

IMPROVING THE MANAGEMENT OF ASYMPTOMATIC BACTERIURIA IN OLDER  
ADULTS IN LONG-TERM CARE

By

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## Abstract

**Problem:** The unnecessary or inappropriate use of prescription antibiotics is a public health problem. An estimated 40% to 75% of antibiotics prescribed in U.S. nursing homes may be unwarranted, and moreover, the most commonly treated infection in nursing homes is a urinary tract infection (UTI). Up to one-third to one-half of prescriptions used to treat suspected UTIs in nursing home residents are actually aimed at asymptomatic bacteriuria (ASB). Consistent findings show the treatment of ASB is unnecessary and can be harmful, leading to increased rates of *Clostridium difficile*, multidrug resistant organisms, adverse drug events, hospital admissions, and higher health care costs. The Centers for Disease Control and Prevention (CDC) recommends that all nursing homes take steps to improve antibiotic prescribing practices through the utilization of antibiotic stewardship activities. The CDC defines antibiotic stewardship as a set of commitments and actions designed optimize the treatment of infections while reducing adverse events associated with antibiotic use.

**Project Aim:** The purpose of this quality improvement project was to assess if the implementation of an antibiotic stewardship program in the nursing home setting decreases the rate of antibiotics prescribed for ASB in older adults.

**Project Method:** A retrospective chart review of data was utilized to record baseline rates of antibiotics prescribed for UTIs and ASB. The chart review included the analysis of nursing notes, progress notes, provider visits, and nursing home infection logs to determine if an antibiotic was prescribed for a symptomatic UTI versus ASB. An antibiotic stewardship program consisting of an educational session about antibiotic stewardship and a decision-making tool was implemented and utilized by nurses and providers. Recommendations regarding antibiotic prescribing practices for suspected UTIs and a toolkit for suspected UTIs developed by the Agency for Healthcare Research and Quality served as core elements of the antibiotic stewardship program. The rate of antibiotics prescribed for UTIs and ASB was evaluated and compared to baseline data at two months.

**Project Results:** Baseline data revealed that 64% of antibiotic prescriptions written for suspected UTIs were aimed at ASB. Exposure to the antibiotic stewardship program decreased the rate of antibiotic prescriptions written for ASB by 18%, as the rate of antibiotics written for ASB in the post intervention period was 46%.

**Conclusion:** The antibiotic stewardship program and decision-making tool decreased the rate of antibiotics prescribed for ASB in older adults in the long-term care setting.

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## Improving the Management of Asymptomatic Bacteriuria in Older Adults in Long-Term Care

The overuse of prescription antibiotics has become a public health problem in the United States. The Centers for Disease Control and Prevention (CDC, 2016) reported that 20% to 50% of antibiotics prescribed in U.S. hospitals and 40% to 75% of antibiotics prescribed in U.S. nursing homes may be unnecessary or inappropriate. The CDC also noted that antibiotics are the most frequently prescribed medication in nursing homes. The most commonly treated infections in nursing homes or long-term care (LTC) facilities are urinary tract infections (Phillips et al. (2012). However, up to one-third of prescription antibiotics used to treat suspected urinary tract infections (UTIs) in nursing home residents are actually directed at asymptomatic bacteriuria (ASB) in which antibiotics are unnecessary and potentially harmful (McMaughan et al., 2016).

The purpose of this paper is to provide evidence as to why the frequent misuse of antibiotics to treat ASB in older adults is problematic and discuss results of a quality improvement project implemented in a LTC setting that aimed to decrease the rate of antibiotics prescribed for ASB. The proposed research question, a relevant literature review, and the implemented quality improvement study will be described in detail. Finally, key concepts will be summarized.

### **Background and Significance of Problem**

UTIs and ASB are common in older adults especially in nursing homes or the LTC setting. Phillips et al. (2012) reported the prevalence of ASB in the nursing home setting could be as high as 50%. Additionally, the CDC (n.d.) reported that the prevalence of ASB in nursing home residents with a long-term indwelling catheter is as high as 100%. Rowe and Juthani-Mehta (2014) stated UTIs account for 30% to 40% of healthcare acquired infections, and

diagnosing a symptomatic UTI in older adults can be complicated as there are varying definitions of UTI in the elderly. “Asymptomatic bacteriuria is defined as the presence of bacteria in the urine in quantities of  $10^5$  colony-forming units per milliliter (cfu/mL) or more in two consecutive urine specimens in women or one urine specimen in men, in the absence of clinical signs or symptoms suggestive of a UTI” (Rowe & Juthani-Mehta, 2014, p. 75). Furthermore, Rowe and Juthani-Mehta (2014) maintained that differentiating between a UTI and ASB in older adults is challenging due to a low incidence of localized genitourinary symptoms and cognitive impairments secondary to underlying comorbidities, inhibiting communication. Thus, in clinical practice, clinicians often consider the presence of nonspecific symptoms such as behavior or mental status changes or fever alone when diagnosing a UTI due to the widely accepted notion that infections present atypically in older adults (Nace, Drika, & Crnich, 2014). However, placing merit in nonspecific symptoms have a low predictive value and can be present in many conditions.

Additionally, many clinicians rely on a urinalysis to diagnose a UTI; however, due to the high prevalence of ASB in older adults, a urine culture should be used to guide treatment only if UTI symptoms are present (Nelson & Good, 2015). Nelson and Good (2015) reported that the diagnosis of a UTI is often made when a urine culture is positive, but clinical signs and symptoms suggestive of UTI are absent, resulting in misdiagnosis and overtreatment.

Properly distinguishing between a symptomatic UTI and ASB is necessary because a symptomatic UTI requires a course of antibiotics, and ASB does not. However, because of the presence of abnormal urine studies despite the absence of physical signs or symptoms of a UTI, older adults often receive a course of antibiotics due to ASB (Phillips et al., 2012). According to the CDC (2016), the misuse of antibiotics in the older adult has consequences, including the

development of *Clostridium difficile* infection (CDI), increased adverse drug events and drug interactions, and the colonization, development, and spread of multidrug resistant organisms (MDROs). The spread of MDROs is problematic because residents are often transitioned to and from acute care settings, transporting MDROs across the continuum of care (Doernberg, Dudas, & Trivedi, 2015).

Randomized controlled trials (RCTs) have shown that antibiotic treatment for ASB does not reduce the risk of re-colonization of the urinary tract or lower rates of hospitalization or mortality, but may actually increase the risk of the future development of a symptomatic UTI (Nelson and Good, 2015). Therefore, the Infectious Diseases Society of America (IDSA) guidelines recommend against screening for ASB in older adults that are institutionalized (Nicolle et al., 2005). Furthermore, the negative outcomes of antibiotic overuse contribute to increased hospital admissions and health care costs (McMaughan et al., 2016); thus, there is a strong need for optimizing antibiotic stewardship in LTC.

### **Definitions**

In order to differentiate between a symptomatic UTI and ASB, a summary of key terms must be defined. The IDSA defines ASB in asymptomatic women as two consecutive clean catch urine specimens with isolation of the same organism in quantity counts of greater or equal to  $10^5$  colony-forming units per milliliter (cfu/mL). In asymptomatic men, ASB is defined by the IDSA as a single clean catch voided urine specimen with isolation of a single organism in quantitative counts of greater or equal to  $10^5$  cfu/mL (Nicolle et al., 2005). Additionally, a single catheterized urine specimen with one organism in quantities of  $10^2$  cfu/mL identifies ASB in asymptomatic men and women (Nicolle et al., 2005). Furthermore, the IDSA recommends ASB be diagnosed



based on a urine culture specimen, which was collected in a manner to minimize contamination, and additionally, urine cultures opposed to urinalysis should be used for diagnosis.

The definition of a symptomatic UTI in older adults requires the presence of localized genitourinary symptoms and a urine culture with an identified urinary pathogen (Rowe & Juthani-Mehta, 2014). In 2012, the Society for Healthcare Epidemiology of America updated surveillance definitions of infections in LTC facilities to incorporate definitions of the CDC, and the McGeer criteria for diagnosis of UTI was revised for residents with and without an indwelling catheter (Rowe & Juthani-Mehta, 2014). The McGeer criteria for diagnosis of a symptomatic UTI includes the following for residents without an indwelling catheter:

**Symptomatic UTI criteria from both 1 and 2.**

1. At least 1 of the following subcriteria of signs or symptoms

- Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

Or

- Fever or leukocytosis and at least 1 of the following localizing urinary tract subcriteria
  - Acute costovertebral angle pain or tenderness
  - Suprapubic pain
  - Gross hematuria
  - New or marked increase in incontinence
  - New or marked increase in urgency
  - New or marked increase in frequency

- In the absence of fever or leukocytosis, then 2 or more of the following localizing urinary tract subcriteria
  - Suprapubic pain
  - Gross hematuria
  - New or marked increase in incontinence
  - New or marked increase in urgency
  - New or marked increase in frequency
- 2. One of the following microbiological subcriteria
  - At least  $10^5$  cfu/mL of no more than 2 species of microorganisms in a voided urine sample
  - At least  $10^2$  of any number of organisms in a specimen collected by in-and-out catheter

In residents with an indwelling catheter in place, the McGeer criteria for a symptomatic UTI includes the following:

**Symptomatic UTI criteria with indwelling catheter.**

- Fever, rigors, or new onset hypotension, with no alternate site of infection
- Either acute change in mental status or acute functional decline, with no alternate sign of infection
- New onset suprapubic pain or costovertebral angle pain or tenderness
- Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate
  - And must have urinary catheter specimen culture with at least at least  $10^5$  cfu/mL of any organism.

