

An Antibiotic Stewardship Protocol to Decrease Antibiotic Prescriptions in a Long Term Care

Facility

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Abstract

Background: Infections in long-term care facility's (LTCF) have been overlooked for the last few years with over-prescription of antibiotics. The Centers for Disease Control and Prevention (CDC) has made long-term care facilities start an antibiotic stewardship program (ASP) that helps limit the use of unnecessarily prescribed antibiotics. The literature indicates that healthcare workers understand that it affects patient outcomes. Many healthcare workers report suspected urinary tract infections to the provider without much knowledge of what qualifies for the need for antibiotics.

Objective: Develop a protocol for patients suspected of UTI with guidelines to reduce unnecessarily use of antibiotics. Present new *SUTISTP* to healthcare staff and evaluate their understanding of it.

Methods: The protocol was implemented in a southern California LTCF. A pre-test and post-test intervention questionnaire were performed.

Results: A comparison of the pre-education questionnaire results and post-education questionnaire results was completed using a paired sample t-test for Phase I of the project. A significant increase in the scores on the knowledge about the *SUTISTP* questionnaire was observed from a mean pre-test of 71.25 ($M=71.25$, $SD=20.917$) compared to the post-test mean score of 98.75 ($M=98.75$, $SD=3.378$). The test values were $t (23) = -6.203$, $p < .001$. The pre-education antibiotic prescribing rate was 18 out of 40, equaling 45%, and the post-education antibiotic prescribing rate was 3 out of 10, equaling 30%. As a result, the impact of the project has helped with the objective of 15% reduction of prescribed antibiotics for UTI.

Keywords: antibiotic stewardship, long-term care, the culture of safety, infection control services, patient safety, urinary tract infections

An Antibiotic Stewardship Protocol to Decrease Antibiotic Prescriptions in a Long Term Care Facility

Introduction

Unnecessarily prescribed antibiotics have been a significant issue in long-term care. Antibiotics are the most frequently prescribed medications in nursing homes (Centers for Disease Control and Prevention, 2017), with 70% of residents in a nursing home receiving one or more courses of systemic antibiotics when followed over a year (Centers for Disease Control and Prevention, 2017). Nursing home leaders can help to reduce the antibiotic use. The problem with providers who are overprescribing antibiotics and at times with no criteria for the use of antibiotics; approximately 40% to 75% of antibiotics are prescribed incorrectly (Centers for Disease Control and Prevention, 2017, p. 1). Some of these prescriptions can cause harm to the elderly population and also instigate diarrheal infections from *Clostridium difficile* (C-DIFF), increased drug resistance, or drug reactions (Centers for Disease Control and Prevention, 2017). New nursing home regulations include a requirement to review and monitor antibiotic use (Centers for Disease Control and Prevention, 2017).

During this DNP project, the development of facility-specific standards and a clear policy for screening of suspected urinary tract infections will be developed with the intent to help ensure that patients are not given antibiotics needlessly. These standards are based on national guidelines to reduce UTI's (Agency for Healthcare Research and Quality, 2016). Research suggests catheter-associated urinary tract infections (CAUTI's) are highly preventable and that perhaps as many as 50 to 70 percent of these episodes can be prevented (Agency for Healthcare Research and Quality, 2016, p. 1). The CDC and AHRQ indicate that nursing staff need to be trained on signs and symptoms of UTI because providers are often following nurse assessments

by phone and there is no clear criterion to ensure conditions were met to start an antibiotic (Nicolle, 2016). Antimicrobial stewardship is the act of using antibiotics appropriately and only when truly needed and using the right antibiotic for each infection (Agency for Healthcare Research and Quality, 2016). Leadership can help improve this issue by having a clear policy and training for staff to use the suspected UTI SBAR toolkit protocol (SUTISTP) and keeping staff accountable for use. This project will help a long-term care facility meet the goals of the CDC and AHRQ regarding the appropriate use of antibiotics. The utilization of a SUTISTP will be a major part of a quality improvement project in this facility (Doernberg et al., 2015).

The AHRQ provides multiple forms, videos, and information to help implement further development of the current antibiotic stewardship program. The problem of excessive antibiotic prescriptions has made nursing home residents at risk for antimicrobial resistance. UTI's are the most common type of infection in a long-term care facility (LTCF). It recently has become an issue due to the overuse of antibiotics to treat suspected UTI's (Agency for Healthcare Research and Quality, 2016). In the past, there were no checklists or toolkits for a nurse to evaluate if a patient had a suspected UTI. The nurse would assess the patient and report the vital signs and symptoms, and the provider would start antibiotics empirically. Now that the CDC and AHRQ have systems in place to aid in the proper assessment of UTI's the facility needs to implement the toolkit into their antibiotic stewardship program (ASP).

Background

As antibiotics have become more common in the long-term care, complications from overuse of antibiotics have prompted the Center for Disease Control to begin requiring nursing homes to start an antibiotic stewardship program. Determining the appropriateness of antibiotic use in nursing homes is difficult. The staff nurses are the eyes and ears of the provider to assess

the patient and, due to the lack of sufficient diagnostic testing in nursing homes, some antibiotics are started empirically (McMaughan et al., 2016). In the skilled nursing facilities where a decision making aid/toolkit was implemented, the incidence of antibiotics prescribed for suspected UTI lowered considerably, and the reduction of antibiotics has become a significant patient safety initiative (McMaughan et al., 2016). The CDC, AHRQ and many others have recognized the importance of effective tools in preventing infections or un-necessarily prescribed antibiotics for a patient to reduce antimicrobial resistance (Agency for Healthcare Research and Quality, 2016). The facility has an ASP at this time that needs some improvement for quality assurance and performance improvement. The ASP is fairly new for all facilities at this time. Facilities are trying to implement their policies and procedures with some information from CDC and AHRQ. In the past, UTI's have been treated with antibiotics without proper assessment. The pharmacist has brought this issue up to the facility to try to make a quality improvement change for screening for suspected UTI's. Introducing this toolkit help address the issue of over utilization of antibiotics.

Problem Statement

LTCF's have over-utilized the use of antibiotics for many years, and the CDC estimates 70% of residents in a nursing home will receive one or more courses of systemic antibiotics when followed over a year (Centers for Disease Control and Prevention, 2017, p. 1). According to the Centers for Disease Control and Prevention 2017, at least 2 million people in the United States are infected by antibiotic-resistant bacteria each year, and about 23,000 people die as a result. Healthcare-associated infections are especially significant in LTCF settings and have been estimated to account for 1.6 to 3.8 million infections and 388,000 deaths annually (Agency for Healthcare Research and Quality, 2016, p. 1). The population for this DNP project will be

predominantly elderly residents residing in a nursing home. Elderly residents are more susceptible to infections (Ironmonger et al., 2016). A guide or toolkit can help leadership, clinicians, and staff to monitor and improve antibiotic use (Centers for Disease Control and Prevention, 2017). Approximately 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate (McMaughan et al. 2016, p. 2). In this nursing home, the antibiotic usage for UTI can be lowered with the use of the SUTISTP. According to Crnich et al. (2015), a resident who remains in a nursing home for more than six months is 40-70 % likelihood of exposure to at least one course of antibiotics.

Leadership accountability will help support and maintain the protocol for safe and appropriate antibiotic use in the facility (Crnich et al., 2015). Application of the SUTISTP will add a focus to improve the ASP in the facility. The outcome would reduce the number of inappropriate antibiotic prescriptions. AHRQ safety programs for nursing homes were developed over three year periods with a focus for national quality improvement in CAUTIs and help enhance LTCF resident safety culture with an adaption of evidenced-based practice (Agency for Healthcare Research and Quality, 2016, p. 1). Initiating the SUTISTP is supported for use in nursing homes to ensure safe practices are performed for suspected UTI's.

Purpose Statement

The purpose of the project is to analyze and reduce antibiotic prescriptions for urinary tract infection with the use of a SUTISTP. The intended outcome of this project is that every provider would utilize and adhere to this SUTISTP. The set objectives are to have protocols in place for the provider to use if they visit the patient in the nursing home with the understanding that if the patient does not meet the criteria, then it would be unnecessary to prescribe an antibiotic (Daley et al., 2015). This SUTISTP will have documentation protocols for when a

nurse decides that a patient may have a suspected UTI. The protocol will indicate the use of the SUTISTP and will be utilized when a staff nurse suspects a patient to have a UTI. When a decision-making aid is used, it reduces the use of unnecessary antibiotics (Crnich et al., 2015). In a study in South Dakota in 2013, a statewide program was created to improve prescribing practices where they found Avera Health achieved 50% decrease of prescriptions for antibiotics linked to C-DIFF infections and created guidelines for treatment of pneumonia (Centers for Disease Control and Prevention, 2014, p. 2).

Project Objectives

- Develop a protocol for patients suspected of UTI with guidelines to reduce unnecessarily use of antibiotics.
- Present new SUTISTP to healthcare staff and evaluate their understanding of it.
- Evaluate changes in staff knowledge regarding current, evidence-based, UTI protocols.
- Evaluate the impact on of reduction of unnecessary antibiotics through chart review with a goal of antibiotics reduction of at least 15% in 100% of patients with suspected UTI over a period of 4 weeks.

After developing a new SUTISTP, the new guidelines will be presented to staff through PowerPoint presentation. Evaluation of understanding will be obtained with pre-tests and after educational presentation evaluation through post-tests. Antibiotics will be recorded on an antibiotic log and monitored and analyzed for an increase in the use of antibiotics for UTI. Charts will be reviewed weekly, and Pharmacist will monitor monthly.

Project Question

Can long-term care facility nursing homes reduce the use of unnecessarily prescribed antibiotics for urinary tract infections by using an antibiotic stewardship toolkit protocol?

Developing a policy for the facility to implement this toolkit will help reduce the risk of antibiotic-related harm. The staff will be in-serviced on the program and toolkit.

P = patient population: The current medical and nursing staff to be educated and the of the long-term care facility.

I = intervention or issue of interest: Having a guide that provides examples of how these elements can be applied by nursing home leadership, clinicians, and staff to monitor and improve antibiotic use. Antibiotic stewardship policies and practices need to be in place to protect patients and improve clinical care in nursing homes.

C = comparison intervention or issue of interest: 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate. Leadership accountability will demonstrate support and commitment to safe and appropriate antibiotic use in the facility (Crnich et al., 2015).

