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Improving Compliance with Clinical Practice Guidelines to Reduce Urinary Tract Infection in Long Term Care

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IMPROVING COMPLIANCE WITH CLINICAL PRACTICE
GUIDELINES TO REDUCE URINARY TRACT INFECTION
IN LONG TERM CARE

A doctoral project submitted in partial fulfillment
of the requirements for the degree of
Doctor of Nursing Practice

By

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M.S.N., Otterbein University, 2001

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April 20, 2015

I HEREBY RECOMMEND THAT THE DOCTORAL PROJECT PERPARED UNDER MY SUPERVISION BY Charman L. Miller ENTITLED Improving Compliance with Clinical Practice Guidelines to Reduce Urinary Tract Infection in Long Term Care BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF Doctor of Nursing Practice.

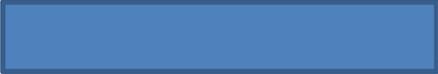


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ABSTRACT

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This evidence-based clinical change project addressed the clinical problem trigger of increased rates of urinary tract infections and related unplanned discharges in a rural Ohio nursing center. The clinical change involved the implementation of a nursing-driven protocol for suspected Urinary Tract Infection (sUTI) based on the *American Medical Director's Association Clinical Practice Guideline: Common Infections*. An interdisciplinary team approach to evidence-based clinical change was utilized through use of the Iowa Model of Evidence-based Practice to Promote Quality Care. Both the process and the intervention were evaluated through analysis of outcome data including rates of urinary tract infection, compliance with the guideline recommendations, measurement of adverse outcomes, and evaluation of policy. The sUTI protocol was piloted for a three-month period and outcomes included a reduction in incidence of UTI from 5.4 to 3.8 infections per 1000 resident days and statistically significant improvements in center compliance with clinical practice guidelines for recognition and management of suspected UTI. The analysis of cost, benefits, and sustainability of this evidence-based guideline is discussed.

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I. INTRODUCTION

Infections are a significant source of illness and death in the long-term care (LTC) setting. Infections account for about 25% of hospital admissions from LTC nursing centers and the incidence of infectious diseases in nursing centers is on the rise (Vance, 2001). By 2030 the number of older adults in the United States (U.S.) is projected to reach 71.5 million, representing approximately 20% of the national population (Federal Interagency Forum on Aging-related Statistics, 2008). The 2004 National Nursing Home Survey found 1.5 million residents living in 16, 628 nursing homes across the U.S.; 88.3% of them are older adults (U.S. Department of Health and Human Services, 2009). Although only around 4% of the U.S. population lives in a nursing home at any given moment, it has been estimated that greater than 40% of the older adult population in our country will spend some time in a nursing home during their lifetime. The risk of Healthcare Associated Infections (HAI) in LTC is reported to range from 1.8- 13.5 infections per 1000 resident-care days (Strausbaugh & Joseph, 2000). In light of the current trend toward shorter hospitalizations, longer nursing home stays, and the growth of the number of older adults in the U.S. during this century, the likelihood of an unprecedented increase in the number of LTC residents at increased risk for morbidity and mortality due to infection is high. Important clinical concerns have arisen from these trends. The American Medical Directors Association (AMDA) has developed a clinical practice guideline (CPG) for common infections in the LTC setting. This guideline was developed by interdisciplinary workgroups using a process combining evidence and consensus-based thinking, and has been reviewed by national organizations and individual experts (AMDA, <http://www.amda.com/tools/guidelines.cfm>). Despite

published studies of estimated prevalence rates for infections in LTC and the availability of clinical guidelines designed for LTC infection control, there are limited data that evaluate the effectiveness of these measures. There is also a lack of evidence pertaining to the implementation of such guidelines in LTC. This translates into a heightened need for attention in healthcare to the unique contributing and modifying factors for infection in this vulnerable population. This information is particularly pertinent to advanced practice registered nurses (APRN's) working in the LTC setting. These APRN's are uniquely positioned to potentially impact the integration of evidence-based protocols and practices into the LTC setting that have the potential to reduce or eliminate HAI's in this population.