In older adults, urine dipstick testing has been found to have little value in the diagnosis of UTI (Nelson & Good, 2015). While a urinalysis can assist in diagnosing a symptomatic UTI, it is not considered the gold standard in diagnosis. A positive urinalysis constitutes pyuria or greater than 10 white blood cells (WBC)/mm<sup>3</sup> per high-power field (HPF). A positive urine culture is defined as the presence of bacteriuria and constitutes a urinary pathogen of at least 10<sup>5</sup> cfu/mL (Rowe & Juthani Mehta, 2014). The urine culture combined with an assessment of clinical symptoms is the gold standard to differentiate between ASB and a symptomatic UTI in older adults (Nelson & Good, 2015).

### **Evidence and Identification of PICO(T)**

The CDC (2016) described growing evidence suggesting that the utilization of antibiotic stewardship programs can enhance the treatment of infections and reduce adverse effects secondary to antibiotic overuse, resulting in increased patient safety, decreased antibiotic resistance, and decreased healthcare costs. Phillips et al. (2012) investigated factors associated with the use of antibiotics to treat ASB in older adults and found that out of 204 antibiotics prescribed for a suspected UTI, approximately 50% of the prescriptions were for residents with no documented UTI symptoms. Moreover, McMaughan et al. (2016) assessed the effectiveness of a decision-making aid for properly diagnosing UTIs and found the rate of antibiotic prescriptions written for ASB decreased significantly. However, Rowe and Juthani-Mehta (2014) stated that despite the evidence and guidelines available to providers to assist in appropriately diagnosing UTIs, adherence is inconsistent, and the overtreatment with antibiotics for ASB remains an issue. Additionally, although antibiotic stewardship programs have been recommended in the LTC setting, there is a lack of consensus on the components of antibiotic stewardship programs (Nicolle, 2014).

### **Identification of PICO(T) Question**

The advanced practice registered nurse (APRN) as a key provider caring for older adults is frequently faced with distinguishing between a symptomatic UTI and ASB. Therefore, the following research question guided this quality improvement project: (P) In older adults residing in the nursing home/LTC setting, (I) does the utilization of an antibiotic stewardship program (C) compared to no antibiotic stewardship program (O) reduce the number of antibiotics prescribed for asymptomatic bacteriuria (ASB) (T) in two months?

This quality improvement project was implemented at a LTC community serving 120 residents in a suburban city in the Midwest. Elderly residents included in the study resided in the community long term. Furthermore, nurses and providers were consistently caring for the residents and were available to receive, implement, and evaluate the antibiotic stewardship program.

A retrospective review of data to determine baseline rates of antibiotics prescribed for ASB and UTIs was performed. Following the education and implementation of an antibiotic stewardship program that included a decision-making tool utilized by providers and nurses, the rate of antibiotics prescribed for ASB was evaluated at two months. The details pertaining to the project will be discussed further in the project's theoretical framework and methodology sections.

### **Review of Literature**

A literature review was conducted to obtain evidence on the need to implement a project supporting the research question. The following literature review will include methods used to obtain articles, strengths and weaknesses of methods, synthesis of key studies examined related

to the research question, and strengths and weaknesses of studies. Finally, key themes will be summarized.

## **Methods**

The literature review was conducted utilizing the databases, Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and Google Scholar. The keywords used in the search were *asymptomatic bacteriuria, urinary tract infection, nursing homes, long-term care, older adults, elderly, antibiotic stewardship program, and decreasing rates of antibiotic prescriptions*. Inclusion criteria included peer-reviewed primary research studies focusing on antibiotic stewardship in older adults in the LTC setting. Studies were screened to ensure an intervention was utilized to decrease antibiotic use for ASB. Exclusion criteria included studies not conducted in the LTC setting, those not including older adults, not written in English, studies greater than ten years old, and those that were not peer reviewed or primary research.

### **Strengths and weaknesses of methods.**

Eight primary, peer-reviewed studies were extracted from the literature search. Additionally, consistency of the defined population, older adults, and the defined setting, LTC, are considered strengths of the search. Finally, the outcome measure of reducing treatment for ASB was consistent across most studies and is considered an additional strength of the methods used for the literature review.

Most of the articles utilized a pre-post intervention quality improvement or quasi-experimental design, and there were not any true experimental or RCTs extracted from the search. This can be considered a weakness as these study designs are not as high on the hierarchy evidence pyramid. However, the author attempted searching for RCTs but had difficulty finding RCTs that fit the inclusion criteria. Two of the studies extracted from the search were from 2007

and 2008, but the remainder of the studies was conducted within the last five years. The two older studies could be considered weaknesses due to changing evidence; however, they were included in the review due to the relevance of the inclusion criteria.

### **Synthesis of Articles**

Nelson and Good (2015) stated that testing and treatment of ASB is not recommended in the general older adult population as it may contribute to poor outcomes, but despite strong evidence against treating ASB, treatment of ASB is still common. Therefore, increased quality measures are needed to incorporate evidenced-based standards in the diagnosis and management of ASB and UTI (Nelson & Good, 2015). Eight primary research articles were critically analyzed following the extraction from the described methods and will be synthesized.

### **Population, Setting, and Interventions**

The population across all studies included older adults, and the setting across all studies included nursing homes or LTCs. The number of participants was not consistently reported in the studies because the number of prescriptions for symptomatic UTI versus ASB and urine cultures was evaluated. The size of the settings ranged from small to large bed facilities.

A variety of educational programs and interventions were utilized across the studies with the main goal of decreasing unnecessary treatment for ASB (Heath et al., 2016; Leduc, 2014; McMaughan et al., 2016; Zabarsky, Sethi, & Donskey, 2008). Decision-making tools were the most commonly used intervention to promote antibiotic stewardship. Three of the studies (Leduc, 2014; McMaughan et al., 2016; Zabarsky et al., 2008) utilized decision tools with additional training support, clinical pathways utilized by nurses and primary providers, and pocket cards used by nursing and providers, respectively to assess the impact of treatment for ASB after obtaining baseline data through retrospective chart reviews.

Another mode of education to promote antibiotic stewardship included continuing education for nurses and providers. In the study conducted by Heath et al. (2016), six modules designed to educate nursing staff who work with older adults contained information about antibiotic stewardship and improving communication with providers utilizing situation, background, assessment, and recommendation (SBAR). While nurses comprised the majority of the 2,240 participants participating in the education, APRNs and physicians consisted of approximately 5% of the participants. A pre-post test design was used to assess understanding of course material.

Chart audits employing a team approach were also an intervention used as a mode of antibiotic stewardship. Two studies (Doernberg et al., 2015; Rummukainen et al., 2012) used healthcare teams dedicated to evaluate effectiveness of defined interventions on antibiotic stewardship for ASB. The quasi-experimental study by Doernberg et al. (2015) used a retrospective pre-intervention data review, and an infectious disease pharmacist and physician performed prospective audits and feedback on prescriptions for suspected UTIs for six months. Rummukainen et al. (2012) used a healthcare team to gather information about diagnostic practices for UTIs, then sent guidelines for an antibiotic stewardship program to decrease use of antibiotics for suspected UTIs. Accordingly, annual questionnaires were distributed for four years to assess the rates of antibiotics prescribed.

Assessing barriers to antibiotic stewardship was a theme used by Lohfeld, Loeb, and Brazil (2007); utilizing, a clinical pathway algorithm, the authors explored attitudes and barriers related to its use. Lastly, the cross-sectional study by Phillips et al. (2012) used a retrospective chart review to understand what factors increased the likelihood of patients receiving antibiotics for ASB.

## **Outcome Measures and Results**

The majority of studies primary outcome measures included antibiotic prescriptions for suspected UTI or ASB (Doernberg et al., 2015; Leduc, 2014; McMaughan et al., 2016; Phillips et al., 2012; Rummukainen et al., 2012; Zabarsky et al., 2008). Additional outcome measures comprised of test results following education, the number of urine cultures sent for suspected UTI, and attitudes and barriers to antibiotic stewardship programs. Following the implementation of a decision-making aid, McMaughan et al. (2016) found that exposure to the decision-making aid significantly reduced the number of prescriptions written for ASB, including a reduction of 78% to 65%. Also utilizing decision-making aids, studies by Leduc (2014) and Zabarsky et al. (2008) resulted in a 36% reduction and 1.7 to 0.6 per 1,000 patient days reduction, respectively in the number of antibiotics prescribed for suspected UTIs. The inappropriate submission of urine cultures also decreased in the study conducted by Zabarsky et al. (2008). An immediate 26% reduction in antibiotic prescriptions for suspected UTI was identified during the antibiotic stewardship program in the research conducted by Doernberg et al. (2015), which utilized weekly audits and recommendations from an infectious disease physician and pharmacist. Moreover, following the distribution of clinical guidelines for conservative UTI management, Rummukainen et al. (2012) found the proportion of antibiotic prophylaxis for UTI decreased from 13% to 6%, which was statistically significant.

The study by Phillips et al. (2012), which sought to investigate factors associated with antibiotic use to treat ASB found that over 80% of prescriptions written for catheterized older adults were for ASB. In the qualitative study by Lohfeld et al. (2007) examining attitudes about clinical pathways to improve UTI management, the authors discovered staff supported the use but barriers included pressure by families, nurses, and physicians. Additionally, the pre-post test



design used to educate nurses and providers on antibiotic stewardship conducted by Heath et al. (2016) concluded that the antibiotic stewardship class addressed a large knowledge gap amongst nurses.