O = outcome(s) of interest: Implementation of an effective educational programs address both nursing staff and clinical providers on the goal of antibiotic stewardship. The outcomes will be measurable with taking at least once a month to evaluate all antibiotics that are used. Regular reporting and feedback on antibiotic use and any resistance from prescribing clinicians and nursing staff will be evaluated and in-serviced. The need is outstanding and regulation now for nursing homes

T = time it takes for the intervention to achieve the outcome(s): The project would be implemented in approximately three months' time and evaluated over a period of 1 month to see if any improvement was made. The population addressed in this project is the medical and nursing staff in this long-term care facility. The organization will have to follow-up to monitor and improve reduction in un-necessarily prescribed antibiotics for UTI's. Antibiotic stewardship

policies and practices need to be in place to protect patients and improve clinical care in nursing homes (McMaughan et al., 2016).

In the timeframe of this DNP project, the facility will implement an evidence-based screening and ASP for patients presenting with suspected UTI symptom. This LTCF will adopt the SUTISTP into practice after medical and nursing staff is provided with instructional sessions for its use. The outcome would be that the staff will use this SUTISTP to help assess if antibiotics are truly needed for patients who are suspected of having a UTI.

Significance

The project focuses on decreasing antibiotic overuse as a treatment for suspected urinary tract infections in LTCF's. Safe care and advocating for patients has always been a concern within the nursing profession. The need to reduce antibiotic use in long-term care has proven to be a worthy project to implement due to high incidents of overly prescribed antibiotics. Literature identifies the prevalence of overuse of antibiotics in LTCF's (Centers for Disease Control and Prevention, 2017). Improving the use of antibiotics to protect patients and reduce antibiotic resistance is a national priority (Centers for Disease Control and Prevention, 2017). The use of ASP will help optimize the treatment of infections while reducing adverse events when successful use of ASP (Centers for Disease Control and Prevention, 2017). According to CDC (2017), up to 70% of residents in a nursing home receiving one or more courses of systemic antibiotics when followed over a year. Exposure to some of these prescriptions can cause harm to the elderly population and also instigate diarrheal infections from *Clostridium difficile* (C-DIFF), increased drug resistance, or drug reactions (Centers for Disease Control and Prevention, 2017).

Search Terms

The articles reviewed were identified by searching several databases including AHRQ, CDC, CINAHL, EBSCOhost, Google Scholar, ProQuest, PubMed, MedlinePlus, NIH, OVID, and SAGE. Search terms were antibiotic stewardship, un-necessarily prescribed antibiotics, skilled nursing facility, nursing home antibiotic prescribing practices, urinary tract infections, reduction of infections, environment, geriatric, antibiotic resistance, quality improvement, and suspected UTI. The initial literature review was conducted from July to August 2018.

Eligibility criteria included studies targeting antibiotics used to treat UTI's in LTCF's.

Inclusion and Exclusion Criteria

The research was limited to studies over the last six years. Articles were selected for inclusion if they included a) detailed the problem; b) were specific to long-term care facility populations; c) detailed interventions implemented; d) included the type of study method: systematic literature reviews, randomized control trials, qualitative studies or pilot studies; e) highlights of national guidelines; f) peer-reviewed, scholarly articles. Articles that were excluded a) were written in languages other than English, b) studies dated older than six years were excluded from the search criteria. Over 2,000 search results returned, and I narrowed down my search with specific terms as to the relevance to the SUTISTP, and it had 918 results. “Antibiotic stewardship,” “long-term care facility antibiotic stewardship program,” “UTI in LTCF,” and “prescribing antibiotics in LTCF’s” was used as search terms to obtain specific relevant articles and studies for the project. Studies that did not meet the criteria were excluded. Only studies that were published in the last six years were used to provide a more up to date review of the literature.

Literature Review

The articles reviewed showed consistent findings that nursing homes over utilized antibiotics for urinary tract infections. Although organizations continue to struggle in holding staff accountable for lack of compliance, the department of health services is now involved in checking on an antibiotic stewardship program during health inspections (Stone et al., 2018). LTCF nursing staff need support, guidance, and training to establish an effective ASP (Stone et al., 2018). Poor infection control practices can put a patient's health at risk for developing super infections (Stone et al., 2018). According to Stone et al. (2018), infection control and management, including antibiotic stewardship, in LTCF's have become national priorities. As of 2016, Centers for Medicare and Medicaid (CMS) ruled that all LTCF's are to develop an infection control program that includes an ASP (Centers for Disease Control and Prevention, 2017). Having an effective evidenced based tool can help ensure the reduction and prevention of over prescribed antibiotics for UTI's. Establishing a policy and protocol for adherence will help measure the host site performance goals (Centers for Disease Control and Prevention, 2017). The CDC lists seven core elements of antibiotic stewardship for LTCF's: leadership, commitment, pharmacy expertise, action, education, accountability, tracking, reporting data and education (Centers for Disease Control and Prevention, 2017). Proper implementation and consistent adherence to infection control measures can be an effective intervention to help reduce unnecessarily prescribed antibiotics at the host site (Centers for Disease Control and Prevention, 2017).

Addressing the Problem with Current Evidence

The need for an ASP in LTCF's is due to the elderly and frail patients being prone to developing infections (Crnich et al., 2015). Infections are the most common reasons for transfer

to acute care hospitals (Crnich et al., 2015). According to Crich et al. (2015), a resident who remains in a nursing home for more than six months has a 40-70 % likelihood of exposure to at least one course of antibiotics. Overuse of antibiotics can lead to antibiotic-resistant bacteria which may result in more harm, cost, and risk of developing CDIFF (Crnich et al., 2015). According to Crich et al. (2015), the available studies suggest educational interventions have a modest impact on antibiotic use in nursing homes. The number of antibiotics starts dropped by 26% and days of antibiotic therapy were reduced by 30% following an educational intervention (Crnich et al., 2015). Educating staff about the signs and symptoms of suspected UTI can help the staff nurse better relay pertinent information to the provider (Crnich et al., 2015). Having this SUTISTP from AHRQ will be an additional tool for reducing the number of antibiotics prescribed for UTI in the host site (Crnich et al., 2015).

According to McMaughan et al. (2016), the proportion of prescriptions for antibiotics in nursing homes declined from 65% to 57% with a decision-making guide being used in the nursing homes that were reviewed. The study concluded that although the decision making aid (when used) reduced unnecessary antibiotic use during the study, in the real world of nursing home operations, it did not become embedded in everyday use (McMaughan et al., 2016). This would suggest that leadership would need to follow up more closely to ensure feasibility of the aid.

In a prospective observational study, the objective for UTI diagnosis was to identify the sign and symptoms associated with the nurse's decisions to submit urine for culture and assess the need for antibiotic therapy (Daley et al., 2015). Further research was needed because the nurse did not communicate to the next shift why a culture was not ordered for a urine sample (Daley et al., 2015). According to Daley et al. (2015) having a protocol in place will help SBAR

communication with staff nurses to relay the proper information to the provider. Additional education on the signs and symptoms of UTI would be essential for effective utilization of the SUTISTP tool.

Relationship to prescriptive improvements. “Asymptomatic bacteriuria in the elderly commonly results in antibiotic prescription despite evidence showing no benefit” (Doernberg et al., 2015, p. 2). According to Dorneberg et al. (2015), a prospective quasi-experimental study was performed to implement an ASP targeted at UTI’s diagnosed and treated in three long-term care facilities in Northern California (Doernberg et al., 2015). There were 292 prescriptions for UTI during the pre-intervention phase and 183 during the intervention (Doernberg et al., 2015). During the intervention phase, antibiotic starts were trending up by 4% (Doernberg et al., 2015). Upon initiation of the ASP, a 26% immediate decrease in antibiotic prescriptions for UTI was observed (Doernberg et al., 2015). The study suggests that an ASP with a syndromic approach has the potential to be effective in LTCF’s (Doernberg et al., 2015). A dedicated educational intervention to the ASP educated nursing staff in identifying residents at risk for UTI (Doernberg et al., 2015).

In a retrospective study conducted by Muller et al. (2018), clinicians nowadays have medical decision making aids such as scores, flow charts, protocols, and algorithms that help essential daily routine decisions to impact the quality of care (Muller et al., 2018). Having tools available have potentially helped reduce unnecessary prescriptions of antibiotics (Muller et al., 2018). This study supports the use of a tool and once the host site gives the training on how to use the tool the adoption of the SUTISTP should have a positive impact on the quality of care of the LTCF.

According to Nicolle (2016), ASP is effective in reducing the use of antibiotics. Many

LTCF's were reviewed in a randomized trial and reported some improvements in antimicrobial use when following the introduction of ASP (Nicolle, 2016). Current evidence is insufficient to recommend a specific program because it is up to the nursing home to implement their ASP. Further evaluation of ASP in LTCF's is needed to be more effective with implementation. The AHRQ, CDC, and CMS have started a national action plan for developing ASP in LTCFs to reduce optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the patient. The CDC, AHRQ, and DHS have mandated LTCF's to have an ASP in place to help reduce the use of unnecessary antibiotics due to the risk of C-DIFF and antimicrobial resistance (Centers for Disease Control and Prevention, 2017).

Current Recommendations

LTCF's are required by Centers for Medicare & Medicaid Services (CMS) to develop an infection control program that includes an antibiotic stewardship component and employs trained infection preventions (Stone et al., 2018). Stone et al. (2018) go on to state that the knowledge of staff nurses of antibiotic stewardship was limited due to lack of training. The infection preventionist was usually the Director of Nursing to implement the antibiotic stewardship program (Stone et al., 2018). The estimated prevalence of infections in LTCF residents ranges from anywhere from 765,000 to 2.8 million infections annually and for these reasons improving infection prevention and control and implementing ASP have become national priorities (Stone et al., 2018). The CDC lists seven core elements of ASP for hospitals and LTCF's: leadership commitment, pharmacy expertise, action, education, accountability, tracking and reporting data and education. Adopting an antibiotic stewardship policy that includes these core elements would improve patient care safety culture and reduce the incidence of acquiring antibiotic-resistant bacteria (Stone et al., 2018). Non-compliance with a guideline may be driven by

ambiguity by the provider. Urine samples should be sent to the laboratory for all women with suspected UTI (Ironmonger et al., 2016). General practitioners treat empirically and sometimes do not order urine test or cultures (Ironmonger et al., 2016). The need for implementation of an ASP in LTCF's is part of national guidelines to reduce unnecessarily prescribed antibiotics (Centers for Disease Control and Prevention, 2017).