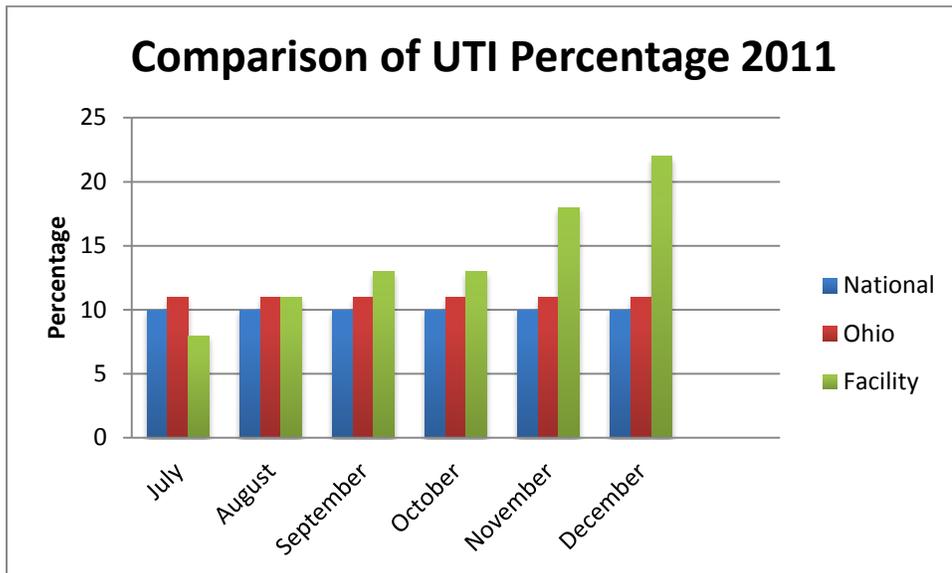
Clinical Problem

The focus of this project was the incidence of and outcomes associated with HAIs of the urinary tract in adult residents of a long-term care (LTC) facility. This focus was driven by a noted increase in UTI 's in center residents and unplanned discharges of residents from the LTC center to acute care facilities with diagnoses of urinary tract infection (UTI) (Figure 1). These unplanned transfers/discharges were a source of concern as the result was a loss of revenue for the center. A cohort study by Grenier, Bell, Bronskill, Schull, Anderson, and Rochon (2010) suggested that UTI is responsible for almost 25% of the visits made to emergency departments by LTC residents.

Quality indicators were also impacted by these trends in regard to number of infections and decline in function. Infections are very common in the LTC setting, represent a major source of morbidity and mortality in LTC, and UTIs are one of the most common infections in LTC facilities for older adults (Mathei, Niclaes, Suetens,

Jans, & Buntix, 2007; Smith et al., 2008). Prevalence of urinary tract infections, a quality indicator, was analyzed for the center. The data was collected from the Mini Data Set (MDS) system and UTI was defined as it is reported into the MDS system. For the purposes of reporting, UTI is defined as signs and symptoms of UTI (i.e. dysuria, fever, urinary frequency, new/increased urinary incontinence) and a urine culture with microorganisms reported at greater than or equal to 100,000 cfu/ml or a documented diagnosis of UTI by a medical provider. This analysis confirmed that the rate of infections was on the rise in the center and was significantly higher than the national and state percentages (Figure 1). The December 2011 UTI incidence in the center was nearly twice that of the national percentage. The incidence of UTI in the center had improved marginally since that time but remained a concern for the facility from a quality perspective.

Figure 1: Percentage of Urinary Tract Infections in the Center for July-December, 2011



Purpose and Goals of Project

The overall project goal was to improve the quality of care of LTC residents through use of best practices for the prevention and management of UTI. The project had several objectives including: 1) evaluate gaps between current center practices and the *AMDA Clinical Practice Guideline: Common Infections (AMDA CPG: CI)* 2) design approaches to assist the LTC center integrate the evidence into practice, 3) implement the approaches, 4) evaluate the outcomes (UTI rates, antimicrobial usage and adverse outcomes), and 5) evaluate the process of systematic implementation of the *AMDA CPG: CI* recommendations for reduction and appropriate management of UTI.

In evidence-based practice (EBP), clinical questions are asked in PICOT format. PICOT is an acronym used to represent *Patient* population, *Issue* of interest, *Comparison* intervention, *Outcome*, and *Time* frame. PICOT format assists the investigators to search for and retrieve the most relevant and best evidence (Melnyk & Fineout-Overholt, 2011). This Doctorate of Nursing Practice (DNP) EBP clinical change project PICOT question was: In patients living in a LTC facility (P), how does implementation of the *AMDA Clinical Guideline: Common Infections (AMDA CPG: CI)* (I) compared to current practices(C) affect urinary tract infection rates, antimicrobial usage, unplanned discharges (O) over three months (T).

Evidence-based Practice Model

The Iowa Model of Evidence-based Practice to Promote Quality Care is the EBP model that was used for the project. The Iowa Model is a seven-step process that focuses on organization and collaboration to incorporate research and other types of evidence into clinical practice (Titler et al., 2001). The model originated in 1994 and has been

continually cited in nursing journals and extensively utilized in clinical research programs (LoBiondo-Wood and Haber, 2006). The Iowa Model employs a linear design with multiple “feedback loops” that facilitate fluid movement through the evidence-based process with analysis and evaluation at each step (Titler et al., 2001). A factor that illustrates the goodness of fit for the Iowa Model to this project is the concept that not only evidence from the literature, but also internal evidence from the organization is integrated (Titler et al., 2001). Table 1 displays the seven steps of the Iowa Model as applied to the project.

Table 1: Application of the IOWA Model to the EBP Project

Steps of the Iowa Model	Proposed Project Application
STEP 1 Selection of a Topic	Trigger of increased unplanned discharges from center to acute care with diagnoses of infection was noted (UTI was most common). Director of Nursing and Director of Clinical Services and APRN met to analyze center quality indicators. A combination of data from the MDS and chart reviews were utilized. UTI in the facility was noted to be increasing over past months. Topic of “Reducing UTI’s in the center and improving outcomes” was determined This clinical problem was accepted as having high organizational priority related to the impact on quality and financial aspects in the center.
STEP 2 Forming a Team	The interdisciplinary team members will include: APRN- project leader Director of Nursing Assistant Director of Nursing Medical Director of the center Pharmacist Consultant
STEP 3 Evidence Retrieval	The APRN led this step. The current evidence was searched and retrieved. Databases searched included: CINAHL, PubMed, Cochrane Database of Systematic Reviews.
STEP 4 Grading the Evidence	The APRN lead this step. See Evaluation and Synthesis Tables
Step 5 Developing an EBP Standard	The APRN presented the results of the search Strategy and Synthesis to the team members at the center’s monthly Quality Meeting. The AMDA guideline was discussed and determined by the group to