### **Strengths and Weaknesses of Literature**

Key strengths of the studies included primary research and the use of statistical analysis when applicable. Another strength was the length of time in which the outcomes were measured, which ranged from several months to several years. The lack of RCTs and thus level two evidence is considered a limitation of the literature extracted. Additionally, some of the studies, which compared data over the course of a year or less, found that the seasons in which the data was collected might have potential bias.

### **Summary of Literature**

It is universally recognized that the inappropriate use of antibiotics is highly prevalent in the LTC or nursing home setting particularly related to suspected UTIs. Challenges to improve antibiotic use in this setting remain because older adults have a high incidence of infection due to comorbidities, use of invasive devices, age associated changes, and institutional exposure (Nicolle, 2014). Furthermore, there is often diagnostic ambiguity due to limitations in clinical and microbiology evaluation. The evidence found in the studies from the literature review consistently showed and supported that the education and implementation of antibiotic stewardship programs have a positive outcome in reducing the inappropriate use of antibiotics to treat ASB (Doernberg et al., 2015; Leduc, 2014; McMaughan et al., 2016; Rummukainen et al., 2012; Zabarsky et al., 2008).

In addition to the reduction of antibiotics prescribed for ASB, several key themes emerged from the literature review. First, the consensus of several studies was that nursing needs

to be on the frontlines in antibiotic stewardship programs (Doernberg et al., 2015; Heath et al., 2016; Leduc, 2014; Lohfeld et al., 2007; McMaughan et al. 2016; Zabarsky et al. 2008). Nurses play a vital role in reporting resident findings to providers and in the collection and promotion of urine cultures. Some studies found that providers felt pressure from nurses to send urine cultures unnecessarily (Doernberg et al. 2015). Furthermore, the findings in the study completed by Heath et al. (2016) suggest ongoing education is needed for nurses regarding ASB and antibiotic stewardship to maintain desired outcomes. This is especially true due to frequent turnover of nursing staff in LTC.

Another key theme is that treatment for ASB is frequently associated with an indwelling urinary catheter. Phillips et al. (2012) found that over 80% of antibiotics prescribed for residents with a catheter were written in the absence of signs indicative of a UTI, suggesting that the presence of a urinary catheter should be further investigated as the subject of future studies.

Sustaining the interventions related to the antibiotic stewardship program was an issue after the completion of the program according to McMaughan et al. (2016). It was reported that the decision aid used in their study did not become embedded in everyday operations in the nursing homes studied likely due to competitive resource needs, implying the need for future studies to focus on the maintenance of antibiotic stewardship and reasonable cost.

Evidence examined from the literature review showed that despite best practice evidence against treating ASB, the treatment of ASB with antibiotics remains a problem. Vigilance in distinguishing between a symptomatic UTI and ASB is of the essence to promote quality resident care.

## **Project Theoretical Framework**

According to Zaccagnini and Waud White (2015) change is notoriously difficult to achieve, and change is more likely to succeed when a theory and model is used to support the planned change. Thus, Kurt Lewin's Change Theory and quality improvement methods founded by Walter Shewhart and W. Edwards Demming served as the theoretical framework for this quality improvement project.

### **Lewin's Change Theory**

Lewin's theory is rooted in the idea that issues are preserved in balance by forces that maintain the current state and forces that advance change, known as restraining and driving forces respectively (Zaccagnini & Waud White, 2015). Furthermore, until the driving forces exceed the restraining forces, change will not occur. Lewin's theory includes three stages to promote change, which are known as unfreezing, movement, and refreezing. Zaccagnini and Waud White (2015) described the steps. The first step entails unfreezing the current state of actions. The second step involves moving toward a new state by persuading people to look at problems from a new perspective. Finally, the third phase of the change theory involves refreezing, in which the change becomes the new normal or protocol. This is accomplished through positive reinforcement of the behavior change and formalizing institutional change.

Utilizing Lewin's change theory, the project can be broadly summarized in three steps. The first step of unfreezing included stopping the prevalent treatment of ASB. The second step included moving toward a new perspective of how to evaluate if an older adult in the nursing home setting has ASB or a symptomatic UTI. This was accomplished through an antibiotic stewardship program, including education. Finally, the third step included utilizing a decision

making tool following education about the tool and providing positive reinforcement and reminders to utilize the tool.

### **Shewhart and Demming Methodology**

The methodology for this quality improvement project was rooted in the models set forth by Shewhart and Demming who are considered the pioneers of quality control. Shewhart is known for the development of his improvement model, Plan, Do, Check, Act (PDCA). Demming modified the PDCA model to the Plan, Do, Study, Act (PDSA) to focus the cyclical model on analysis instead of inspection; this model is still used today in healthcare agencies (Zaccagnini & Waud White, 2015). One of the benefits of this model is that small changes can be made and evaluated within in a short amount of time. Hall and Roussel (2017) stated that the PDCA and PDSA models do not incorporate patient safety practices, and therefore, another modified version of the model that seeks to incorporate patient safety as well as teamwork is the Plan, Brief, Execute, Debrief (PBED) model. This model utilizes patient safety practices by including steps that require teamwork and communication (Hall & Roussel, 2017). The PBED model was utilized for this DNP quality improvement project.

### **Author Assumptions**

Prior to the initiation of the project, the author believed the project was necessary to promote resident safety and improve quality of care. The author donned responsibility for developing, implementing, and evaluating the project under guidance of the DNP project chair and co-chair. Furthermore, the author assumed that the project was realistic and feasible to complete in two months. It was also assumed that nursing and provider staff at the partnering LTC facility would be inclined to participate to the full extent of the directions outlined by the project protocol. It should be noted that each resident is unique, and thus, nursing and provider

discretion was to be utilized when deciding if a patient should be exempt from the project's protocol. The risk of the project was minimal as the project supported the implementation and utilization of current evidence based practice.

## **Project Methods**

### **Project Design**

The project utilized a quality improvement design consisting of a pre- and post-intervention test to evaluate the effectiveness of an antibiotic stewardship program on the rates of antibiotic use for ASB. The design was rooted in the quality improvement PBED methodology as well as Lewin's change theory to promote patient safety and practice change.

This study design was chosen because rigorous evidence has demonstrated the treatment of ASB with antibiotics is not beneficial and potentially harmful, yet treatment of ASB with antibiotics persists (McMaughan et al., 2016). Hall and Roussel (2017) stated that quality is established in advance of evidence-based care practices that produce desirable outcomes, and quantifying outcomes gives the best support for the effect of practice on patient care. The study quantified the outcome of interest, rates of antibiotics prescribed for ASB versus UTI, by measuring baseline rates of antibiotics prescribed for ASB and UTI and comparing them to the post-intervention rates at two months.

Utilizing elements of the plan and brief of the PBED model, the antibiotic stewardship program included an educational session to educate nurses and providers of the benefits of antibiotic stewardship and familiarize staff with a decision-making tool specific to suspected UTIs. This was accomplished through the use of a handout of the new decision tool and a PowerPoint presentation (see Appendix H). A pretest and posttest was also administered to all of the attendees to evaluate understanding of the material presented (see Appendix H).

In order to address communication between nursing staff and providers, the decision tool incorporated elements of SBAR. Additionally, the nurses and providers at the LTC partner currently use an SBAR approach to communicate. SBAR provides a structured method of communicating, which has the potential to directly impact patient care outcomes (Renz, Boltz, Wagner, Capezuti, & Lawrence, 2013). Moreover, nurses taking care of complex residents in the nursing home setting are in a key role for assessing resident changes; how these changes are communicated to providers can dramatically influence provider decision-making (Renz et al., 2013). Thus, SBAR serves as a clear, concise, and consistent way to communicate findings to assist the provider in accurate diagnosis and treatment.

The education session familiarized nurses and providers with a SBAR decision tool adapted from the Agency of Healthcare Research and Quality (AHRQ). The AHRQ (2016) developed a suspected UTI SBAR toolkit to assist nursing home staff and prescribing clinicians to communicate about suspected UTIs and facilitate appropriate antibiotic prescribing practices. According to the AHRQ (2016), a study in 12 Texas nursing homes found that the UTI SBAR form reduced antibiotics prescriptions for ASB by approximately one-third. A modified version of the AHRQ suspected UTI SBAR form incorporating McGeer criteria for antibiotic prescribing was utilized. The McGeer criteria was utilized because these criteria were currently used by the partnering organization in a monthly infection report. Additional elements of the AHRQ toolkit were also used for educational purposes and were incorporated into the PowerPoint; this included resident case studies for participants to practice using the new tool.

In line with Lewin's change theory, the goal of the education session was to unfreeze current antibiotic prescribing practices and move toward a new perspective of antibiotic stewardship. Additionally, the education session served as the Brief component of the PBED

model in which the plan was communicated to all involved. Following the education session, nurses and providers were expected to utilize information learned as well as the suspected UTI SBAR decision tool; this constituted the Execute portion of the PBED model. Finally, following the completion of the project, a survey was sent out to all participants in the study to obtain information about adherence, benefits, and barriers of the new tool. Survey results and results of the study were communicated with the organization and comprised the Debrief portion of the PBED model.