Impact of the Problem

According to McMaughan et al. (2016), “Up to 70 percent of nursing home, residents may receive at least one antimicrobial agent a year” (p. 1). Antibiotics are highly used in the nursing homes and policies to reduce unnecessary antibiotics to treat UTI's could be complemented by (a) a prescribing algorithm or tool (b) training of medical staff and nurses regarding monitoring for suspected UTI symptoms. This DNP project was used for quality assurance and process improvement (QAPI) through development, implementation, and assessment of policy related to the use of SUTISTP. “Antibiotics are one of the most commonly prescribed medications in nursing homes and overuse of antibiotics is recognized as a serious problem” (Agency for Healthcare Research and Quality, 2016, p. 1). Overuse of antibiotics allows drug-resistant strains of bacteria and healthcare-associated infections, such as C-DIFF to emerge in the LTCF. If this occurs, it is harder to treat, and the result is increased resident mortality, hospitalizations, and costs (Agency for Healthcare Research and Quality, 2016). LTCF's represent a challenge due to inadequate resources and less controlled settings, and national statistics are sparse (Romero et al., 2017).

Current Management

The need for ASP is a new regulation from CMS that requires LTCF to develop an infection control program addressing excessive antibiotic prescribing practices. The host site has

started an ASP but still needs further implementation of protocols and toolkits. The current ASP includes a power point presentation on what CDC recommends to start an ASP and some examples of signs and symptoms of different medical problems that may require antibiotics. The initial compliance of the ASP was low due to lack of knowledge of the ASP. Nurses were not trained properly on how to evaluate other measures to help reduce the rate of antibiotic prescriptions. Compliance of the ASP is 50% of the time when antibiotics are used. Further enhancement of the ASP with policy change would benefit the LTC (Pitiriga et al., 2017). Making these efforts in battling the resistance with various interventions could have positive outcomes (Pitiriga et al., 2017).

Theoretical Framework

Kurt Lewin's Change Theory will be utilized as the guiding framework for this project (Appendix A). This organizational theory includes three steps of unfreezing, change and refreezing. Lewin's interest in change has been an influential guide for people to change (Nursing Theory, 2016). Change in organizations is challenging but with the guidance and plan of the Lewin Change model this can be achieved (Cummings et al., 2015). Theoretical models provide a framework to describe key features of targeted behaviors, contexts and interventions (Nursing Theory, 2016). The use of Kurt Lewin's Change Theory can support staff through transitions and identify areas of strengths and resistances prior to implementing change (Cummings et al., 2015). Theory driven projects can help build an understanding of change and sustainability (Cummings et al., 2015).

Historical Development of the Theory

In 1950s, Psychologist Kurt Lewin developed a change management model, which today is known as Lewin's Change Management Model (Culcaghais3, 2014). Lewin observed that

people like to be risk free and have a tendency to work within safety limits (Culcaghais3, 2014). Therefore, Lewin was able to recognize the 3 stages of change (Culcaghais3, 2014). Lewin's Change Theory is still a fundamental approach for change management in health care today. For over fifty years the Change Theory had influenced western theories of change though it and had gained both critics and supporters (Cummings et al., 2015). Lewin had completed a large amount of work and reported that more research was needed for the Change Theory (Cummings et al., 2015). The collections of work on the theory included scattered documents that were compiled by Lewin's widow, thus giving it the name of Field Theory which was edited by Dorwin Cartwright (Cummings et al., 2015). The formation of Lewin's Change Theory was unnoticed until the 1980's (Cummings et al., 2015). Additional theorists have made some adjustments to Lewin's Theory throughout the 1950's but, currently, the originality of the theory still stands as not only being applicable in the realm of healthcare, but leaders in a variety of settings have applied the unfreezing-changing-refreezing model to change processes (Cummings et al., 2015).

Major Tenets

The Change Theory was developed by Lewin using a three-stage model of change, which includes: 1) unfreezing; 2) change; and 3) refreezing model. This three-step model requires learning to be rejected and be replaced (Nursing Theory, 2016).

Unfreezing. Unfreezing is the process where a method is used to be counterproductive or making it possible for a person to release old patterns of behavior (Nursing Theory, 2016). Lewin proposed that unfreezing can be attained by using the three stages; increasing driving forces that drive behavior away from the current situation or status quo (Nursing Theory, 2016). This step is important to recognize the old behaviors and overcome resistance to change.

Change. The second stage of Lewin's theory is driving change forward and implementing more productive behaviors (Cummings et al., 2015). The planning and implementation stages of the project occur in this stage. It is believed that individuals will support the new direction. Most healthcare staff is aware of change and that evidence based outcomes are needed for a successful process change. As a result it will take time for individuals to transition from unfreezing to change. In order for this to be successful it is important to have an understanding of the benefit of the change. Time and communication are keys to successful change during this stage.

Refreezing. Refreezing is the process of accepting the change and implementing the new behavior pattern so that it becomes as a habit and routine. Establishing this final stage is crucial as a return to old habits may occur (Mitchell, 2013). Lewin's goal for the Change Theory is to explore ways or methods to modify the equilibrium towards the direction of the desired change (Nursing Theory, 2016).

Kurt Lewin's Change Theory Application to the DNP Project

During the process of this DNP project, the *unfreezing* stage would include the release of old patterns of behavior of treating every patient with symptoms of a UTI with an antibiotic before a more detailed assessment was complete. Providing education to the staff and providers regarding the need for a change in prescribing practices would be included in this stage. The in-service would include research and evidence based measures that prove there is an adverse impact to patients for un-necessarily prescribed antibiotics to treat suspected UTI. This in-service should serve a purpose for change and the need for keeping up with newly recommended guidelines.

The *Change* stage will serve as a period of driving force to move forward and implement

the recommended practice (Cummings et al., 2015). Planning and implementation of the project occur during this stage. The incorporation of the SUTISTP will serve as a tool for staff nurses and providers to use if suspected UTI may be present. Managing change is always challenging in health care facilities and often time staff mentions the lack of time for extra patient related tasks. For successful implementation of the SUTISTP careful planning and identification of these barriers is important. Recognizing the current educational needs or various staff will help leadership understand how to use Lewin's Theory successfully for the change process.

The final stage, *refreezing*, will be completed by having the SUTISTP available for any staff nurse or provider to use if a UTI is suspected. SUTISTP will be available at the host's site nurse's station and available as a resource for staff. Flyers will be posted in station for continued in an effort to promote a decrease in un-necessarily prescribe antibiotics for suspected UTI. This will be a time for stability and evaluation process. Support from all stakeholders should continue for the desired outcome. Once the SUTISTP is completed and available, an evaluation of the problems encountered, successes, and challenges throughout the project will be evaluated for future improvement (Cummings et al., 2015). Leadership will continue to monitor and follow up with routine rounds, audits, and staff support.

The application of nursing education using this theory lessens deficits in knowledge. Knowledge deficits with medical staff are universal, and health is derived from related conditions (Romero et al., 2017). The delivery of relevant education for infection control measures and why patients are on antibiotics with the risk and benefits explained could prove useful in this project to help staff understand about ASP (Romero et al., 2017). Due to the inconsistencies in the current procedure for treating suspected UTI's at the host facility, the need for education for medical and nursing staff is pertinent to the reduction of antibiotic resistance

(Romero et al., 2017). Lewin's model of change can help the organization make changes in a growing high-demand area of healthcare (Mitchell, 2013). Leadership in this organization will use Lewin's process to make changes to current practice. Lewin's Change Theory (see Appendix A) can be applied to this project to help guide leadership with project implementation. Lewins' Change Theory is a simple and easy to understand framework for managing change. Leadership will serve as a change agent for integration of tasks and updating the process with the intent to not go back to the previous ways of practice. Lewin's theory provides the framework for defining the role of the nurse in identifying UTI and then meeting the communication gap between staff nurses and providers.

Application of Theory to Current Practice

Change is inevitable in healthcare with evidence based outcomes. Being an agent for change is a big role that a DNP prepared nurse will understand and help organizations help make a change. Using this three step model with the unfreeze-change-refreeze process will help create awareness among staff and providers to give up the old ways of practice. Health care changes quite often to keep up with evidenced-based research and practice. Lewin's three-step process is a fundamental planned change to get away from the status quo and push for change. In a health care change process the goal should be better outcomes for all. Using Levin's Change Management theory to guide the implementation of SUTISTP in this LTCF can help promote acceptance by frontline nurses and medical staff involving them in all parts of the planning and implementation. Having the staff understand and buy in to the project, will ultimately lead to success of the project (Mitchell, 2013). By using Levin's theory, the hope is to reduce stakeholder resistance and fear of change through the development of a well thought plan and active participation in the change process (Mitchell, 2013).

Methods

Project Design

This quality improvement project will focus on the development and implementation of a suspected UTI SBAR toolkit protocol (SUTISTP) to reduce the number of antibiotics prescribed in the LTCF. “In 2013, South Dakota created a statewide program to improve antibiotic prescribing practices program and remains effective and used for 833, 354 residents” (Centers for Disease Control and Prevention, 2014, p. 2). The need for an antibiotic stewardship program (ASP) is high due because the health department in South Dakota surveyed LTCF’s and only found 21% had an effective ASP in place (Centers for Disease Control and Prevention, 2014). The Secretary of Health of South Dakota called on health leadership to improve antibiotic prescribing practices across the United States and flagship facilities implemented the ASP program to tackle the underlying problem of drug-resistant organism in general (Centers for Disease Control and Prevention, 2014). This ASP project is being done to reduce inappropriate antibiotic prescriptive practices. Initiating a policy to control excessive use of antibiotics is an important patient safety and public health issue as well as a national priority (Centers for Disease Control and Prevention, 2014). As a result, the U.S. health department developed a program to train health care teams with the intent to improve antibiotic prescribing practices (Centers for Disease Control and Prevention, 2014).

The nurses and providers will use the SUTISTP toolkit as a standard guideline for assessing the need for antibiotic therapy in the presence of a UTI. The toolkit will include a Situation, Background, Assessment, Recommendation (SBAR) format that has specific criteria for prescribing an antibiotic for a UTI. This guide is focused on this project in which a group of practitioners/other individuals responsible for triage or care are educated with the inservice. The

improvement in patient treatment/outcomes is then assessed from a chart review.