	<p>be the most applicable for the center in regard to appropriateness, feasibility, meaningfulness and effectiveness.</p> <p>The team developed a plan, timeline and process for implementation of the standard.</p>
<p>Step 6 Implementing EBP</p>	<p>Pilot site for the project was selected.</p> <p>Review of current policies, procedures in comparison to <i>AMDA CPG:CI</i> completed.</p> <p>Baseline UTI rates in the center were identified.</p> <p>Baseline antibiotic usage in the center was identified.</p> <p>Retrospective chart reviews were completed on resident records to analyze the current practices in comparison to the <i>AMDA Guideline</i>.</p> <p>sUTI Worksheet was developed for integration of the <i>AMDA CPG: CI</i>.</p> <p>Education of staff/clinicians completed regarding the guideline/intervention/processes.</p>
<p>Step 7 Evaluation of the Change</p>	<p>A retrospective chart review of resident records was completed 3 months following full implementation of the intervention to evaluate compliance with the guideline and determine outcome data.</p> <p>Incidence of UTI, antibiotic usage, and unplanned discharges were compared to the baseline.</p>

The Iowa model also emphasizes problem solving and is “widely recognized for its applicability and ease of use by multi-disciplinary healthcare teams” (Melnik & Fineout-Overholt, 2011, p.251). This was a major consideration in the selection of the Iowa Model as the project utilized a multi-disciplinary team approach involving nursing, medicine, administration, and pharmacy.

The EBP Clinical Change Project

The setting for the clinical change project pilot was a 98-bed, for-profit, Medicare/Medicaid certified extended care nursing center in rural southwest Ohio. The seven steps of the Iowa Model served as the guiding framework for organizing the project from planning through evaluation. The Iowa Model employs a linear process design but emphasizes fluid movement within the process based on evaluation at each step (Titler et al., 2001).

Iowa Model Step 1: Selection of a Topic

The first step in the Iowa Model is selection of a topic with emphasis on identification of a problem- focused trigger. The problem-based trigger for this project was presented in the introduction with the statement of the clinical problem and PICOT question. The Iowa Model identifies the importance of ascertaining that the clinical problem being addressed is an organizational priority in order to facilitate cooperation and support for the project. The problem identified for this project had clearly been accepted as an organizational priority as it stood to impact both the financial and quality aspects of the center. In the LTC setting, the key stakeholders encompass the organization's hierarchy including: corporate leaders, center administration, medical providers, nurse supervisors, all front line and ancillary staff, patients and families.

Iowa Model Step 2: Forming a Team

The second step in the Iowa Model is selection of a team. As part of the project development, this DNP student, as project leader, met with the center administration and solicited suggestions for the EBP Project Team membership. Upon consideration of those recommendations and the need to involve members from multiple disciplines, the EBP team will be comprised of the following members:

- APRN- the Doctorate of Nursing Practice (DNP) student was an APRN and served as team leader for the EBP Practice Change Team. The role of the APRN was to lead the EBP process and report to stakeholders as necessary to gain support/resources, educate the team members on the Iowa Model and the EBP processes, and lead the team through the project implementation and evaluation.

- Director of Nursing (DON) - this individual's support of the clinical project was essential as the role and responsibility of the DON is for day-to-day operations of the nursing department and review of policy. DON buy-in to the project was a critical first step in the implementation process. The DON role on the committee was to provide guidance on data sources and retrieval, input on policy review and revision, and leadership for the marketing of the project.
- Assistant Director of Nursing (ADON) - this individual was involved in both the planning and implementation phases of the project as the CSD oversees the infection surveillance activities, the immunization program and facilitates the clinical education and in -servicing.
- Medical Director- this individual drove the acceptance of the guideline by center clinicians, participated in review/revision of current policy, and served as a key advisor in development of the protocol.
- Pharmacist Consultant- this individual will provide expertise for the analysis of antibiotic usage and concerns related to the project.

As part of the project pilot development, an initial meeting of the EBP Project Team was held and the APRN introduced the problem-based trigger, the PICOT question, and the preliminary literature review findings. The *AMDA CPG: CI* was discussed and determined by the team to be the most applicable for the center in regard to appropriateness, feasibility, meaningfulness and effectiveness. The resources necessary for implementation were discussed and determined to be feasible. The team accepted the PICOT question as proposed and acknowledged the role that each member will fulfill as part of the team. The team acknowledged that historically, integration of CPG's in LTC

has been fragmented and difficult to evaluate. Gaining support and buy-in for this EBP project from those involved in the performance improvement was essential for success of the project. Anticipated barriers to implementation of this clinical change project identified by the EBP Project Team included:

- Need for staff buy-in and accountability for utilizing the EBP project process.
- Sustainability of the guideline across shifts and over time.
- Acceptance of and compliance with guideline recommendations by all facility medical providers.
- Lack of history of culture in support of EBP within the center.
- Historical limited engagement by professional pharmacy and medical professionals in quality improvement activities in the center.

The anticipated barriers were addressed through frequent communication from the project team to staff and stakeholders. The center in which the pilot was completed is part of a large corporation with sizable clinical resources available. Anticipated Facilitators of the clinical change project identified by the EBP Project Team included:

- Support from the DON, center Administrator, and nursing leadership with the clinical problem identified as an organizational priority.
- Administrator support for compensation of staff/team members for team meeting times and educational time.
- Medical Director support of the project.