### **Project Sample and Selection**

Residents residing in the LTC were selected to participate in the project. Residents at the facility for acute rehab or skilled nursing were exempt from the project's protocol due to recent hospitalization and thus potential bias due to increased susceptibility of hospital acquired infections. Additionally, the project sample consisted of nursing staff and providers, including physicians and nurse practitioners. The facility's infection control liaison assisted with coordinating the presentations and approved the content prior to the sessions. The educational session was attended by 29 of 50 total staff nurses; the nurses unable to attend the session received the content online. While the presentation and education was mandatory for nursing staff, an email of the presentation and new SBAR tool was sent to the provider staff at the time the presentations were given describing the project's protocol. A total of five presentations, one hour in length, were given on two different days during a two-week period. The study protocol started one week following the final presentation. After the start of the study, the LTC partner requested an additional education session specifically for providers, which was held midway through the project. Six nurse practitioners, the assistant director of nursing, and weekend nursing supervisor attended that presentation.

## Data Collection

A retrospective chart review was used to collect data. This review looked at the two months prior to the initiation of the project to determine baseline rates of antibiotics prescribed for UTI and ASB. Infection logs, which are required to be kept under federal regulations, were used as the source to identify the number of cases of antibiotics prescribed for suspected UTIs. In addition to documenting the primary outcome of interest, antibiotic prescription rates, corresponding elements of signs and symptoms suggestive of a UTI, the presence of a urinary catheter, urinalysis, and urine culture results were tracked. This was achieved by reviewing lab results, SBAR forms, nursing notes, and provider visit notes in the corresponding patient's chart. It was then determined if an antibiotic was prescribed for ASB. This was defined as a lack of documented symptoms suggestive of a UTI meeting criteria included in the SBAR form in the presence of an antibiotic prescription for a suspected UTI. The data was collected and formatted in a table (see Appendix D: Table D1), and all patient identifiers were stripped in compliance with the Health Insurance Portability and Accountability Act. To maintain reliability and validity, the same systematic approach was used to collect baseline data and data following the completion of the antibiotic stewardship program at two months.

At the conclusion of the antibiotic stewardship program, a secure REDCap survey was distributed to nursing staff and providers that participated in the antibiotic stewardship program. The goal of the survey was to obtain information about attitudes, adherence, benefits, and barriers of the program. Results of the survey were meant to assist the LTC organization in continuing the intervention and in line with Lewin's approach, refreeze the new mode of care.



## **Data Analysis**

The baseline and post intervention rates of antibiotic prescriptions written for ASB were evaluated and reported as the proportion prescriptions written for ASB divided by the total number of prescriptions written for suspected UTIs. A descriptive analysis was used to assess the survey results.

## **Results**

### **Pretest and Posttest Results**

The pre- and post-test administered during the educational session was completed by a total of 31 nurses and six nurse practitioners and served as an evaluation tool during the educational session. The pre- and post-test were the same, and the answers were reviewed at the end of the session as a group such that all participants could track their own progress in learning. Although the posttest was reviewed as a group at the end of each session, the participants were able to answer all questions correctly as a group at each education session.

### **Chart Review Results**

Baseline data collected via retrospective chart included the suspected UTIs for January and February 2018. The total number of suspected UTIs for January and February was 11. Chart reviews revealed four of these were symptomatic UTIs and seven were ASB (see Appendices D and E for Table D1 and Figures E1 and E2); thus, 64% of baseline antibiotic prescriptions for suspected UTIs were aimed at ASB. Post intervention data included review of suspected UTIs for March and April. The total number of suspected UTIs post intervention was 13; of these, seven met criteria for symptomatic UTIs and six met criteria for ASB. In the post intervention period, 46% of antibiotic prescriptions were aimed at ASB. Thus, exposure to the antibiotic stewardship program decreased the rate of antibiotic prescriptions written for ASB by 18%.

Of the total 24 patient charts reviewed (see Appendix D for Table D1), 18 residents had some type of documented sign or symptom, but only 11 residents met criteria for a symptomatic UTI. Six residents who received an antibiotic for a suspected UTI had no associated documented signs or symptoms of a UTI. A change of mental status alone was the single most documented sign without corresponding documented signs or symptoms suggestive of a UTI in those that did not meet criteria for a symptomatic UTI. Additionally, only one resident had an indwelling catheter in place, and in 100% of the residents a urinalysis and urine culture was obtained. Furthermore, 100% of the urine cultures were positive for various microorganisms.

In the post intervention chart audits, only two residents had corresponding suspected UTI SBAR forms scanned into the corresponding chart. Both residents met criteria for a symptomatic UTI. The number of symptomatic UTIs also increased in the post intervention period; there were four baseline UTIs and seven UTIs found in the post intervention period.

Additional observations revealed by chart audits include documented requests by family members to check urine in the absence of documented signs and symptoms suggestive of a UTI. Another finding revealed that urine was often sent for analysis several days after documented signs and symptoms of a behavior changes or that of a suggestive UTI without corresponding documentation of follow up signs or symptoms during the time urine was sent.

### **Survey Results**

A total of three respondents, one nurse and two physicians, completed the survey distributed by REDCap, a secure survey tool, which assessed understanding of antibiotic stewardship, adherence to the SBAR tool, as well as barriers and benefits to the tool (See Appendix I). The survey was sent to all 50 nursing staff as well as six provider staff, and recipients were given one week to complete the survey. All the respondents reported they either

agreed or strongly agreed that the antibiotic stewardship program enhanced their understanding of antibiotic stewardship, that they had adequate training to use the suspected UTI SBAR tool, and that the tool improved quality care delivered to their residents. Additionally, all the respondents agreed that the SBAR tool improved communication with either providers or nurses. However, two of the three respondents reported they only sometimes used the SBAR tool when it was indicated. Respondents stated benefits of the tool included that it assisted in eliminating the unnecessary treatment of suspected UTIs, that it standardized processes, and was evidence based. Conversely, respondents reported barriers of the tool included difficulty filling out the form due to length and ensuring it was consistently used.

### **Discussion**

Findings from the study demonstrated that the rates of treating ASB at the LTC partner community were consistent with previous reports by the CDC (2016) in that 40% to 75% of antibiotics in nursing homes may be unnecessary. However, findings from the study demonstrated that exposure to the antibiotic stewardship program and the suspected UTI SBAR tool reduced the proportion of antibiotic prescriptions directed at ASB by 18%. Additionally, only one resident was found to have an indwelling catheter in place, and this resident was appropriately treated for a symptomatic UTI. While studies have reported an indwelling catheter is a powerful predictor of treatment for ASB, the prevalence of cases of ASB associated with an indwelling catheter at the LTC was 0% during the study.

It is difficult to assess the full impact of the antibiotic stewardship program and determine the rates of adherence to the decision-making tool as survey respondents reported they only sometimes utilized the tool. Additionally, an increase of symptomatic UTIs was seen in the post-intervention period, which could demonstrate that the Suspected UTI SBAR tool led to improved

documentation in cases where a symptomatic UTI should be treated. However, this is difficult to determine as only two SBAR tools were found in chart audits following the antibiotic stewardship program and implementation of the SBAR tool.

### **Limitations**

Limitations of the study include a low number of survey respondents relative to the number of people that participated in the antibiotic stewardship program, leading to potential bias and inconclusive data surrounding adherence and understanding of antibiotic stewardship. Another limitation of the study was that 58% of nurses completed the education training, and a small proportion of providers completed the training. The in-person training for providers also occurred mid way through the project's protocol. Another potential bias of the study was that the project director and author served as the only recorder of chart audits; however, the process followed a systematic approach in all collection of data to control for bias. An additional limitation of the study was the short duration of time for implementation and evaluation. Evaluating data over a six to 12-month time frame may provide more accurate data of trends.

### **Recommendations**

Based on the chart audits and survey results, it can be determined that the decision-making tool or Suspected UTI SBAR tool was underutilized in every day operations at the LTC unit. However, in the cases where the tool was used and documented, the tool provided clear and concise evidence of criteria met for residents who needed treatment for a symptomatic UTI. It is recommended that a focus group of providers and nurses from the LTC partner evaluate how to better utilize the tool as findings of the study demonstrated resistance to change as evidenced by the lack of Suspected UTI SBAR tools found in resident charts and the continued treatment of ASB in the post intervention period. Other topics to discuss during a focus group could include a

focus on improving documentation from providers and nursing staff as six cases of ASB that were treated were found to have no documented signs and symptoms of a symptomatic UTI nor did they meet any criteria for treatment.

Additionally, it was found that a change in mental status alone continued to spark urine testing in many cases of ASB, suggesting the need for reeducation and reiteration that this is not a criterion for urine testing in residents without an indwelling catheter. The original McGeer criteria for diagnosing a UTI, which came out in 1991 included worsening mental status or functional status as part of the criteria for diagnosis, but this criterion was changed in 2012 to exclude a change in mental status. An additional focus of education could pertain to nursing and provider staff that were trained prior to 2005 when the IDSA advised against screening and treating ASB in institutionalized older adults as change may be more difficult to achieve in those whose education were rooted in different teachings.

Another finding from chart reviews included urine testing following requests from resident family members without documented signs and symptoms of a UTI, signifying the need to expand antibiotic stewardship education to residents and family members. The CDC has developed antibiotic stewardship fact sheets for residents and family members that could assist in this education.

Due to the complexity of differentiating between a symptomatic UTI and ASB as well as the ongoing rates of treatment of ASB found in this study, it is recommended that an appointed staff member at the LTC partner become an antibiotic stewardship champion. Duties of this person could include education for new hires, routine chart audits to determine rates of ASB as well as reinforcing and revising policies surrounding antibiotic stewardship. Additional education and training opportunities could also emphasize the prevention of symptomatic UTIs,

including hydration, proper hygiene techniques, the use of topical estrogen, and minimizing indwelling catheter use.