Some of the relevant information included on the SBAR toolkit is if the patient has a catheter, signs, symptoms or causes of a UTI. This information will be readily available for the prescriber and the nursing staff to inform a prescriber if they suspect a UTI. The nursing and medical staff will have this tool available at the station if they suspect a patient is having signs or symptoms of a UTI.

The SUTISTP toolkit will provide a guideline as to when an antibiotic would be indicated for the patient's specific symptoms. Once the criteria are met, the provider has justified the need for antibiotics. Once the SUTISTP is completed, it would be relayed to the medical provider whether the criteria for prescribing an antibiotic was met. After retrospective review of patient charts, the project lead will review the data gathered from the charts with administration.

The pre and post-test questionnaire that will be used during the educational preparation sessions with the facility providers includes questions regarding the use of the toolkit (see Appendix E). These educational sessions with the staff regarding the new protocol and SUTISTP tool will be on shift changes and posted as a mandatory meeting that will be twice a month for the first month of implementation. For the weekend staff, the project lead will have the meetings on shift changes to ensure all staff is educated and sign off that they are aware and understand the new protocol.

Antibiotic prescriptions will be logged in an infection control log for further follow up by the project lead and administrator during daily log checks. If an antibiotic does not meet criteria then the provider will have to justify why an antibiotic was given. If a provider orders an antibiotic for suspected UTI without meeting the criteria, the project lead will call the provider and ask for justification and re-educate on the ASP. At the end of the month, the infection

control logs will be reviewed by leadership for any further intervention needs. Some needs, may include further staff education about the program and the toolkit if providers or nursing staff are not using the forms when and if antibiotics were prescribed. If providers are ordering too many antibiotics they will be subject to question and re-educated about the antibiotic stewardship program. If an antibiotic was prescribed and did not meet the criteria, the provider will be asked for justification as to why the current policy was not followed. Leadership includes the administrator, staff developer and project lead.

The population addressed in this project is the medical and nursing staff in a rural, California LTCF. A convenient sample of approximately 40 patient charts will be reviewed before and after implementation of the ASP to determine any change in the rate of antibiotic prescriptive use as treatment for UTI symptoms. The staff's knowledge of the ASP protocol will be measured by pre-test and post-test to analyze the effectiveness of the education and training for the SUTISTP. The aim of the project is to disseminate best practice information included in the ASP and is a resident safety initiative designed to improve clinical outcomes and reduce antibiotic resistance (Doernberg et al., 2015). The nursing and medical staff will have the same in-service training for the SUTISTP. Quality assurance and performance improvement (QAPI) intervention is required in LTCF's that are participating in Medi-Care and Medi-Cal programs to improve the quality of resident care (Doernberg et al., 2015). The policy named Protocol for UTI common infections will be presented in conjunction with the SUTISTP (see Appendix D) (Agency for Healthcare Research and Quality, 2016).

Having competencies in place to help solve quality problems and prevent their recurrence allow for better care and continuing improvement (Crnich et al., 2015). LTCF's have specific quality indicators for the percentage of long-stay and short-stay residents with a urinary tract

infection, lower percentages are better (Centers for Disease Control and Prevention, 2017). The staff's, including all stakeholders play an integral role and will be encouraged to help with suggestions during the following weeks of preparation.

Population of Interest

For the population of interest, inclusion criteria will be all the practitioners (nine MD's and two NP's) and nursing staff of twelve LVN's, and two RN's. The licensed nurses and medical staff help assess and evaluate the residents who are suspected to have UTI. There are no temporary workers or registry agency employees who work at practice site. Employees meeting that criterion would be excluded from the project. The staff will be in-serviced on the s/s of UTI and the SUTISTP for implementation in the practice site. There will be no direct patient interaction; charts will be audited on the residents who reside in the practice site with the diagnosis of UTI. The facility is staffed by nurses, practitioners and providers for the geriatric population. The inclusion criteria will be all licensed nurses and medical staff who care for the geriatric population at the host site who present with s/s of UTI.

Setting

The practice setting for the project will be in a long-term care facility in rural, California. The 50-bed facility is currently 92% occupied and serves the geriatric population. This facility is a stand-alone family operated facility and has been in business for over 50 years. Each provider visits the residents at a minimum of once a month and sees patients independently. Patients admitted to the LTCF are particularly vulnerable to suspected UTI's due to the number of devices, like catheters that may pose a risk for infection. The administrator has given permission to implement this project at the practice site.

Stakeholders

A stakeholder is a person, group, organization or system who affects or can be affected by an organizations action (Chism, 2019). They have a vested interest in evidence that supports clinical decisions that have an eventual good outcome. The facility stakeholders will include the patients, caregivers, nursing and medical staff and the administration. The key stakeholders are the Medical Director, Administrator, Director of Nursing (DON), and Director of Staff Development (DSD). Having been working in the same facility for many years, the project lead has built a rapport with the staff and administration who are willing to aid in the integration of this project.

Recruitment Methods

The project lead explained the proposal for the project to the Administrator and was able to explain that having a toolkit for suspected UTI could help reduce the use of unnecessary antibiotic use in the facility. The project lead will recruit the staff and medical staff to participate in the change process with in-service meeting's and collaboration while maintaining good workflow in the facility. Mandatory in-services and training will be provided at the practice site for implementation of SUTISTP. The staff that will participate will be protected for privacy and confidentiality for participant data. Posters and flyers announcing mandatory meetings will be used to inform all staff of the project and buy-in will be encouraged with incentives for participation. Pens, notepads, and participation points on annual evaluations are incentives that will be used.

Tools/Instrumentation

The implementation of SUTISTP toolkit from the AHRQ will be used in the facility for suspected UTI. A policy will be implemented from the AHRQ database to understand and use

the toolkit correctly (see Appendix D). Each provider taking part in the project will complete a pre and post implementation questionnaire which will measure knowledge of the signs, symptoms, and causes of an UTI (see Appendix E). This is relevant in meeting the objectives in this project that pertains to the signs, symptoms and causes of UTI. The following data tool was used in the article regarding a national surveillance system for healthcare-associated infections in long-term care that has been validated (Monaliza et al., 2017). The data tool was developed to depict the practices of the study subjects regarding prevention of UTI. A PowerPoint presentation will be used as presentation materials for this project implementation with the purpose of addressing the following objectives: Introduction of protocol for patients suspected of UTI with guidelines to reduce unnecessarily use of antibiotics, present new SUTISTP to healthcare staff and evaluate their understanding of it, evaluate changes in staff knowledge regarding current, evidence-based, UTI protocols evaluate the impact of the reduction of unnecessary antibiotics through chart review weekly with a goal of 5% reduction in antibiotic prescriptions for 80% of patients with suspected UTI over a period of two months. Posters and flyers about the new protocol and ASP for reduction of antibiotics will posted at the practice site see (Appendix F).

Data Collection Procedures

An analysis of the antibiotic prescription rates before and after the implementation of the project intervention will be reviewed at the host site. Medical records will be involved in the process for data collection. The data will be collected by the project lead and will be evaluated by the key stakeholders: Administrator, staff developer and project lead. A retrospective sample of about 40 charts of residents that meet the criteria of evidencing the signs and symptoms of a UTI will be reviewed to determine the rate of antibiotic prescriptive use as treatment. Within

four weeks following implementation, the project lead will gather a convenient sample of another 40 charts and determine the rate of antibiotic prescriptions in that population to see if there is a change. The privacy and confidentiality of resident charts will be maintained and adhered to by the project lead as well as for the questionnaires conducted. The information will be kept secure in the medical records office in a locked cabinet. Only the project lead, administrator and medical records director will have access to the information. Residents receiving an antibiotic for a suspected UTI will be identified through retrospective chart reviews and infection control logs (Monaliza et al., 2017). The data collected will be evaluated using the Statistical Package for Social Sciences (SPSS) Survival Manual.

Project/Intervention Timeline

The project timeline is four weeks. The timeframe includes implementation of the project intervention, data collection and analysis/interpretation. The project implementation will start at the beginning of DNP III. Project approval will be obtained at the end of DNP II.

Week one will include recruiting participants and preparing content for the training sessions. Week two will include educating the providers and the implementation of the antibiotic protocol. In week three collecting antibiotic prescription rates from patient records will be the focus. Week four will include project evaluation through statistical evaluation of the gathered data. This is outlined in the table below:

Week 1	<ul style="list-style-type: none">• Collection of at least (40) patient records with a UTI diagnosis to determine antibiotic prescription rates prior to the intervention• Recruitment methods by the project lead to recruit the staff and medical staff to participate in the change process with in-service meetings. Mandatory in-services and training will be provided at the practice site for implementation of
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	SUTISTP. Posters and flyers (Appendix F) announcing mandatory meetings will be used to inform all staff of the project and buy-in will be encouraged with incentives for participation.
Week 2	<ul style="list-style-type: none"> • Provider training sessions including pre-and post-questionnaire completion • Rounding by project lead related to training follow-up in order to support and guide staff through the protocol.
Week 3	<ul style="list-style-type: none"> • Staff will be observed if a resident is reported as having s/s of UTI and whether the protocol is implemented. • Question and answer with staff during shift change to review the new protocol.
Week 4	<ul style="list-style-type: none"> • During week four, weekly monitoring of the SUTISTP and infection control log located at the nurse station for nurses to log antibiotics used with name of antibiotic and start and end and will continue and observations if form is used. • Face-to-face encounters and phone calls as needed to keep compliance with new protocol. • Meetings will be held with administration to report any new antibiotics used throughout the project start. • Patient charts (40) will be reviewed to determine prescription rates and evidence of antibiotic protocol being utilized by staff.

Ethics/Human Subjects Protection

This DNP project will be a quality assurance and performance improvement project and will involve the use of the SUTISTP for implementation in the practice site to reduce unnecessary antibiotic prescriptive practices. No patient identifiers will be collected, and variables will be coded to maintain confidentiality during the medical record review. The privacy and

confidentiality of resident charts will be maintained and adhered to by project lead by keeping track of charts and will not be considering names of the patients or medical staff involved in the patient's care during the review process. The population is the medical staff at the LTCF that have prescriptive abilities and the licensed nursing staff while the project lead will oversee the protection of privacy for those involved. The medical and licensed nursing staff are eligible to participate and will not be compensated financially. However, participants will have the opportunity to receive pens, notepads, and participation point's annual evaluations. In the DNP project no temporary staff is used in the facility or will participate. The benefits are evidenced-based knowledge regarding appropriate antibiotic prescriptions use through the application of the SUTISTP. The two populations: the practitioners and the antibiotic prescription rates.