Appendix A contains the barriers and the specific strategies utilized for addressing these as well as the facilitators and the strategies employed to sustain them throughout the project.

II. LITERATURE SEARCH, APRAISAL, AND ANALYSIS

In this section, the clinical literature and clinical practice guidelines relevant to UTI in LTC and integration of CPG's in LTC are reviewed and analyzed. The seven steps of the Iowa model continue to be utilized as an organizing framework. The significance of this analysis to the project are discussed and gaps between the existing literature and clinical practice are acknowledged.

Iowa Model Step 3: Evidence Retrieval

The literature review is an essential aspect of the Iowa Model. The APRN led the retrieval of evidence from electronic databases including: The Cumulative Index of Nursing and Allied Health (CINAHL), PubMed (Medline) and the Cochrane Database of Systematic Reviews. The *AMDA Guideline: Common Infections* was also appraised as were several other national guidelines pertaining to UTI prevention. Grey literature was avoided in this literature review as adequate research-based articles were identified. Studies were identified through a search of the aforementioned databases from 2000 to the present using subject headings “urinary tract infection” or “UTI” combined with “long term care” or “LTC” with the use of controlled vocabulary through the databases. Limits were also set in the PubMed database to include only those articles available in English, dated 2000 or more recent, age 19+ years, clinical trial, meta-analysis, practice guidelines, and randomized control trials. This strategy reduced the hits from 28,918 to 1,033. Adding an additional limit of evidence-based medicine (EBM) reduced the hits to 16. Limits were set in the CINAHL database to include articles in English and EBP only. This strategy reduced the hits from 2157 to 62. A search of the CINAHL database for the keywords “clinical practice guidelines” combined with “long term care” yielded nine

hits. The PubMed (Medline) databases was also searched with the terms “clinical practice guidelines” and “urinary tract infections” with limits of human, aged 65+ years, and English which yielded 47 hits. The Cochrane database was searched with the keyword “urinary tract infection” combined with “older adults” or “long term care” which yielded 25 hits. The search strategy was repeated September 2013 with additional limits of date range December 2012- 2013 to update the original literature search and yielded one additional systematic review of infection prevention in LTC. The final cohort hits were reviewed by reading the abstracts and only those articles pertaining specifically to urinary tract infection in long term care or the older adult and prevention or reduction of infection and having publication dates 2010 or more current will be retained for appraisal from the Cochrane, CINAHL and PubMed databases. The final number of articles/studies/guidelines retained for future critical appraisal was 17. The abstracts contained information suggesting that these articles pertain specifically to urinary tract infection in long term care and impact on adverse outcomes or rate of infection, or implementation of CPGs in LTC. All articles pertaining specifically to the use or evaluation of CPG’s in LTC with publication dates in the past 10 years were included. No articles were identified that were specific to the PICOT question in regard to evaluation of use of the *AMDA CPG: CI* and impact on UTI rates or outcomes. The search strategy and results are summarized and presented in Appendix B. The evidence included and excluded with rationale are presented in Appendix C.

Iowa Model Step 4: Grading and Synthesis of the Evidence

This step in the Iowa Model includes the critical appraisal and synthesis of evidence. Relevant literature was evaluated and summarized in a table format. Refer to Appendix C for this summary of the literature. Melnyk & Fineout-Overholt's (2011) rating system for the hierarchy of evidence was utilized to grade the evidence. This system was adapted from Guyatt and Rennie's hierarchy and includes seven levels of evidence with level one evidence being considered the highest level of evidence and level seven being the lowest level of evidence. The evidence was examined and the essential elements considered beginning with level I evidence and moving down the hierarchy. There is a paucity of existing studies pertaining to the prevention and management of UTI specifically in the LTC setting (Uchida, Pogozelska-Maziarz, Smith & Larson, 2013). This lack of scientific evidence to evaluate recommended interventions is a source of much concern and support for the need for nursing research in this area.

Three CPGs, which were considered level I evidence based on the strategies used in guideline development, were evaluated. Two of these CPGs were included in the *AMDA CPG: CI*. The third CPG (*HICPAC Guideline for Prevention of CAUTI-2009*) was not included in the *AMDA CPG: CI* likely due to it being released after the *AMDA* guideline was developed. The *HICPAC* guideline provides a rich source of descriptive grading of evidence in support of the included recommendations. As many of these recommendations are included in the *AMDA CPG: CI*, this new CPG lends further support to the *AMDA CPG: CI*. The *AMDA CPG: CI* is derived from evidence-based guidelines, current available evidence and expert consensus. The *AMDA CPG: CI* was developed under a project conducted by *AMDA-Dedicated to Long Term Care Medicine*,

the national professional association of medical directors, attending physicians, and others practicing in long term care. The development of the guideline used a process of combined evidence and consensus –based approaches. The process to guideline development is described as systematic and including literature review, framework development, and interdisciplinary contributions. AMDA relates the ongoing issue of limited scientific evidence in LTC as requiring some recommendations to be based on expert consensus. Each recommendation within the guideline is linked with the scientific evidence available. There is, however, a lack of detailed explanation of the quality of evidence supporting the recommendations. The recommendations are clinically relevant to the LTC setting, are practical and feasible in the LTC setting, and are in alignment with current practice. The outcomes of the guideline can be measured through standard care with analysis of outcomes data from the MDS database, chart reviews, as well as other existing center data sources. The AMDA Clinical Practice Guideline Steering Committee reviews the guideline every three years. The results of the critical appraisal of the *AMDA CPG: CI* and the three other CPG’s are summarized in Appendix D.

