pain
	☐ Gross hematuria

Nursing:

1. Please check box to indicate whether criteria are met.

   ☐ **McGeer criteria are met.** Resident may require UA with C&S and initiation of an antibiotic.

   ☐ **McGeer criteria are NOT met.** The resident does NOT need an immediate order for UA with C&S and/or antibiotic but may need additional observation.

2. If orders are given, write all new orders in the resident's chart and enter in PointClickCare.
3. Document change of condition in PointClickCare.
4. Place this form in Teresa Synowiez's locked office. Not a part of the medical record.

Appendix C

DO YOU SUSPECT THAT YOUR RESIDENT HAS AN UTI?

1. Complete the Suspected UTI DST prior to contacting the provider.
2. Complete only one section:
    a. Resident **WITH** indwelling catheter, or
    b. Resident **WITHOUT** indwelling catheter.
3. Check box to indicate if revised McGeer criteria are met or not met.
4. If new orders are received, write orders in resident's chart, and enter in PointClickCare.
5. Document change of condition in PointClickCare.
6. Place Suspected UTI DST in Teresa Synowiez's mailbox.
7. The Suspected UTI DST should not be placed in the chart or uploaded to PointClickCare.

Appendix D

Date	DST used yes/no	Criteria met yes/no	UA C&S yes/no	Urine culture results	Antibiotic prescribed yes/no	Antibiotic details