Plan for Analysis/Evaluation

Analysis of all data will be conducted through the use of the IBM SPSS program. The analysis will evaluate the effectiveness of the new SUTISTP in addition to provider adherence to the new protocol. The data collected from the pre-post-intervention questionnaires will be analyzed with a paired sample t-test (Pallant, 2016). The paired sample t-test is designed to be used to determine whether there is statistical evidence that the mean difference between paired observations and would reveal if there was a statistically significant result after implementation of an intervention (Pallant, 2016). Analysis of the patient chart audit comparison will be done through the use of the McNemar's test. This analysis will be considering provider adherence to the new protocol and antibiotic prescription rates. Staff knowledge of the SUTISTP will be measured by pre-test before the education intervention is administered.

Implications for Nursing

Antibiotic Resistance

Over use of antibiotics is a national problem that could have the potential effect of antibiotic resistance. Antibiotic resistance is a worldwide problem in hospitals and nursing homes (L Verhoef et al., 2014). Antibiotic resistance happens when bacteria and fungi develop the ability to defeat the drugs designed to kill them (Centers for Disease Control and Prevention, 2018). Antibiotic resistance threatens everyone at any age and is the world's most urgent public health problems. "Each year in the U.S., at least two million people are infected with antibiotic-resistant bacteria, and at least 23,000 people die as a result" (Centers for Disease Control and Prevention, 2018, p. 1). Setting up an ASP and having surveillance in nursing homes is important (L Verhoef et al., 2014). The AHRQ and the Department of Health and Human Services are advocating for national change in antibiotic prescriptive practices. Having an ASP in place can help to more effectively evaluate for the need of antibiotics in health care settings. Research and guidelines from AHRQ have demonstrated that reduction in antibiotics for UTI can help lower antibiotic resistance. Through the utilization of an ASP, the emergence and impact of antimicrobial resistance and infections in nursing homes can be limited (L Verhoef et al., 2014). "New recommendations from the Centers for Disease Control and Prevention (CDC) advise all nursing homes to improve antibiotic prescribing practices and reduce their inappropriate use to protect residents from the consequences of antibiotic-resistant infections, such as C. difficile" (Centers for Disease Control and Prevention, 2015, p. 1).

Effective Prescriptive Practice

A protocol should be put in place for guidance for prescribers to help guide practice for evidenced based measures (Monaliza et al., 2017). "The UTI SBAR form helps to reduce the

unnecessary use of antibiotics. A recent study in 12 Texas nursing homes found that using the UTI SBAR form reduced the use of antibiotics for asymptomatic bacteriuria by about one-third” (Agency for Healthcare Research and Quality, 2016, p. 2). To improve patient outcomes it is important to use an evidenced based approach to nursing care that can be incorporated in a clinical practice setting (Agency for Healthcare Research and Quality, 2016). Having an effective evidenced based tool can help ensure the reduction and prevention of over prescribed antibiotics for UTI’s. Successful implementation relies on prescribing clinicians and this includes clinicians and licensed nursing staff communication through the use of the new SUTISTP (Agency for Healthcare Research and Quality, 2016). According to Doernberg et al., (2015), an immediate 26% decrease in antibiotic prescriptions for UTI’s while the ASP was in use identified with a 6% reduction continuing through the intervention period. The potential significance is effective to help reduce the rate of antibiotic prescriptions for UTI’s.

Results

Analysis of Results

The statistical analysis was performed using the Statistical Package for the Social Sciences (IBM SPSS). A comparison of the pre-education questionnaire results and post education questionnaire results was completed using a paired sample *t*-test for Phase I of the project. The paired-samples *t*- test was performed to evaluate whether understanding of the elements of the *SUTISTP* protocol improved after the educational sessions with the providers and staff. A significant increase in the scores on the *knowledge about the SUTISTP* questionnaire was observed from a mean pre-test of 71.25 ($M=71.25$, $SD=20.917$) compared to the post-test mean score of 98.75 ($M=98.75$, $SD=3.378$). The test values were $t(23) = -6.203$, $p < .001$. This indicates that the education protocol was largely effective at increasing *SUTISTP* questionnaire

scores. Effect size was calculated with an online effect size calculator, using the Cohen's d for paired samples (Magnusson, 2014). The Cohen's d value was calculated as 1.266 which is interpreted as a large effect size, according to standard practices (Effect Size Calculator, 2018). The Cohen's d value indicates the magnitude of the effect of the education protocol without regard to the size of the sample (see Appendix G).

► T-Test

[DataSet0]

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pre_test_score	71.25	24	20.917	4.270
Post_test_score	98.75	24	3.378	.690

Paired Samples Correlations			
	N	Correlation	Sig.
Pair 1 Pre_test_score & Post_test_score	24	-.162	.451

Paired Samples Test								
	Paired Differences		Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Mean	Std. Deviation		Lower	Upper			
Pair 1 Pre_test_score - Post_test_score	-27.500	21.720	4.433	-36.671	-18.329	-6.203	23	.000

Prior to the *SUTISTP* educational intervention, no formal protocol had been in standard use for providers and staff when evaluating symptoms indicative of UTI. Following the educational intervention, there has been a one hundred percent adherence rate in using the *SUTISTP*, as measured by the infection control log in use at the facility in which the data was collected.

Phase II data was collected for post-intervention prescribing rate, a McNemar's test was performed using SPSS to compare pre- and post-intervention prescribing rates. The second phase of data collection using descriptive statistics have been calculated for the Phase I data, which measures the current prescribing rate at the pre-education stage. A retrospective analysis of patient charts for the previous 6 months was conducted to identify cases with a diagnosis of

urinary tract infection (UTI). Of the 40 cases identified as UTI diagnoses, 18 had a prescribed antibiotic as a treatment intervention. The pre-education antibiotic prescribing rate was 18 out of 40, equaling 45% and the post-education antibiotic prescribing rate was 3 out of 10, equaling 30%. The goal of the present project is to evaluate the effectiveness of education using the SUTISTP. Therefore, the project statement to be tested in Phase II is that the antibiotic prescribing rate will be significantly lower in cases where a UTI is diagnosed, following education on the SUTSITP.

The McNemar's test showed that the two proportions were significantly different, $p = .043$ (2 sided). This suggests that there is significant change in the proportion of the participants diagnosed having UTI and antibiotic treatment being lower, when compared with the proportion prior to the educational session. The research hypothesis that the SUTSITP would decrease the antibiotic prescribing rate for UTI diagnosis was supported by the data analysis (see Appendix H).

Discussion

Discussion of Findings

The purpose of this project was to design and implement a UTI protocol and provide education to the medical and licensed nursing staff on how to use the new protocol to reduce unnecessary antibiotics for patients with UTI symptoms. The success of any quality improvement project is based on the buy-in of those involved with the project. The project was proposed to the organization in the summer of 2018, the organizations leadership was eager and pleased that this project would help with an antibiotic stewardship program (ASP). All the stakeholders involved were very involved and support was gained for this project because ASP is such a topic of importance in healthcare today. Based on the project results and success the

intervention was accepted as a standard of practice at the practice site.

After implementation of the educational sessions aimed at the use of the SUTISTP with the providers, the results of the pre- and post-intervention questionnaires indicated that there was a significant statistical change in knowledge among the participating providers. Forty patient charts were reviewed prior to the project's intervention and of the 40 patient charts there were 18 patient charts that documented that patients received antibiotics treatment' which computes to a 45% prescription rate. Ten charts with the diagnosis of UTI were evaluated and three of those had an antibiotic as a treatment intervention. There was a decrease of antibiotic prescriptions for UTI from 45% to 30 % and that shows that the use of the SUTISTP was statically significant. However, the difference in the number of charts that were reviewed was a significant number of 30 charts.

Significance/Implications for Nursing

The goal of this DNP project was to develop a protocol to better assess if an antibiotic is necessary for the treatment of patients diagnosed with UTI in a long term care facility. The project objectives were met with developing a tool that has a guideline to help better assess if antibiotics are indicated. The staff had educational sessions for the new protocol and background information on UTI's. As a result, the impact of the project has helped with the objective of reduction of prescribed antibiotics to 15% as opposed to the 45% prescription rate prior to the intervention. The educational sessions for SUTISTP proved effective in reducing the amount of antibiotics used as a treatment for UTI. A comparison of pre- and post-questionnaires that were administered during provider education sessions focused on the new ASP protocol were used in the analysis of the educational sessions. Having the educational sessions significant to the data and indicated that the education protocol was largely effective at

increasing *SUTISTP* questionnaire.

The data for patients with UTI symptoms that received antibiotics was collected through retrospective chart review. The practice of prescribing antibiotics is common and high in prevalence (McMaughan et al., 2016). The facilities antibiotic prescribing rate was 45% from the retrospective 6 month analysis of patient charts. The potential for large numbers of unnecessary antibiotics makes this setting ideal for implementing the SUTISTP and reducing the rate of antibiotic prescriptions (McMaughan et al., 2016). The effect of this decision making aid was adhered by the nursing and medical staff and the compliance rate is 100% at this time with all nursing and medical staff. After the implementation of the SUTISTP, the increased awareness has helped the nursing and medical staff be more proactive in the antibiotic stewardship program. The 15% reduction in antibiotic prescription rates does indicate a positive response to the project question asking if unnecessary prescribed antibiotics for UTI symptoms were reduced after providers had implemented the SUTISTP.

The need for antibiotic stewardship is a concern and the rise in UTI's in long-term care creates a need for advocacy for antibiotic stewardship programs. Education of the staff and medical providers is essential to optimize antibiotics and when not to use antibiotics when not indicated (Crnich et al., 2015). Some clinical studies have shown a modest impact on antibiotic use in long term care. The number of antibiotics dropped 26% and days of antibiotic therapy reduced by 30% following an educational intervention in a Chicago long term care facility (Crnich et al., 2015). The impact of education and protocols has significantly helped long term care in ASP (Crnich et al., 2015). Some other approaches can help with documentation and having the interdisciplinary team be a part of the communication through tools and protocols (McMaughan et al., 2016). Many benefits for the patient can be that they are being assessed

more properly and the risk of C-DIFF or antibiotic resistance can be reduced due to the ASP (Centers for Disease Control and Prevention, 2015). The impact of improper prescriptions for UTI can be harmful, there are also implications associated due to a high antibiotic prescription rates with quality measures (Crnich et al., 2015). Some of the implications of a long term facility having high antibiotic prescription rates are lesser admissions, lower reimbursement and the facility could develop the reputation of being a location with a high patient infection rate (Agency for Healthcare Research and Quality, 2016). Because Medicare monitors trends with antibiotics used to treat UTI's, the project site aims to lower rates of antibiotics used in the facility as a quality measure to be reviewed by Medicare. Low Medicare ratings can impact the facility's reimbursement and the public's view of the facility's quality measures. This SUTISTP protocol can help to improve quality and ratings in most term care facilities. The protocol has the ability to be easily acquired by other long term care facilities resulting in further improvement in patient outcomes.