The scientific evidence pertaining to the implementation and evaluation of CPG for UTI prevention in LTC is quite limited. Much of the literature that relates to this topic takes the form of expert opinion or applied research of older adults and geriatric medicine. For the purposes of this literature review, key evidence within the *AMDA CPG: CI* pertaining to UTI was identified and is presented in Appendix C. The overall level of evidence that supports the use of the *AMDA CPG: CI* is moderate. The *AMDA CPG: CI* is an evidence-based and practice- based guideline consistent with level B strength of recommendations utilizing the USPSTF system for evaluating evidence to

support recommendations as there is moderate certainty that the benefit of the intervention is moderate to substantial and benefits outweigh harms (<http://www.ahrq.gov/about/evaluations/uspstf/uspstfeval1.htm>). The *AMDA CPG: CI* incorporates evidence from the highest level of evidence currently available (CPG's from leading healthcare organizations). There are elements of the guideline that have high quality evidence to support the recommendations but there are also some components that are not based on high quality evidence due to the lack of such evidence; in these instances, the guideline developers provide expert consensus data to support the recommendation. The *AMDA CPG: CI* provides a synthesis of the available evidence pertaining to the most common infections encountered in LTC. Table 6 displays the critical appraisal data for the *AMDA CPG: CI*, as well as the Infectious Diseases Society of America (IDSA) CPG for catheter-associated UTI (2010), and the Society for Healthcare Epidemiology of America (SHEA)/Association for Professional in Infection Control and Epidemiology (APIC) for infection prevention and control in the long term care facility which are included in the *AMDA CPG: CI*. Table 6 also includes critical appraisal data for the Healthcare Infection Control Practices Advisory Committee (HICPAC) of the Centers for Disease Control (CDC) guideline for prevention of catheter-associated UTI. These CPG's represent the highest level of evidence available regarding UTI in LTC.

The entire *AMDA CPG: CI* appears to be best implemented utilizing an interdisciplinary team approach in the center. The guideline takes a general approach to infection control but also includes specific recommendations for the most common infections encountered in the LTC setting including UTI. The synthesis of the current

evidence into this comprehensive guideline, which contains strategies and considers factors that are unique to the LTC setting, was a necessary first step toward facilitating higher quality evidence to support these recommendations in the LTC setting.

The literature regarding CPG use in LTC is also sparse and limited to small retrospective studies and several qualitative studies. Seven studies pertaining specifically to CPG use in LTC were identified and appraised (Appendix E). Deuster et al. (2010) conducted an intervention study to evaluate the use of treatment guidelines to improve antibiotic therapy use (N=100) and found that implementation of treatment guidelines increased the appropriate antibiotic use in a LTC facility. A systematic review by Flodgren et al. (2013) examined the efficacy of strategies to promote staff adherence to infection control measures and in thirteen studies found insufficient evidence to support any specific measures changing adherence behaviors. A qualitative study by Resnick et al. (2004) explored the feasibility of implementing CPG's in LTC settings and resulted in four themes being identified: 1) challenges to implementation, 2) benefits of implementation, 3) process recommendations, and 4) recommendations for changes to CPGs. Another qualitative analysis by Colon-Emeric (2007) identified additional barriers to implementation of CPGs in LTC. In a retrospective study, Wipke-Tevis et al. (2004) (N=362) revealed that forty percent of LTC facilities were using a tool to assess pressure ulcer risk and prevention that was not evidence-based. Hutt et al. (2006) conducted a quasi-experimental pre-post test with a control group to assess feasibility of the use of evidence-based guidelines for treatment of community-acquired pneumonia in nursing homes; findings suggested that compliance with some guideline components improved. Berlowitz et al. (2001) conducted a survey to determine whether and how CPGs were

being used in nursing homes (N=1065) and found that less than fifty percent reported adoption and use of CPGs.

Analysis of the literature indicates that although CPG's applicable to LTC are available, the actual systematic implementation of CPG's in this setting remains poor (Berlowitz, et al., 2001; Colon-Emeric, et al., 2007; Resnick, Quinn, & Baxter, 2004). Several studies have indicated that the potential for CPG's to improve quality and compliance with current practice standards is good (Deuster, Roten, & Muehlebach, 2010; Hutt, et al., 2006). Results of qualitative studies have supported the feasibility of the use of CPG's in LTC as a means of quality improvement in regard to improvement in documentation and outcomes (Colon-Emeric et al., 2007; Resnick et al., 2004). Qualitative data also provided some perceptions regarding barriers to the implementation of CPG's including perceived lack of congruence between the guidelines and the patient/family wishes, lack of congruence of guidelines with current policies, perception of guidelines as inhibiting individualized care, getting staff buy in, dealing with issues of staff turnover and sustaining implementation as new staff replace old, and ensuring accountability of nursing staff to promote the use of the guidelines (Resnick et al., 2004; Colon-Emeric et al., 2007). The same studies also identified some potential facilitators of implementation of CPG's in the LTC setting which included streamlining the guidelines into algorithms, incorporating the guideline recommendations into standing orders, implementing one CPG at a time, designating a person or small team to champion the implementation of the guideline, developing tools for each guideline, and involving staff in a stepwise education process for implementation (Colon-Emeric et al., 2007; Resnick et al., 2004). The Institute of Medicine (IOM) recommends the use of CPG's, which