### **Conclusion**

In summary, the misuse of antibiotics to treat ASB in older adults remains a significant problem in the LTC setting. Mistaking ASB for a symptomatic UTI has consequences, which can lead to increased risk for CDI, adverse drug reactions, and antibiotic resistance (Nelson & Good, 2015). The research included in the literature review supported the proposed research question and project, seeking to determine if the implementation of an antibiotic stewardship program would reduce the rates of antibiotic prescriptions for ASB in seniors residing in the LTC setting.

The described project's theoretical framework and methodology addressed key themes that emerged from the literature review. First, distinguishing between a symptomatic UTI and ASB is difficult in the older adult, and thus, careful attentiveness is crucial to making the correct diagnosis. Second, communication between nurses and providers is necessary for antibiotic stewardship to be successful. Finally, the continued use of antibiotic stewardship is vital for maintenance of success and improved quality care. The antibiotic stewardship program, Suspected UTI SBAR tool, and survey addressed these themes, which encouraged nurses and providers to work together to achieve optimal outcomes rooted in evidence-based care.

Results of the study demonstrated that exposure to the antibiotic stewardship program led to an 18% reduction in the number of prescriptions directed at ASB. However, it was concluded that adherence to the Suspected UTI SBAR tool was likely low based on the chart audits and survey results. Similar to other studies seeking to improve antibiotic stewardship in LTC, embedding antibiotic stewardship practices in everyday practice remains a challenging issue.

Recommendations to solidify the success of antibiotic stewardship include evaluating current practice and resistance to change as well as ongoing education on the topic, which should also encompass residents and resident family members. Additionally, appointing an antibiotic stewardship champion to continue chart audits, reinforce antibiotic stewardship activities, and revise policies and protocols that are up to date on evidenced based practice can assist in embedding antibiotic stewardship in everyday practice.

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## Appendices

### Appendix A: Project Timeline

1. Submit Proposal: Monday February 19<sup>th</sup> 2018
2. Present Antibiotic Stewardship Program education session/distribute SBAR tool:  
February 22<sup>nd</sup> 2018 and February 27<sup>th</sup> 2018
3. Antibiotic Stewardship Program Implemented March 1 – April 30<sup>th</sup> 2018
4. Collect baseline data via retrospective chart review: March 2018
5. Administer post intervention survey and collect post intervention data via retrospective  
chart review: May 2018
6. Interpret results: May 2018
7. Complete and edit DNP paper: May 2018 – early June
8. Submit paper: June 2018
9. Present DNP Final Presentation: July 2018

## Appendix B: Human Subjects Committee Form



### KUMC HUMAN SUBJECTS COMMITTEE

#### REQUEST FOR QUALITY IMPROVEMENT / QUALITY ASSURANCE DETERMINATION

***\*THIS FORM MUST BE TYPED\****

<b>Project Leader:</b> Carol Buller, DNP, APRN	
<b>Department:</b> KU School of Nursing	
Email: cbuller@kumc.edu	Phone: 913-588-1021
<b>Alternate Contact Person (e.g., Project Coordinator):</b> Sally Pattison	
Email: swise@kumc.edu	Phone: 913-522-1812

**Project Title:**

Improving the Management of Asymptomatic Bacteriuria in Older Adults in Long-term Care

**Project Number, Version and/or Date:**

11/30/17 Version 1

**1. Briefly state the purpose of the proposed project. (Attach project plan if available.)**

The purpose of this quality improvement project is to assess if the implementation of an antibiotic stewardship program in the nursing home setting at Lakeview Village in Lenexa, Kansas decreases the rate of antibiotics prescribed for asymptomatic bacteriuria in older adults. The goals of the antibiotic stewardship program are to enhance nurse to provider communication through the utilization of SBAR, improve the diagnosis and treatment of suspected urinary tract infections (UTIs), and decrease the

rates of antibiotics prescribed for asymptomatic bacteriuria (ASB). The project plan is attached.

**2. Describe the research that has already demonstrated the effectiveness of your intervention. (Cite research and/or attach documentation about the national program or standard you are implementing)**

The Centers for Disease Control and Prevention (CDC, 2017) report that improving the use of antibiotics in healthcare is a national priority in order to reduce the threat of antibiotic resistance. Additionally, the CDC (2017) reported that 40-75% of antibiotics prescribed in U.S. nursing homes may be unnecessary or inappropriate, and furthermore, suspected urinary tract infections are the most commonly treated infection in nursing homes. Studies have shown that one-third to one-half of antibiotics prescribed for suspected UTIs in nursing home residents are actually aimed at asymptomatic bacteriuria (ASB), in which antibiotics are unnecessary and potentially harmful (McMaughan et al., 2016).

ASB is common in older adults, and the consequences of antibiotic overuse can be significant in the frail and elderly population (CDC, 2017). These consequences include the development of diarrhea infections, adverse drug effects and events, and the spread of multi-drug resistant organisms.

The CDC (2017) defines antibiotic stewardship as a set of commitments and actions designed to optimize the treatment of infections while reducing the adverse events associated with antibiotic use and encourages all nursing homes to partake in antibiotic stewardship activities to improve antibiotic prescribing practices.

Following the completion of a literature review on the topic, it was found that antibiotic stewardship activities decreased the rates of antibiotics prescribed for ASB. McMaughan et al. (2016) found that exposure to a decision-making tool significantly reduced the number of prescriptions written for ASB, including a reduction of 78% to 65%. Also utilizing decision-making tools, studies by Leduc (2014) and Zabarsky et al. (2008) resulted in a 36% reduction and 1.7 to 0.6 per 1,000 patient days reduction, respectively in the number of antibiotics prescribed for suspected UTIs.

The Agency for Healthcare Research and Quality (AHRQ, 2016) developed a suspected UTI SBAR toolkit to assist nursing home staff and prescribing clinicians communicate about suspected UTIs and facilitate appropriate antibiotic prescribing practices. The AHRQ (2016) stated that a study in 12 nursing homes in Texas found that using the

AHRQ suspected UTI SBAR form reduced antibiotic prescriptions for asymptomatic bacteriuria by approximately one-third.

A modified version of the suspected UTI SBAR form developed by the AHRQ along with additional elements of the AHRQ toolkit will be utilized as part of the in this quality improvement study. Forms attached.

**3. What types of data are needed for the project?**

Data Collection will include:

- a. Obtain number of antibiotics prescribed for UTI from infection logs for past two months prior to initiation of project.
- b. Perform retrospective chart review of nursing and provider notes to evaluate if antibiotic was prescribed for UTI versus ASB.
- c. Repeat retrospective chart review following project.
- d. Distribute survey to nurses and providers to obtain information about adherence to SBAR tool and benefits and barriers to use.

\* Note: A HIPPA agreement will be signed by project coordinator in order to gain access to the medical record system at Lakeview Village in order to perform the chart review. All reported data will be stripped of patient identifiers.

\*Data Collection instrument attached in project plan.

**4. Do you need access to identifiable patient records to complete the project?**

- NO  
 YES

**If yes, who holds the records?** Lakeview Village, 9100 Park, Lenexa, KS 66215

**If yes, which patient identifiers or demographics are needed for the project?**  
None

**5. Which descriptions best fits your project? *Check all that apply:***

- Determine if a previously-implemented clinical practice improved the quality of patient care

- Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations
- Gather data on hospital or provider performance for clinical, practical or administrative uses
- Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC
- Perform an analysis to characterize our patient population/clients to improve quality of services
- Implement programs to enhance professional development for providers and trainees
- Measure local efficiency, cost or satisfaction related to standard clinical practices
- Develop interventions or educational strategies that improve the utilization of recognized best practices
- Implement strategies to improve communication within our local healthcare environment
- Improve tools for patients that promote education, health literacy or treatment plan compliance

6. **Does your project involve any of the following?** *Check all that apply:*

- Randomizing participants into two or more groups
  - Student/residents/trainees are randomized
  - Patients are randomized
  - Healthcare providers are randomized
  - Units of the hospital are randomized
  - Other *Specify:* \_\_\_\_\_
- Surveying a patient population
  - Developing clinical practice guidelines
- Developing new curriculum recommendations
- Developing or refining a new assessment tool
- Implementing a novel approach to care that may improve patient outcomes

7. **Which institutions are involved in the project?**

KUMC only

Other institutions List Lakeview Village

9100 Park St, Lenexa, KS 66215



**8. Which individuals or groups will receive the results of your project?**

Internal department personnel

Hospital representatives

 University representatives Presentation/publication\* Other Specify Results will be presented to Lakeview Village medical director, nursing director, quality improvement chair, providers, and nurses and at DNP final capstone presentation at the University of Kansas School of Nursing.**9. How will your results be used to implement local improvements?****Results will be shared with local chapter of Gerontological Advanced Practice Nurses Association (GAPNA).**\_\_\_\_\_  
Signature\*\*\_\_\_\_\_  
Date\_\_\_\_\_  
Type/Print Name

\*Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

\*\*Ink signature or email from the project leader is required.