Limitations

There were a few limitations noted in the project. One of the limitations was the four week time line for the project. Having closer to one year to monitor the project would have resulted a better picture of the providers' compliance with using the SUTISTP protocol. Another limitation included the amount of time that was required to go through the charts. Because the patient charts were in paper format, it took an unexpected additional amount of time to locate and gather the data. Additionally, following the educational sessions, the number of charts of patients with a UTI was minimal due to the project's time limitation for gathering post-intervention data. The post-implementation sample size of ten charts was not enough to effectively compare to the forty patient charts that were gathered prior to the project intervention.

Although the data results supported the project, more time for data gathering of at least six to twelve months could better reveal support for the SUTISTP, its sustainability, and continued compliance by the providers.

Dissemination

The project findings are anticipated to be shared within the practice site and disseminated to nearby long term care facilities interested in incorporating the project intervention. The project will be incorporated in annual competences for licensed nursing and medical staff at the project site. It will be a part of the new hire training for licensed nurses and new medical providers to the facility to help sustain the project at the facility.

The Sigma Theta Tau International Nursing Honor Society calls for authors to submit abstracts and articles in the online repository. The project will be uploaded to this site for further dissemination. The population that this project will address is providers of the geriatric population that reside in long term care due to this patient population being at risk for overutilization of antibiotics for UTI. The project will also be submitted to the Doctor of Nursing Practice repository for dissemination. After graduation the project will be submitted for possible publication in several peer reviewed journals such as Journal of Gerontological Nursing and the American Nurse Association.

Project Sustainability

Using this SUTISTP in other long term care facilities would increase its reliability and support its benefits. Recommendation for its use in other long-term care facilities within the region will be a goal of the project's DNP student. The project intervention was accepted fully as a standard of practice at the practice site and its continued use will be supported by the DNP student. The project's long term projections for sustainability should continue until new

evidence based outcomes prove that a change in the protocol is required.

The costs to sustain the project's intervention will continue to be minimal and will be incorporated into current practice. The practice site will continue to incorporate the SUTISTP in new hire orientation and annually in performance competencies to ensure the project will have sustainability. The project will continue to be monitored and followed to measure the rate of antibiotic prescriptions for UTI treatment at the project site in order to determine any changes in prescribing practices for treatment of UTIs.

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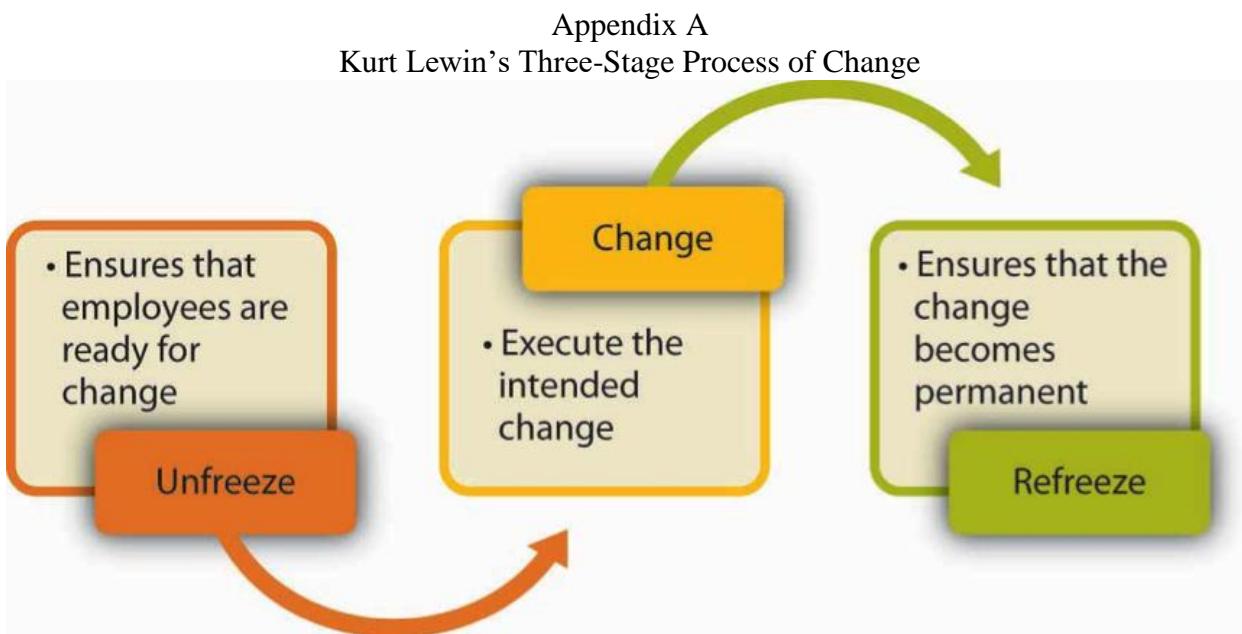


Figure 1. Kurt Lewin's Change Theory (Culcaghais3, 2014).

Appendix B

Permission to Use UTI SBAR Toolkit



DEPARTMENT OF HEALTH AND HUMAN SERVICES

Agency for Healthcare
Research and Quality5600 Fishers Lane
Rockville, MD 20857
www.ahrq.gov

December 6, 2018

Jesse Santoyo
DNP student
Touro University
Las Vegas, NV

Dear Jesse Santoyo:

This letter, sent on behalf of the Agency for Healthcare Research and Quality (AHRQ), is to grant you permission to use the Suspected UTI SBAR toolkit in your Doctor of Nursing Practice (DNP) Capstone project at Touro University (Las Vegas, NV).

This material is Toolkit 1 in the AHRQ *Nursing Home Antimicrobial Stewardship Guide*'s Section "Determine Whether It Is Necessary to Treat a Potential Infection with Antibiotics" (<https://www.ahrq.gov/nhguide/toolkits/determine-whether-to-treat/index.htm>). You have permission to reproduce and use the contents of this toolkit for your Capstone project, but not to reproduce these materials to sell for a profit. Proper source credit should be given to AHRQ.

If you do not modify the "Suspected UTI SBAR" form (Tool 1) or the "Not All 'Infections' Need Antibiotics" handout (Tool 3), you can retain the AHRQ and HHS logos. However, any materials that you customize or adapt (Tools 2 & 4) should not have the logos, but have a statement at the end, "Adapted with permission of the Agency for Healthcare Research and Quality (AHRQ)."

A suggested reference citation for the toolkit in the Guide might be:

"Toolkit 1. Suspected UTI SBAR Toolkit." In: *Nursing Home Antimicrobial Stewardship Guide* (Section 2. Determine Whether It Is Necessary to Treat a Potential Infection with Antibiotics). Rockville, MD: Agency for Healthcare Research and Quality. October 2016. (<https://www.ahrq.gov/nhguide/toolkits/determine-whether-to-treat/toolkit1-suspected-uti-sbar.html>)

Best wishes on your graduate research.

Sincerely,



David I. Lewin, M.Phil.

Health Communications Specialist/Manager of Copyrights & Permissions
Office of Communications
Agency for Healthcare Research and Quality
5600 Fishers Lane
Room # 07N58D / Mail Stop # 07N94A
Rockville, MD 20857 USA

Email: David.Lewin@ahrq.hhs.gov
Phone: +1 301-427-1895
Fax: +1 301-427-1783

Appendix C
Suspected UTI SBAR (SUTISTP)

(SUTISTP)
Suspected UTI SBAR
 Toolkit Protocol

Complete this form before contacting the resident's physician.

Date/Time _____

Nursing Home Name Two Palms Nursing Center, Inc.

Resident Name _____ Date of Birth _____

Physician/NP/PA _____ Phone _____

Fax _____

Nurse _____ Facility Phone 626-798-8991
 Facility Fax 626-798-2048

Submitted by Phone Fax In Person Other _____

S Situation

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

Vital Signs BP _____ / _____ HR _____ Resp. rate _____ Temp. _____

B Background

Active diagnoses or other symptoms (especially, 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 for limiting treatment related to antibiotics and/or hospitalizations
 Specify _____

No Yes Medication Allergies

Specify _____

No Yes The resident is on Warfarin (Coumadin®)



Agency for Healthcare Research and Quality
 Advancing Excellence in Health Care • www.ahrq.gov



www.ahrq.gov/NH-ASPGuide • June 2014
 AHRQ Pub. No. 14-0010-2-EF

1/2

(Agency for Healthcare Research and Quality, 2016)