synthesize the most current and quality evidence and expert opinion into best practice standards (Institute of Medicine, 2000). A single systematic review assessed the efficacy of interventions which target healthcare professionals or organizations to improve professional adherence to infection control guidelines on device-related infection rates and suggested that educational interventions with multiple active elements that are administered repeatedly over time are most effective (Flodgren et al., 2013). An intervention study measuring effectiveness of incorporating a practice algorithm for suspected UTI in LTC patients resulted in a UTI rate reduction by 30% and antibiotic usage reduction of 20%, which persisted over twelve months (Genao & Buhr, 2012). Similarly, another intervention study utilizing an educational intervention noted sustained reductions in inappropriate treatment of asymptomatic bacteriuria in a LTC center (Zabarsky, Sethi, & Donskey, 2008). An increasing number of CPG's have been developed specifically for use in LTC. The AMDA has led the way of this trend with evidence-based CPG's that take into account many of the factors unique to the LTC environment. The existing literature provides some important considerations in quality improvement intervention development. The pertinent literature from 2010 (the last publication date included in the *AMDA CPG: CI*) to the present was evaluated and is presented in Appendix F. Further discussion of the literature is included in Step 5 with the recommendations for practice change.

Iowa Model Step 5: Developing an EBP Standard

Recommendations for Practice Change

This step of the Iowa Model involves establishing recommendations for practice change based on the evidence. The evidence clearly supports that infections are a

significant source of morbidity and mortality in the LTC setting (Tsan, et al., 2010). The AMDA, the premier professional association for LTC clinicians, has developed a clinical guideline for the four most common infections in the LTC setting (respiratory, urinary, gastrointestinal, and skin/skin structure). This guideline was developed by interdisciplinary workgroups using a process combining evidence and consensus-based thinking, and has been reviewed by national organizations and individual experts (AMDA, <http://www.amda.com/tools/guidelines.cfm>). The practice recommendation was the systematic implementation of the *AMDA CPG: CI* to address the PICOT question. This CPG represents the highest available evidence for prevention and management of UTI in the LTC setting as it is a CPG based on systematic review of available evidence (AMDA, 2011). The clinical change project intervention was an evidence-based and practice-based guideline consistent with Level B utilizing the USPSTF system for evaluating evidence to support recommendations as there is moderate certainty that the benefit of the intervention is moderate to substantial (U.S. Department of Health and Human Services, 2012). There is a noted lack of evidence in the literature that evaluates the use of CPGs in LTC in regard to impact on outcomes. The project integrated the most current practice standards and best practices for infection prevention, recognition, and management in efforts to add to the much-needed evaluation of the CPG in this setting.

III. IMPLEMENTATION

In this section the project implementation is described. The specific practice recommendations with rationale from the body of evidence are presented within the framework of the twelve steps of the *AMDA CPG: CI* and are summarized in Table 2. Specific elements relative to the project interventions are also discussed here.

Table 2: Summary of Recommendation for Practice Change

PICOT Question	In patients living in a LTC facility (P), how does implementation of the AMDA <i>Clinical Guideline: Common Infections (AMDA CPG: CI)</i> (I) compared to current practices(C) affect urinary tract infection rates, antimicrobial usage and adverse outcomes (O) over three months (T).
Practice Change Recommendation	Systematic implementation of the AMDA <i>Clinical Guideline: Common Infections</i> including: <ol style="list-style-type: none"> 1. Establish protocol for initial nursing assessment/evaluation of suspected UTI 2. Establish protocol for appropriate laboratory test evaluation of suspected UTI 3. Establish protocol for evaluation of need for transfer to acute care facility 4. Establish protocol for implementation of appropriate transmission precautions 5. Establish process for ongoing monitoring and documentation of patient response to treatment for infection. 6. Implement an immunization program for all center patients 7. Implement a center-wide infection control program that conforms to federal and state regulations and current standards of practice. 8. Monitor management of infections in the center. 9. Monitor antibiotic use in the center.
Level of Effectiveness	The project intervention is an evidence-based and practice- based guideline consistent with level B utilizing the USPSTF system for evaluating evidence to support recommendations as there is moderate certainty that the benefit of the intervention is moderate to substantial http://www.ahrq.gov/about/evaluations/uspstf/uspstfeval1.htm)
References in Support of Recommendation	This CPG represents the highest available evidence for prevention and management of UTI in the LTC setting as it is a CPG based on systematic review of available evidence and expert consensus in the field (AMDA, 2011).

AMDA CPG: CI Step 1: Recognition

In this step the guideline emphasizes the importance of prompt recognition of signs and symptoms consistent with infection. This step includes evaluation of vital signs, mental status compared to baseline, and the importance of nursing staff reporting these acute changes of conditions to healthcare providers. The evidence supports that infections, including UTI's, in LTC residents predispose to serious consequences such as dehydration, delirium, falls, sepsis, hospitalization, and even death (Engelhart, Hanses-Derendorf, Exner, & Kramer, 2005; Mylotte, 2005). In the LTC population UTI's account for approximately one fourth of all infections (Foxman, 2002; Ruben et al., 1995). UTI's have also been estimated to account for up to sixty percent of systemic antimicrobials used in the LTC setting (Nicolle, 2001; Nicolle, 2003). UTI's that are not recognized and managed appropriately may also lead to the need for hospitalization of LTC residents that can cause disruptions in care, "discomfort and anxiety for residents and families, iatrogenic complications during hospitalization with related morbidity, and excess health care costs" (Ouslander et al., 2009, p. 645). The project team developed a suspected UTI (sUTI) worksheet to be utilized by center nursing staff when a patient is suspected of having a UTI (Appendix J). The sUTI worksheet was developed from the *AMDA CPG: CI* and included criteria for change in patient condition that suggests UTI. Staff used these criteria to determine when further assessment for sUTI was warranted.