**FOR OFFICE USE ONLY****Quality Improvement Determination Acknowledged. IRB review is not required.**\_\_\_\_\_  
HRPP Official\_\_\_\_\_  
Signature\_\_\_\_\_  
Date

## Appendix C: Project Plan

### Improving the Management of Asymptomatic Bacteriuria in Older Adults in Long-term Care

#### Project Plan

The quality improvement project includes the following:

1. A retrospective chart review to determine baseline rates of antibiotics prescribed for urinary tract infections (UTIs) versus Asymptomatic Bacteriuria (ASB).
  - a. UTI defined as: Positive urine culture with documented signs/symptoms suggestive of UTI that meets McGeer's criteria.
  - b. ASB defined as: antibiotic prescribed either with or without positive urine culture in the absence of documented signs/symptoms suggestive of UTI that does not meet McGeer's criteria.
  - c. A HIPPA agreement will be signed by project coordinator in order to gain access to the medical record system at Lakeview Village in order to perform the chart review.
  - d. All reported data will be stripped of patient identifiers.
2. Implement Antibiotic Stewardship Program for nurses and providers to include:
  - a. Educational session about antibiotic stewardship
    - i. Review common myths about UTIs
    - ii. Review McGeer's criteria for diagnosis and treating symptomatic UTI versus ASB
    - iii. Review proper technique for collecting urinalysis and urine culture
    - iv. Review Suspected UTI SBAR toolkit and decision-making tool developed by the Agency for Healthcare Research and Quality (AHRQ). (Decision tool attached).
  - b. Nurses and providers will utilize suspected UTI SBAR decision-making tool for two months.
3. Follow up chart review to assess the rate of antibiotics prescribed for UTIs and ASB will be evaluated and compared to baseline data at two months.
4. Survey distributed via REDCap to nurses and providers
  - a. Gain insight on adherence to SBAR tool
  - b. Identify strengths and barriers to use of SBAR tool
5. Analyze data and summarize findings
6. Present findings

## Appendix D: Table D1.

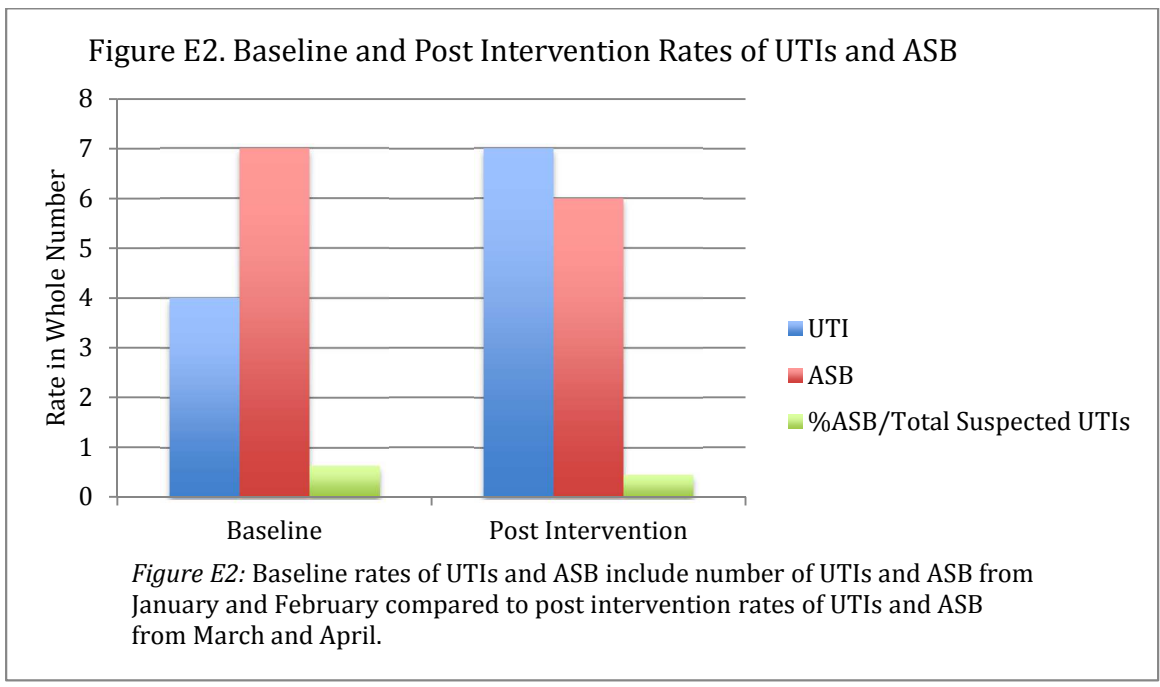
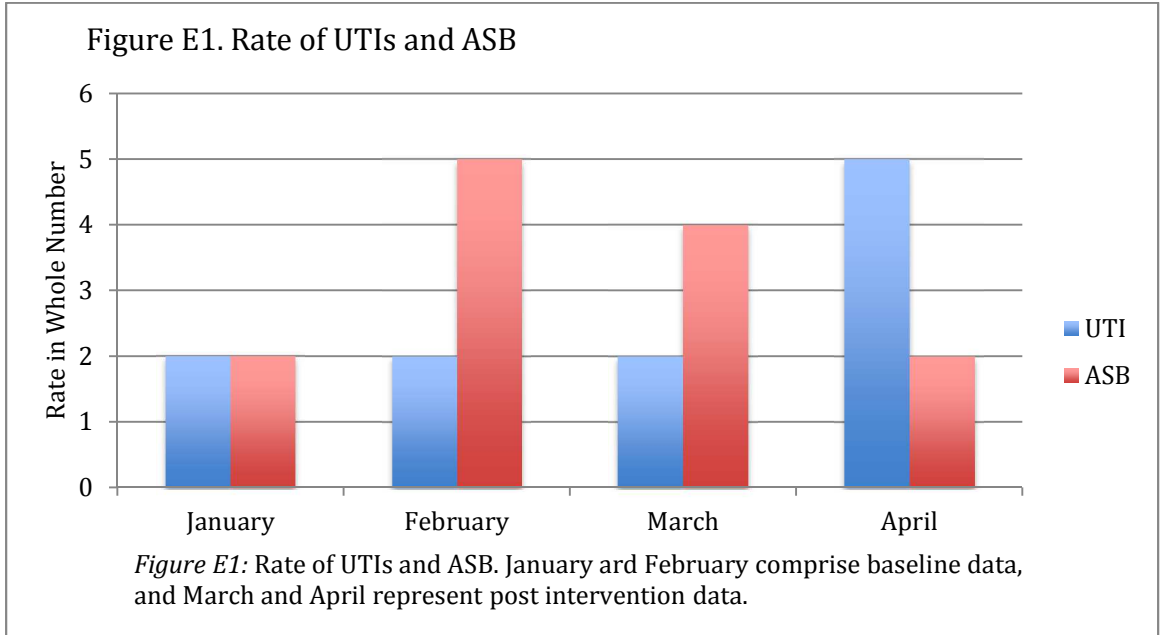
Table 1  
Data Collection Tool

Antibiotic prescription for suspected UTI	Documented Signs/Symptoms Yes/No	UTI SBAR Criteria Met Yes/No	Foley Catheter Yes/No	Urinalysis Obtained Yes/No	Urine Culture Obtained Yes/No	Culture Positive Yes/No	ASB or UTI
Rx 1- Jan.	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 2-Jan.	No	No	No	Yes	Yes	Yes	ASB
Rx 3-Jan	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 4-Jan	Yes	No	No	Yes	Yes	Yes	ASB
Rx 5-Feb.	No	No	No	Yes	Yes	Yes	ASB
Rx 6-Feb.	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 7-Feb.	No	No	No	Yes	Yes	Yes	ASB
Rx 8-Feb.	Yes	No	No	Yes	Yes	Yes	ASB
Rx 9-Feb.	No	No	No	Yes	Yes	Yes	ASB
Rx 10-Feb.	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 11-Feb.	Yes	No	No	Yes	Yes	Yes	ASB
Rx 12 March	Yes	No	No	Yes	Yes	Yes	ASB
Rx 13 March	No	No	No	Yes	Yes	Yes	ASB
Rx 14 March	Yes	No	No	Yes	Yes	Yes	ASB
Rx 15 March	Yes	Yes	No	Yes	Yes	Yes	UTI

Rx 16 March	Yes	Yes	Yes	Yes	Yes	Yes	UTI
Rx 17 March	Yes	No	No	Yes	Yes	Yes	ASB
Rx 18 April	Yes	No	No	Yes	Yes	Yes	ASB
Rx 19 April	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 20 April	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 21 April	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 22 April	Yes	Yes	No	Yes	Yes	Yes	UTI
Rx 23 April	No	No	No	Yes	Yes	Yes	ASB
Rx 24 April	Yes	Yes	No	Yes	Yes	Yes	UTI
<b>Total: 24</b>	<b>18/24 =75%</b>	<b>11/24= 46%</b>	<b>1/24= .04%</b>	<b>24/24= 100%</b>	<b>24/24= 100%</b>	<b>24/24 = 100%</b>	<b>ASB:54%</b> <b>UTI:46%</b>  <b>Baseline:</b> <b>ASB: 64%</b> <b>UTI: 36%</b>  <b>Post</b> <b>Intervention:</b> <b>ASB: 46%</b> <b>UTI: 54%</b>

*Note: Prescriptions in January and February (red and orange) comprise baseline data and prescriptions in March and April (purple and green) include post intervention data.*

**Appendix E: Figures E1 and E2**



## Appendix F: Letter of Confirmation from Lakeview Village

November 13, 2017

Carol Buller, DNP, APRN  
Kristine Williams, RN, PhD  
Sally Pattison, BSN, RN  
University of Kansas Medical Center School of Nursing  
3901 Rainbow Blvd., MS 4043  
Kansas City, KS 66160

Dear Dr. Buller, Dr. Williams, and Sally,

Lakeview Village is enthusiastic to participate in your proposed antibiotic stewardship program targeting the improvement of diagnosis and treatment of suspected urinary tract infections (UTIs) as part of a Doctor of Nursing Practice capstone quality improvement project at the University of Kansas School of Nursing.