	Nursing Home Name <u>Two Palms Nursing Center, Inc.</u>	Facility Fax <u>626-798-2048</u>														
	Resident Name _____															
A Assessment Input (check all boxes that apply)																
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> Resident WITH indwelling catheter The criteria are met to initiate antibiotics if one of the below are selected <p>No Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> Fever of 100°F (38°C) or repeated temperatures of 99°F (37°C)* <input type="checkbox"/> <input type="checkbox"/> New back or flank pain <input type="checkbox"/> <input type="checkbox"/> Acute pain <input type="checkbox"/> <input type="checkbox"/> Rigors /shaking chills <input type="checkbox"/> <input type="checkbox"/> New dramatic change in mental status <input type="checkbox"/> <input type="checkbox"/> Hypotension (significant change from baseline BP or a systolic BP <90) </td> <td style="width: 50%; vertical-align: top;"> Resident WITHOUT indwelling catheter Criteria are met if one of the three situations are met <p>No Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> 1. Acute dysuria alone <input type="checkbox"/> <input type="checkbox"/> OR <input type="checkbox"/> <input type="checkbox"/> 2. Single temperature of 100°F (38°C) and at least one new or worsening of the following: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><input type="checkbox"/> urgency</td> <td style="width: 50%;"><input type="checkbox"/> suprapubic pain</td> </tr> <tr> <td><input type="checkbox"/> frequency</td> <td><input type="checkbox"/> gross hematuria</td> </tr> <tr> <td><input type="checkbox"/> back or flank pain</td> <td><input type="checkbox"/> urinary incontinence</td> </tr> </table> <input type="checkbox"/> <input type="checkbox"/> OR <input type="checkbox"/> <input type="checkbox"/> 3. No fever, but two or more of the following symptoms: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><input type="checkbox"/> urgency</td> <td style="width: 50%;"><input type="checkbox"/> suprapubic pain</td> </tr> <tr> <td><input type="checkbox"/> frequency</td> <td><input type="checkbox"/> gross hematuria</td> </tr> <tr> <td><input type="checkbox"/> incontinence</td> <td></td> </tr> </table> </td> </tr> </table>			Resident WITH indwelling catheter The criteria are met to initiate antibiotics if one of the below are selected <p>No Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> Fever of 100°F (38°C) or repeated temperatures of 99°F (37°C)* <input type="checkbox"/> <input type="checkbox"/> New back or flank pain <input type="checkbox"/> <input type="checkbox"/> Acute pain <input type="checkbox"/> <input type="checkbox"/> Rigors /shaking chills <input type="checkbox"/> <input type="checkbox"/> New dramatic change in mental status <input type="checkbox"/> <input type="checkbox"/> Hypotension (significant change from baseline BP or a systolic BP <90) 	Resident WITHOUT indwelling catheter Criteria are met if one of the three situations are met <p>No Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> 1. Acute dysuria alone <input type="checkbox"/> <input type="checkbox"/> OR <input type="checkbox"/> <input type="checkbox"/> 2. Single temperature of 100°F (38°C) and at least one new or worsening of the following: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><input type="checkbox"/> urgency</td> <td style="width: 50%;"><input type="checkbox"/> suprapubic pain</td> </tr> <tr> <td><input type="checkbox"/> frequency</td> <td><input type="checkbox"/> gross hematuria</td> </tr> <tr> <td><input type="checkbox"/> back or flank pain</td> <td><input type="checkbox"/> urinary incontinence</td> </tr> </table> <input type="checkbox"/> <input type="checkbox"/> OR <input type="checkbox"/> <input type="checkbox"/> 3. No fever, but two or more of the following symptoms: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><input type="checkbox"/> urgency</td> <td style="width: 50%;"><input type="checkbox"/> suprapubic pain</td> </tr> <tr> <td><input type="checkbox"/> frequency</td> <td><input type="checkbox"/> gross hematuria</td> </tr> <tr> <td><input type="checkbox"/> incontinence</td> <td></td> </tr> </table> 	<input type="checkbox"/> urgency	<input type="checkbox"/> suprapubic pain	<input type="checkbox"/> frequency	<input type="checkbox"/> gross hematuria	<input type="checkbox"/> back or flank pain	<input type="checkbox"/> urinary incontinence	<input type="checkbox"/> urgency	<input type="checkbox"/> suprapubic pain	<input type="checkbox"/> frequency	<input type="checkbox"/> gross hematuria	<input type="checkbox"/> incontinence	
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<input type="checkbox"/> urgency	<input type="checkbox"/> suprapubic pain															
<input type="checkbox"/> frequency	<input type="checkbox"/> gross hematuria															
<input type="checkbox"/> back or flank pain	<input type="checkbox"/> urinary incontinence															
<input type="checkbox"/> urgency	<input type="checkbox"/> suprapubic pain															
<input type="checkbox"/> frequency	<input type="checkbox"/> gross hematuria															
<input type="checkbox"/> incontinence																
<p>Nurses: Please check box to indicate whether or not criteria are met</p> <ul style="list-style-type: none"> <input type="checkbox"/> Nursing home protocol criteria are met. Resident may require UA with C&S or an antibiotic.† <input type="checkbox"/> Nursing home protocol criteria are NOT met. The resident does NOT need an immediate prescription for an antibiotic, but may need additional observation.†† 																
R Request for Physician/NP/PA Orders																
Orders were provided by clinician through <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person <input type="checkbox"/> Other _____																
<input type="checkbox"/> Order UA <input type="checkbox"/> Other: Cranberry juice one 8 oz cup _____ times daily for _____ days.																
<input type="checkbox"/> Urine culture <input type="checkbox"/> Other: UTI-stat 30 mL po BID supplement for _____ days.																
<input type="checkbox"/> Encourage _____ ounces of liquid intake _____ times daily until urine is light yellow in color.																
<input type="checkbox"/> Record fluid intake. <input type="checkbox"/> Other: Cranberry 450 mg supplement 1 tab po _____ times daily for _____ days.																
<input type="checkbox"/> Assess vital signs for _____ days, including temp, every _____ hours for _____ hours.																
<input type="checkbox"/> Notify Physician/NP/PA if symptoms worsen or if unresolved in _____ hours.																
<input type="checkbox"/> Initiate the following antibiotic																
Antibiotic: _____ Dose: _____ Route: _____ Duration: _____																
<input type="checkbox"/> No <input type="checkbox"/> Yes Pharmacist to adjust for renal function																
<input type="checkbox"/> Other _____																
Physician/NP/PA signature _____ Date/Time _____																
Telephone order received by _____ Date/Time _____																
Family/POA notified (name) _____ Date/Time _____																

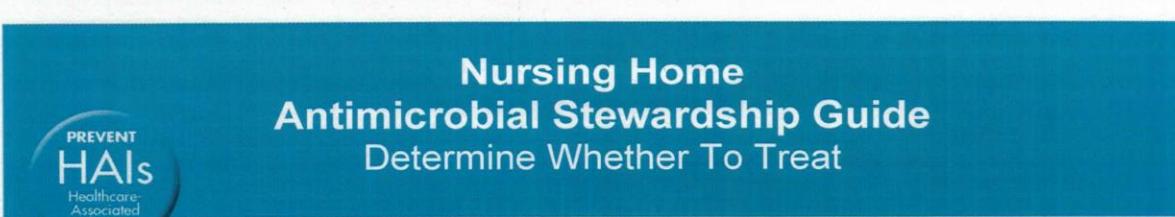
* For residents that regularly run a lower temperature, use a temperature of 2°F (1°C) above the baseline as a definition of a fever.
 † This is according to our understanding of best practices and our facility protocols. Minimum criteria for a UTI must meet 1 of 3 criteria listed in box.

†† This is according to our understanding of best practices and our facility protocols. The information is insufficient to indicate an active UTI infection.

2/2

27518_7/15

Appendix D
Suspected UTI SBAR Policy



Toolkit 3. Minimum Criteria for Common Infections Toolkit

Tool 1. Policy: Minimum Criteria for Initiating Antibiotics for a Urinary Tract Infection

TWO PALMS NURSING CENTER, INC.

Protocol for UTI Common Infections

DATE:

Between 25 percent and 75 percent of antibiotic prescriptions in nursing homes do not meet clinical guidelines for prescribing. Unnecessary antibiotics can result in side effects and drug-resistant bacteria. Unnecessary prescribing practices by prescribing clinicians and overuse of newer, broad-spectrum antibiotics when either no antibiotic or a narrow-spectrum drug would suffice are large contributors to this problem. The Minimum Criteria for Common Infections toolkit ("Minimum Criteria toolkit") aims to reduce unnecessary prescribing for the three infections where antibiotics are most frequently prescribed in nursing homes: (1) urinary tract infections (UTIs).

To improve appropriate antibiotic use for the residents at TWO PALMS NURSING CENTER, INC. the minimum criteria for three common infections will be implemented on [DATE].

The minimum criteria are shown below. TWO PALMS NURSING CENTER, INC. will be using (Minimum Criteria for Initiating Antibiotics for a Urinary Tract Infection) (THE NURSING HOME WILL USE, I.E., THE FAXES, THE LETTER, OR TRAINING)



(Agency for Healthcare Research and Quality, 2016)

Minimum Criteria for Initiating Antibiotics for a Urinary Tract Infection

For residents without an indwelling catheter, initiate antibiotics if the resident meets criteria of one of three situations:

1. Acute dysuria alone

OR

2. Fever of 100°F (37.9°C) or two repeated temperatures of 99°F (37°C) **AND** at least **one** of the following:

New or worsening:

- Urgency, or
- Frequency, or
- Suprapubic pain, or
- Gross hematuria, or
- Costovertebral angle tenderness, or
- Urinary incontinence

OR

3. No fever, then **two** or more of the following:

- Urgency, or
- Frequency, or
- Suprapubic pain, or
- Gross hematuria, or
- Urinary incontinence

For residents with a chronic indwelling catheter, initiate antibiotics if **one or more** of the following criteria are met:

- Fever of 100°F (37.9°C) or two repeated temperatures of 99°F (37°C), or
- New or worsening costovertebral tenderness, or
- New onset suprapubic pain, or
- New or worsening delirium (sudden onset of confusion, disorientation, dramatic change in mental status), or
- New or worsening rigors (shaking chills) with or without identified cause, or
- New or worsening hypotension (e.g., significant change from baseline BP or a systolic BP <90)

AHRQ Pub. No. 17-0006-5-EF
October 2016

Notes:

1. Urine cultures should not be performed on a scheduled basis (e.g., monthly).
2. Urine cultures should **not** be used to identify UTIs in the absence of symptoms.
3. Smelly or cloudy urine is **not** a symptom of a UTI.
4. Residents with an intermittent catheter or a condom catheter should be evaluated as if they are not catheterized.
5. Urine cultures should be used to identify the most appropriate antibiotic. For residents with acute dysuria, it may be appropriate to initiate empirical antibiotic therapy; but for all other symptoms, wait for a urine culture.
6. For residents that regularly run a lower temperature, use a temperature of 2°F (1°C) above the baseline as a definition of a fever.

If none of the minimum criteria are met, consider initiating the following:

- Encourage _____ ounces of liquid intake _____ daily until urine is light yellow in color.
- Record fluid intake every _____ hours for _____ hours.
- Assess vital signs, including temp, every _____ hours for _____ hours.
- Request notification if symptoms worsen or if unresolved in _____ hours.

DIRECTOR OF NURSING

DATE: _____

AHRQ Pub. No. 17-0006-5-EF
October 2016

Appendix E
 Survey Instrument Tool (Pre-test/Post-test)
Knowledge About the SUTISTP.