AMDA CPG: CI Step 2- 4: Assessment

In these steps the guideline emphasizes the performance of a targeted history and physical exam that aligns with the likely sources of infection based on presenting symptomology. This step includes diagnostic testing as appropriate. In regard to UTI,

the guideline suggests the use of clinical signs and symptoms to guide the judicious use of urinalysis and culture. This is further supported by the 2009 study by Juthani-Mehta et al. in which clinical features associated with bacteriuria plus pyuria (the proposed clinical definition for UTI) were found to be dysuria, change in character of urine, and change in mental status. This study further supports the recommendation of the *AMDA CPG: CI* for assessment and reporting of clinical features suggestive of UTI promptly to providers so that a clinical decision can be made. The guideline suggests that positive urine dipstick or presence of leukocyte esterase on urinalysis suggest that a urine culture should be performed. Furthermore, the guideline recommends avoiding follow up urine culture after antibiotic treatment due to the high incidence of asymptomatic bacteriuria in the LTC population. Asymptomatic bacteriuria is prevalent in the LTC population and several randomized clinical trials among LTC residents have demonstrated that treatment of AB is not beneficial (Abrutyn et al., 1994; Nicolle, Mayhew, & Bryan, 1987; Nicolle, Bjornson, & Harding 2000). Despite the recommendations that treatment of AB with antimicrobials be avoided in LTC, the practice remains common in this setting (Loeb et al., 2001). An intervention study in an Ohio LTC facility involving an educational intervention demonstrated sustained reduction in inappropriate treatment of asymptomatic bacteriuria as well as decreased overall antimicrobial use (Zabarsky, et al., 2008). Genao and Buhr (2012) reported a thirty percent decrease in suspected UTI and twenty percent decrease in antibiotic usage over a three-month period with the use of a nursing-driven algorithm for suspected UTI management.

Inappropriate treatment of AB with antimicrobials results in adverse drug events, emergence of MDRO's, occurrence of *c. difficile* diarrhea, and increased costs (Abrutyn

et al., 1994; Nicolle, 2001, Nicolle, 2003; Ouslander et al., 2009). Infections with MDRO's have long-reaching consequences for the health of LTC residents and the general public. Morbidity associated with infection with MDRO's leads to increased costs associated with increased hospitalizations, treatment, and implementation of infection control measures (Straussbaugh, Crossley, Nurse, & Thrupp, 1996). MDRO infections may also contribute to a lower health-related quality of life and functional decline (Loeb et al., 2001).

Assessment also includes determining whether a patient's condition requires transfer to an emergency department or hospital setting when the patient has unstable vital signs, diagnostic tests are not available in the center, or the scope of monitoring or treatment exceeds the capabilities of the center. The assessment component also addresses the need for assessment of LTC patients for appropriate use of indwelling urinary devices. The *AMDA CPG: CI* incorporates recommendations from the IDSA CPG for catheter-associated UTI (2010), and the SHEA/APIC guideline for infection prevention and control in the long term care facility. The new HICPAC of the CDC guideline for prevention of catheter-associated UTI provides additional support for these recommendations for evaluation of appropriate short and long-term catheter use, catheter management strategies, and diagnostic criteria for UTI in the LTC setting. An intervention study reported that the use of a nursing-driven algorithm for determining appropriateness of indwelling urinary catheter placement reduced total catheter days by twenty percent (Magers, 2013). The HICPAC CPG sets a new standard for documentation of grade of evidence to support recommendations with comprehensive evidence tables and recommendations for further research. Finally, assessment requires

the determination of the need for heightened infection control precautions. Specific to UTI this may include the containment of urine that is potentially contaminated by multi-drug resistant organisms (MDROs). Standard precautions are those applied at all times to all patients and transmission precautions are those that should be implemented in the case of known or suspected transmissible diseases.

The sUTI worksheet delineated the pertinent history and physical exam elements from the *AMDA CPG: CI*. These elements included vital signs, mental status, and urinary symptoms. The worksheet also provided the criteria for laboratory urinalysis and culture and implementation of appropriate transmission precautions.

AMDA CPG: CI Step 5 and 6: Treatment

These steps of the guideline focus on the targeted treatment of the symptoms of infection through use of supportive measures for comfort (i.e. treatment of fever, maintenance of fluid intake, monitor nutritional status and initiate nutritional interventions as needed). The treatment component of the guideline also addresses antibiotic therapy. The guideline suggests that empiric therapy based on center epidemiologic data and the most likely source of infection may be warranted but stresses the importance of specific therapy through culture when possible. The guideline refers to current CPGs for CAUTI in regard to limiting duration of antibiotic therapy for UTI. Deuster et al. (2009) further support the *AMDA CPG: CI* recommendation for referral to targeted antibiotic treatment guidelines to support the judicious use of antibiotics in LTC. The sUTI worksheet prompted staff to determine whether the patient met *AMDA CPG: CI* criteria for empiric treatment with an antibiotic and to communicate this to the provider when reporting the change in condition.