We understand that a retrospective chart review will be completed to determine baseline rates of antibiotics prescribed for UTIs versus asymptomatic bacteriuria. The program manager will sign a HIPPA agreement prior to the chart review. It is also understood that you will recruit nursing and provider staff to participate in the project. The recruited staff will participate in an educational session regarding the project's protocol, focusing on the differentiation between asymptomatic bacteriuria versus a symptomatic UTI. The staff will also become familiar with a Suspected UTI SBAR toolkit and decision-making tool developed by the Agency for Healthcare Research and Quality (AHRQ). Following the education session, nursing staff and providers will utilize the AHRQ decision-making tool for suspected UTIs for two months. Following the two-month period, we understand a follow up retrospective chart review will be completed to assess the rates of antibiotics prescribed for UTIs versus asymptomatic bacteriuria and compared to baseline data.

Our facility is dedicated to providing quality care. We understand that the study protocol will be approved by the Human Subjects Protections Committee at the KUMC prior to start up, and the anticipated start date of the project will be early 2018. We look forward to participating in this antibiotic stewardship program, which may help staff improve care for clients with suspected UTIs and reduce rates of antibiotics prescribed for asymptomatic bacteriuria.

Sincerely,

Pam Hermon, RN, LACHA, CDON-LTC  
Director of Clinical Operations

## Appendix G: QI Confirmation Approval

# The University of Kansas Medical Center

Human Research Protection Program

December 4, 2017

Project Title: Improving the Management of Asymptomatic Bacteriuria in Older Adults in Long-term Care

Institutional Contacts: Carol Buller, DNP, APRN  
Salli Pattison

Sponsoring Department: KU School of Nursing

### Quality Improvement Determination

Thank you for your submission. The KUMC Human Research Protection Program (HRPP) has conducted a review of the above referenced project.

The current proposed project plan falls under one or more of the following quality improvement activities:

- Determine if a previously-implemented clinical practice improved the quality of patient care
- Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations
- Gather data on hospital or provider performance for clinical, practical or administrative uses
- Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC
- Perform an analysis to characterize our patient population/clients to improve quality of services
- Implement programs to enhance professional development for providers and trainees
- Measure local efficiency, cost or satisfaction related to standard clinical practices
- Develop interventions or educational strategies that improve the utilization of recognized best practices
- Implement strategies to improve communication within our local healthcare environment
- Improve tools for patients that promote education, health literacy or treatment plan compliance

Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

At this time, IRB review is not required. If a quality improvement protocol is revised to undertake a systematic investigation designed to answer a research question or produce knowledge that would be generalizable beyond the local setting, the HRPP will re-evaluate your project's regulatory status. More information about distinguishing quality improvement from research is available on the OHRP website at: <http://www.hhs.gov/ohrp/policy/faq/quality-improvement-activities/index.html>

Karen Blackwell, MS, CIP  
Director, Human Research Protection Program

Mail-Stop 1032, 3901 Rainbow Blvd., Kansas City, KS 66160  
Phone: (913) 588-0942 Fax: (913) 588-5771  
kblackwe@kumc.edu

## Appendix H: Antibiotic Stewardship Program Educational Materials: Pre and Post Test, SBAR Form, and PowerPoint Presentation

### Pretest/Posttest

**Question One:** In a resident *without* an indwelling catheter, the following signs and symptoms meet criteria for a suspected UTI. Mark all that apply.

**Fever**

**Acute dysuria or acute pain with urination**

Change in mental status

Foul smelling or dark urine

**Suprapubic pain**

**CVA tenderness**

**New or marked increase in incontinence, urgency, and frequency**

**Question Two:** Resident Smith has a new fever of 101.0. He does *not* have an indwelling catheter in place. The nurse should anticipate that a UA and C&S should be ordered if any one of the following criteria is met **except**?

- A. Suprapubic pain or acute costovertebral angle (CVA) pain/tenderness
- B. Gross hematuria
- C. New or marked increase in incontinence
- D. New or marked increase in urgency
- E. Foul smelling or dark urine**
- F. New or marked increase in frequency

**Question Three:** Resident Brown *has* an indwelling catheter in place. He is typically independent with most ADLs and is oriented x4 at baseline. You visit Mr. Brown and he is acutely confused and was unable to dress himself today. You do not assess any other possible sites of infection. What should your next action be after ensuring his safety?

- A. Do nothing. Mr. Brown is probably just having a bad day.
- B. Communicate findings with provider. Mr. Brown has a suspected UTI. Anticipate orders for a UA with C&S and possibly an antibiotic.**
- C. Reorient Mr. Brown to person, place, and time.

**Question Four:** You have received orders to obtain a UA with C&S on Mrs. Jacobs who has an indwelling catheter because she has developed discharge around her catheter and acute suprapubic pain. Her catheter has been in place for 16 days. What should you do prior to collecting the specimen?

- A. Nothing. It is okay to get the specimen as long as you scrub the collecting port first.
- B. Replace the catheter first, and then collect the specimen.**
- C. Obtain the specimen, then replace Mrs. Jacobs's catheter.

Reference: Agency for Healthcare Research and Quality. (2016).

Nursing home antimicrobial stewardship guide: determine whether to treat. Retrieved from:

[https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4\\_TK1\\_T4-Urinalysis\\_and\\_UTIs\\_Improving\\_Care\\_Final.pdf](https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4_TK1_T4-Urinalysis_and_UTIs_Improving_Care_Final.pdf)



## Pretest/Posttest Answer Key

**Question One:** It is a common myth that any change in mental status by itself in a resident *without* an indwelling catheter has a UTI. If the resident does however *have an indwelling catheter*, then a new and dramatic change in mental status alone is reason to suspect a UTI. Other possible reasons for changes in mental status include: dehydration, being tired, side effects of medication, head trauma, dementia, sensory deficiencies, or other infections.

Another myth is that dark and/or foul smelling urine means a resident has a UTI. If urine is darker, it is more concentrated, which could indicate dehydration. The patient may need additional fluids. The smell of urine has to do with the amount and concentration of substances excreted by the kidneys. Urine that is more concentrated may smell like ammonia. Dehydration, certain foods, vitamins and health conditions can affect the smell.

The remaining items are signs/symptoms of a suspected UTI that meet McGeer's criteria.

**Question Two: E.** See above. According to the McGeer criteria, in residents without a catheter a patient with either A) fever or leukocytosis Or B) Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate, there must also be one of the following criteria in order to meet criteria for UA, C&S, and possible antibiotic. These include: Suprapubic pain, gross hematuria, new or marked increases in incontinence, urgency or frequency.

**Question Three: B.** Mr. Brown meets criteria for a suspected UTI. These findings should be communicated to provider, and the nurse should anticipate orders for UA, C&S and possible antibiotic. In patients with a catheter, one of the following sub-criteria meets criteria for suspected UTI. Fever, rigors, new onset hypotension, acute change in mental status, or acute functional decline, with no other site of infection, new onset suprapubic pain or CVA pain, or purulent discharge around catheter or acute pain or swelling of testes, epididymis or prostate.

**Question Four: B.** If a patient with an indwelling catheter meets criteria to obtain a UA with C&S and a urinary catheter has been in place for >14 days, the catheter should be replaced, then the UA/C&S should be obtained.

Reference: Agency for Healthcare Research and Quality. (2016). Nursing home antimicrobial stewardship guide: determine whether to treat. Retrieved from: [https://www.ahrq.gov/sites/default/files/wysiwyg/nhgguide/4\\_TK1\\_T4-Urinalysis\\_and\\_UTIs\\_Improving\\_Care\\_Final.pdf](https://www.ahrq.gov/sites/default/files/wysiwyg/nhgguide/4_TK1_T4-Urinalysis_and_UTIs_Improving_Care_Final.pdf)

## Suspected UTI SBAR

Complete this form before contacting the resident's provider.

Date/Time \_\_\_\_\_

Resident Name \_\_\_\_\_

Date of Birth \_\_\_\_\_

Nurse \_\_\_\_\_

Phone \_\_\_\_\_

### SITUATION

I am contacting you about a suspected UTI for the above resident.