Survey Questions	Yes	No
1. Does SBAR stand for Situation, Background, Assessment Input, and Request?		
2. Do you use SBAR to document a resident's condition to make it easier to determine whether antibiotics are appropriate?		
3. Is there an ASP in the facility?		
4. Even though a change in mental status can be related to an infection, does it necessarily mean that someone has a UTI.		
5. Are the following key symptoms of urinary tract infections listed? — Dysuria or acute pain when urinating — Fever with another symptom <input type="checkbox"/> Note that fever should be evaluated for each individual resident. Some residents regularly run a lower temperature. — Back or flank pain — Frequent urination — Incontinence — A strong, persistent urge to urinate — Suprapubic pain — Gross hematuria — New or dramatic change in mental status for residents with an indwelling catheter — Hypotension		

6. Is it true that signs or symptoms of a UTI, sometimes they could be related to some other issue or problem?		
7. If a resident has a suspected UTI, should the nursing staff communicate with the physician or NP about symptoms and the resident's condition?		
8. Could ordering excess antibiotics lead to C-Diff or antibiotic resistance?		
9. Is using the SUTISTP a new policy and mandatory for assessment of UTI?		
10. Is encouragement of liquids multiple times a day an intervention for suspected UTI?		

(Agency for Healthcare Research and Quality, 2016)

Appendix F
Posters and Flyers for Meetings

The poster features a blue header with the title "Be Smart About Antibiotics" in large white letters. To the right is a circular logo with the word "PREVENT" at the top, "HAIs" in the center, and "Healthcare-Associated Infections" below it. Below the title is a yellow curved graphic. In the bottom left corner is a white hexagonal inset containing a photograph of medical supplies: a green syringe, several colorful capsules (red, blue, yellow), and a small white vial.

Taking antibiotics when you don't need them is like leaving the lights on all the time.

- The lights may burn out, leaving you in the dark when you most need them.
- **If you use antibiotics when you don't need them, they may not work when you get sick.**

Antibiotics can help the body fight infections caused by germs called bacteria, but they are not miracle drugs for everything.

When antibiotics are NOT needed:

- You have an infection caused by a virus (such as a cold, bronchitis, the flu, or most types of diarrhea). **Antibiotics don't work on viruses.**
- You don't have an infection but instead have some other medical problem (such as anemia).
- You are not actually sick (except in rare cases where antibiotics have been shown to prevent infection).
- You have decided against them (such as near the end of life).

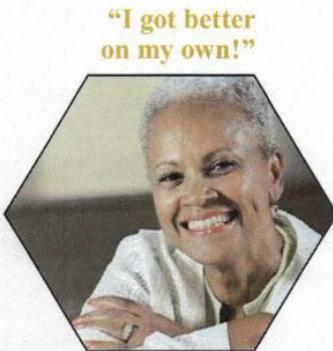
Why doctors may give antibiotics when they are NOT needed:

- Doctors are not always sure what is causing an illness and may feel they have to provide treatment right away.
- Some patients and families think they are not getting good care unless they get an antibiotic and insist that they want one.

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AHRQ
Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

(Agency for Healthcare Research and Quality, 2016)



What you can do:

- Talk with the doctor about the benefits and harms of antibiotics.
- Take medicine exactly the way the doctor says. Don't skip doses.
- Take care of yourself: get rest, eat and drink enough, and take over-the-counter medicines as needed.
- If you are on hospice or thinking about hospice, talk with your doctor about whether you need antibiotics anymore.

What not to do:

- **Don't ask for an antibiotic when the doctor says it isn't needed.**
- Don't take an antibiotic for a virus (cold, cough, or flu).

How antibiotics can hurt you:

- Antibiotics normally work by killing bacteria. Sometimes not all of the germs are killed, and the strongest ones can grow and spread. A person can get sick again, and this time the germs are harder to kill because the antibiotics no longer work. **This is called resistance and makes some infections very hard to control.** Resistance can make you sick longer, requiring more doctor visits and drugs that are even stronger. The more often you use an antibiotic, the greater the chance that the germs will become resistant.
- Antibiotics can save lives, but they can cause problems, too. **Older people have more side effects,** which can cause problems all over the body. In addition to resistance, antibiotics can cause nausea, dizziness, diarrhea, rash, kidney damage, and allergic reactions.

Don't Take Antibiotics for Granted:

Antibiotics are helpful, but now you know why sometimes you or a family member may not need them. You can help yourself and others by taking antibiotics only when they are needed.

Resources for you:

CDC: www.cdc.gov/getsmart/

FDA: <http://www.fda.gov/Drugs/ResourcesForYou/UCM078484>

AHRQ: <http://www.ahrq.gov/patients-consumers/index.html>



AHRQ Pub. No 14-0011-4-EF
May 2014

www.ahrq.gov/NH-ASPGuide

Developed by the Massachusetts Infection Prevention Partnership

Suspect a Urinary Tract Infection?

How Taking Antibiotics When You Don't Need Them Can Cause More Harm Than Good

An Important Message for Seniors and their Families



Did You Know That...

- » Up to 50 percent of all antibiotics prescribed are not needed or are not prescribed appropriately?
- » Confusion or sudden behavior changes don't necessarily indicate a urinary tract infection (UTI)?
- » As many as half of seniors living in long-term care settings will test positive for bacteria in their urine, ***without actually having a UTI?***

Learn Why The CDC is Sounding The Alarm About The Overuse of Antibiotics



**Massachusetts Coalition
for the
Prevention of Medical Errors**



© Massachusetts Coalition for the Prevention of Medical Errors – used with permission from the Coalition and the Massachusetts Infection Prevention Partnership

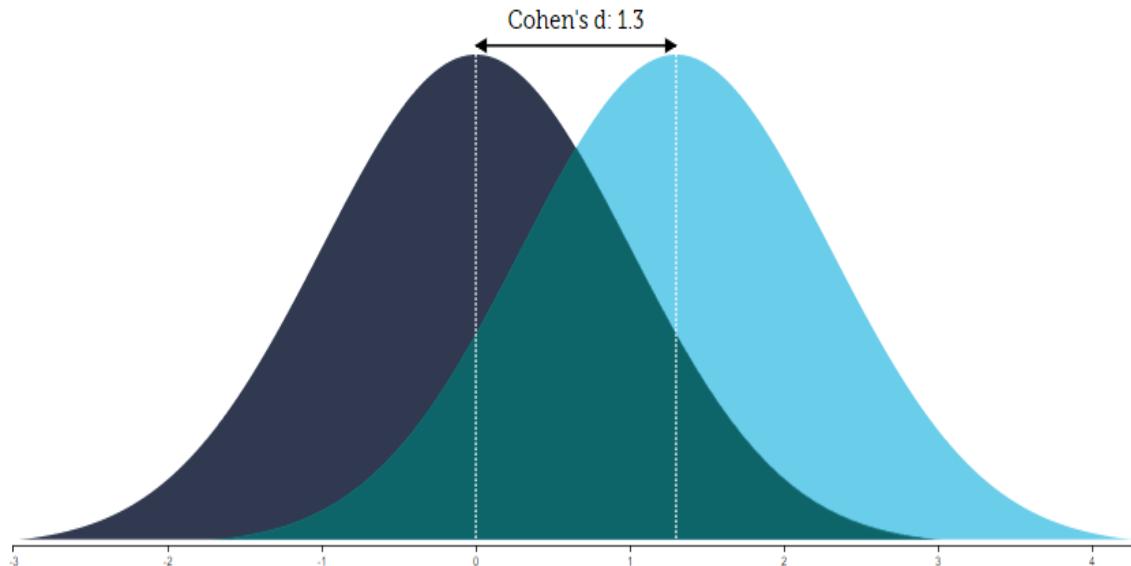
(Agency for Healthcare Research and Quality, 2016)

Appendix G Cohen's *d*

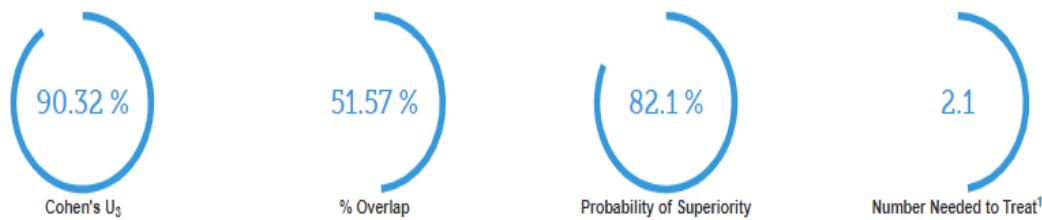
$$d = \frac{|\bar{m}_1 - \bar{m}_2|}{\sqrt{s_1^2 + s_2^2 - (2rs_1s_2)}}$$

where *r* is the correlation between the two conditions.

Effect Size Calculator	
\bar{x}_1	71.25
s_1	20.917
\bar{x}_2	98.75
s_2	3.378
<i>r</i>	-.162
<input type="button" value="Calculate"/>	
Cohen's <i>d</i>	1.266



Interpretation



A Common Language Explanation

With a Cohen's *d* of 1.3, 90 % of the treatment group will be above the mean of the control group (Cohen's *U*₃), 52 % of the two groups will overlap, and there is a 82 % chance that a person picked at random from the treatment group will have a higher score than a person picked at random from the control group (probability of superiority). Moreover, in order to have one more favorable outcome in the treatment group compared to the control group we need to treat 2.1 people. This means that if 100 people go through the treatment, 47.7 more people will have a favorable outcome compared to if they had received the control treatment¹.

(Effect Size Calculator, 2018)

Appendix H Data Analysis

Before or After Training * Where antibiotics prescribed (Y/N?) Crosstabulation

			Where antibiotics prescribed (Y/N?)		Total
			No	Yes	
Before or After Training	Before Educational Session	Count	22 ^a	18 ^a	40
		Expected Count	23.2	16.8	40.0
	After Educational Session	Count	7 ^a	3 ^a	10
		Expected Count	5.8	4.2	10.0
Total		Count	29	21	50
		Expected Count	29.0	21.0	50.0

Each subscript letter denotes a subset of Where antibiotics prescribed (Y/N?) categories whose column proportions do not differ significantly from each other at the .05 level.

McNemar Test

Crosstabs

Before or After Training & Where antibiotics prescribed (Y/N?)

Before or After Training	Where antibiotics prescribed (Y/N?)	
	No	Yes
Before Educational Session	22	18
After Educational Session	7	3

Test Statistics^a

	Before or After Training & Where antibiotics prescribed (Y/N?)	
	N	.50
Exact Sig. (2-tailed)		.043 ^b

a. McNemar Test

b. Binomial distribution used.