Vital Signs BP \_\_\_ / \_\_\_ HR \_\_\_ Resp. rate \_\_\_ Temp. \_\_\_

### BACKGROUND

Active diagnoses OR other symptoms (bladder, kidney, genitourinary conditions)

Specify

- No  Yes The resident has an indwelling catheter
- No  Yes Patient is on dialysis
- No  Yes The resident is incontinent **If yes, new/worsening?** No Yes
- No  Yes Advance directives.  
Specify \_\_\_\_\_
- No  Yes Medication Allergies.  
Specify \_\_\_\_\_
- No  Yes The resident is on Warfarin (Coumadin®)

### ASSESSMENT

Infection	Criteria (Symptoms must be New or Increased)	Conditions/Comments
<b>Without Catheter</b>  (any previous catheter must have been D/C'd at least 48 hrs before symptoms began)	Criteria 1 AND 2 MUST be present 1. At least 1 of the following sub criteria: <input type="checkbox"/> Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate <input type="checkbox"/> Fever or leukocytosis <b>AND</b> At least 1 of the following sub criteria: - OR - <b>In the absence of fever or leukocytosis, then 2 or more of the following subcriteria:</b> <input type="checkbox"/> Acute costovertebral angle pain or tenderness <input type="checkbox"/> Suprapubic pain <input type="checkbox"/> Gross hematuria <input type="checkbox"/> New or marked increase in incontinence <input type="checkbox"/> New or marked increase in urgency <input type="checkbox"/> New or marked increase in frequency <b>AND 2.</b> One of the following sub criteria: <input type="checkbox"/> At least $10^5$ cfu/ml of no more than 2 species of microorganisms in a voided urine sample <input type="checkbox"/> At least $10^2$ cfu/ml of any number of organisms in a specimen collected by in-and-out catheter	UTI should be diagnosed when there are localizing genitourinary signs and symptoms and a positive urine culture result. A diagnosis of UTI can be made without localizing symptoms if a blood culture isolate is the same as the organism isolated from the urine and there is no alternate site of infection. In the absence of a clear alternate source of infection, fever or rigors with a positive urine culture result in the non-catheterized resident or acute confusion in the catheterized resident will often be treated as UTI. However, evidence suggests that most of these episodes are likely not due to infection of a urinary source.  Urine specimens for culture should be processed as soon as possible, preferably within 1-2 h. If urine specimens cannot be processed within 30 min of collection, they should be refrigerated.  Refrigerated specimens should be cultured within 24 h.

<b>With Catheter</b>  <b>(if symptoms begin within 48 hrs after discontinuing a catheter, count it as related to catheter)</b>	At least 1 of the following sub criteria: <input type="checkbox"/> Fever, rigors, or new-onset hypotension, with no alternate site of infection <input type="checkbox"/> Either acute change in mental status or acute functional decline, with no alternate site of infection <input type="checkbox"/> New-onset suprapubic pain or costovertebral angle pain or tenderness <input type="checkbox"/> Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate  <b>AND Must have</b> <input type="checkbox"/> Urinary catheter specimen culture with at least 10 <sup>5</sup> cfu/ml of any organism(s)	Recent catheter trauma, catheter obstruction, or new-onset hematuria are useful localizing signs that are consistent with UTI but are not necessary for diagnosis.  Urinary catheter specimens for culture should be collected following replacement of the catheter (if current catheter in place for >14 days).
--	--	---

\* For residents who regularly run a lower temperature, use a temperature of 2°F (1°C) above the baseline as a definition of a fever.

**Criteria are met.** Resident may require UA with C&S or an antibiotic.

**Criteria are NOT met.** The resident does NOT need an immediate prescription for an antibiotic, but may need additional observation.

## REQUEST FOR ORDERS

Orders were provided by clinician through  Phone  Fax  In Person Other \_\_\_\_\_

Order UA (Call with results when available)

**If pt has current catheter in place for >14 days, replace catheter, then collect specimen**

Urine Culture (Call with results when available)

**If pt has current catheter in place for >14 days, replace catheter, then collect specimen**

Encourage \_\_\_\_\_ ounces of liquid intake \_\_\_\_\_ times daily for \_\_\_\_\_ days.

Record fluid intake for \_\_\_\_\_ days.

Assess vital signs for \_\_\_\_\_ days, including temp, every \_\_\_\_\_ hours for \_\_\_\_\_ hours.

Notify provider if symptoms worsen or if unresolved in \_\_\_\_\_ hours.

**Initiate the following antibiotic:**

Antibiotic: \_\_\_\_\_

\_\_\_\_\_ Dose: \_\_\_\_\_ Route: \_\_\_\_\_ Duration: \_\_\_\_\_

No  Yes Provider to adjust for renal function  Last Creatinine \_\_\_\_\_  Pt weight \_\_\_\_\_

Other \_\_\_\_\_

Provider signature \_\_\_\_\_ Date/Time \_\_\_\_\_

Telephone Order received by \_\_\_\_\_ Date/Time \_\_\_\_\_

Family/POA notified \_\_\_\_\_ Date/Time \_\_\_\_\_

**Form adapted From McGeer Criteria and**



Agency for Healthcare Research and Quality  
Advancing Excellence in Health Care

## Improving the Management of Asymptomatic Bacteriuria in Older Adults in Long-term Care

Sally Pattison  
The University of Kansas School of Nursing



## Overview

- Background
- Defining Antibiotic Stewardship
- UTI versus ASB
- Suspected UTI SBAR Tool
- Summary
- Comments and Questions



## Antibiotic Use in Nursing Homes

- Antibiotics are one of the most frequently prescribed medication in U.S. nursing homes.
- The CDC (2017) reported that up to 70% of nursing home residents receive one or more courses of antibiotics each year.
- Many of these antibiotics may be unnecessary or inappropriate.



## Antibiotic use for Suspected UTIs

- Suspected urinary tract infections (UTIs) are the most commonly treated infection in nursing homes.  
(Phillips et al., 2012).
- Studies have shown that one-third to one-half of antibiotics prescribed for suspected UTIs were for residents with asymptomatic bacteriuria (ASB), in which antibiotics are unnecessary and potentially harmful.



## Consequences?



Image retrieved from LinkedIn (2018).



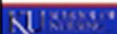
## Consequences of inappropriate antibiotic use

- Development of Clostridium difficile infection (CDI)
- Adverse drug events
- Adverse drug interactions
- Spread of multidrug resistant organisms (MDROs)



### What Can We Do?

- Antibiotic Stewardship
  - Emphasis on suspected UTIs
- The CDC recommends all nursing homes take steps to initiate or expand antibiotic stewardship activities.
- Antibiotic Stewardship involves a team approach.



### Defining UTIs and ASB



### What is a UTI?

- A UTI is an infection in any part of your urinary system.
- Defined using a variety of signs and symptoms and laboratory data.
- A symptomatic UTI requires a course of antibiotics.



### Key Signs and Symptoms of UTI

- What are some key symptoms of a UTI?
- Do these signs and symptoms vary if the resident has an indwelling catheter?



### Common Myths

- Change in mental status
- Foul smelling and/or dark urine
- Urinalysis with positive findings



### Asymptomatic Bacteriuria

- The presence of bacteria in the urine in quantities of  $10^5$  colony-forming units per milliliter (cfu/mL) or more in two consecutive urine specimens in women or one urine specimen in men, in the absence of clinical signs or symptoms suggestive of a UTI\* (Rowe & Juthani-Mehta, 2014, p. 75).



### ASB is Common in Older Adults

- The prevalence of ASB in non-catheterized residents in nursing homes ranges from 25% to 50% (CDC, n.d.).
- The prevalence of ASB in long-term catheterized individuals is up to 100% (CDC, n.d.)
- ASB does not require a course of antibiotics.



### UTI Versus ASB?

- It is challenging to distinguish between a UTI and ASB in older adults due to:
  - Low incidence of localized genitourinary symptoms
  - Cognitive impairments
  - Impaired communication



### Now What?

- Implement antibiotic stewardship program
- Goals:
  - Improve the treatment of suspected UTIs
  - Enhance nurse to provider communication through the utilization of SBAR
  - Decrease the rates of antibiotics prescribed for ASB



### Suspected UTI SBAR Tool

- Developed by The Agency for Healthcare Research and Quality (AHRQ)
- Enhances communication
- Goal: optimize antibiotic prescribing practices.



### SBAR

- **Situation** – Introduce self and why you are calling.
- **Background** – Include pertinent history, medication, and allergies.
- **Assessment** – Briefly describe your assessment of the situation.
- **Recommendation/Request** – provide recommendation and repeat any instructions or orders given back to provider.



### Suspected UTI SBAR

For use with the nurse to call the provider

Name \_\_\_\_\_ Room # \_\_\_\_\_  
 Unit \_\_\_\_\_ Bed # \_\_\_\_\_

#### SITUATION

I am contacting you about a suspected UTI for resident # \_\_\_\_\_

History: HT \_\_\_\_\_ BP \_\_\_\_\_ Temp \_\_\_\_\_

#### BACKGROUND

History of symptoms (fever, chills, genitourinary symptoms):

Yes/No

• No • Yes (The resident has a urinary catheter)

• No • Yes (Patient is on fluids)

• No • Yes (See resident's medication list for any "antibiotics") (Yes/No) (Yes/No)

• No • Yes (All other residents)

• No • Yes (Resident is on fluids)

• No • Yes (The resident is on fluids)











**Appendix I: Survey distributed by REDCap**

1. What is your role?

Physician  NP  RN  LPN

2. The Antibiotic Stewardship Program enhanced my understanding of antibiotic stewardship.

Strongly Agree  Agree  Disagree  Strongly Disagree

3. How often did you adhere to the **new** Suspected UTI SBAR tool?

Always  Sometimes  Seldom  Never

4. Others on my team utilized the Suspected UTI SBAR tool.

Strongly Agree  Agree  Disagree  Strongly Disagree

5. The Suspected UTI SBAR tool improved quality patient care.

Strongly Agree  Agree  Disagree  Strongly Disagree

6. I had enough training to use the new Suspected UTI SBAR tool.

Strongly Agree  Agree  Disagree  Strongly Disagree

7. The Suspected UTI SBAR tool improved my communication with providers or nursing staff.

Strongly Agree  Agree  Disagree  Strongly Disagree

8. The Suspected UTI SBAR tool shows patients and families we care about providing quality care.

Strongly Agree  Agree  Disagree  Strongly Disagree

9. What benefits were there to the tool?

10. What barriers were there to the tool?