AMDA CPG: CI Step 7-12: Monitoring

The monitoring component of the guideline refers to monitoring of: 1) Patient response to treatment, 2) monitoring for, identifying and containing identified outbreaks of infection, 3) implementing and monitoring an immunization program for patients, 4) implementation of a facility-wide program of infection prevention and control that complies with both state and federal LTC regulations as well as current practice standards, 5) monitoring of infection management in the center, and 6) implementing an antibiotic stewardship program in the center. Specific to UTI these guidelines can be interpreted to include the need for monitoring of response to antibiotic therapy including assessing for recurrent infections and appropriate referral for urologic evaluation when warranted. It suggests that a comprehensive program of infection prevention and control including staff education of aseptic catheterization and urine specimen collection techniques be implemented. Perhaps most importantly, the guideline suggests a program of monitoring infection trends in the center and participating in antibiotic stewardship through evaluation of appropriate antibiotic prescribing and appropriate follow up with providers.

Iowa Model Step 6: Implementing EBP

The project was submitted for expedited review through the Wright State University Institutional Review Board. The project was determined to be exempt from Institutional Review Board approval. Project implementation included three phases. Each phase is presented in the following sections. Appendix H contains an outline for the project including final implementation and evaluation timeline.

Implementation phase I.

The EBP Project Team determined the specific project implementation timeline and communicated this to key stakeholders via a brief presentation. The EBP Project Team reviewed current policies and procedures in comparison to *AMDA CPG: CI* for infection control measures, immunization program, and infection and antimicrobial surveillance. It was determined that current policies and procedures regarding immunization and infection control were in compliance with the *AMDA CPG: CI*. It was also determined that the antibiotic surveillance elements of the guideline were also being partially followed. The pharmacy and laboratory provided the appropriate antibiotic usage and aggregate microbe reports but these were not being shared routinely with providers. The ADON added the monthly antibiotic and microbe reports to the agenda for the routine Quality Committee meetings to close this gap. Baseline data for the outcome indicators were assessed and recorded by the EBP Project Team through retrospective chart audits (Appendix I). The MDS and resident chart reviews were the sources of data at both pre-intervention and post-intervention. Charts were reviewed for treatment of asymptomatic bacteriuria and appropriate implementation of transmission precautions in residents identified as having been treated for UTI in the center. Retrospective chart reviews were completed on records of residents identified as having been treated for UTI in the three months pre-intervention to analyze the center practices in comparison to the *AMDA CPG: CI*.

Implementation phase II.

The EBP Project Team analyzed results of this assessment and determined that an evidence-based, nursing-driven protocol for suspected UTI was appropriate to facilitate

improved integration of the CPG. The EBP Project Team developed the sUTI protocol worksheet (Appendix J) and staff/provider education related to the protocol based on the systematic evaluation of gaps between current center practices and comparison to the *AMDA CPG: CI*. A PowerPoint presentation (Appendix K) was utilized for staff/provider education in addition to return demonstration of technique for dipstick urine collection and performance, and role-playing of communication of protocol elements between staff and providers.

Implementation phase III.

The Project Leader in collaboration with the nursing leadership completed formal staff/provider education for the intervention including instructions for use of the sUTI worksheet. The EBP Project protocol was piloted for a period of three months. The sUTI Protocol binders with worksheets were placed in convenient locations in the nursing documentation area. The Project Leader made site visits to the center monthly during the pilot period and talked with individual and small groups of nursing staff regarding protocol utilization. Project Team members were present at monthly nursing staff meeting in the center and provided reminders for all staff regarding protocol utilization.

Iowa Model Step 7: Evaluation of the Clinical Change

Selection of Outcomes and Methods.

Identification of outcome indicators is a critical step in a practice-based project. The outcome indicators for this project were derived from the overall project goal and purpose. Donabedian's S-P-O Model was utilized as a framework for the evaluation components of the project. Donabedian (2005)) suggested that quality may be evaluated using three approaches either as a stand-alone approach or in combination with the other

approaches: 1) structure of care, 2) process of care, or 3) outcome of care. For this project, assessment of the status of current structure indicators was completed as part of the project planning through assessment of administrative support and analysis of potential barriers and facilitators. The process and outcome approaches to evaluation utilized for the evaluation of this project are summarized and presented in Appendix G.

The outcome indicators included: 1) incidence of UTI per 1000 resident days and 2) incidence of unplanned discharges from the center to acute care facilities/emergency room for UTI/urosepsis per 1000 resident days, and 3) antibiotic usage. The Minimum Data Set (MDS) and patient charts were the sources of data for these outcome indicators. The process indicators of *AMDA CPG: CI* implementation were also evaluated and included: 1) evidence of process for suspected UTI risk, 2) evidence of suspected UTI assessment according to the *AMDA CPG: CI*, 3) evidence of appropriate diagnostics for suspected UTI according to the *AMDA CPG: CI*, 4) evidence that residents with suspected UTI being treated with antimicrobials therapy met criteria for UTI, 5) evidence that appropriate transmission precautions were implemented for UTI caused by multiple drug resistant organisms (MDRO's), and 6) staff evaluation of process. Staff evaluation of the process was evaluated through use of focus groups to identify staff perceptions of what went well, what could have been improved, and strategies for future improvements in regard to the project process. Chart audits were the primary source of data for the remaining process indicators.

Measurement and evaluation of the quality of health is a complex process. The evidence supports that infections, including UTI's, in LTC residents predispose to serious consequences such as dehydration, delirium, falls, sepsis, hospitalization, and even death

(Engelhart, et al. 2005; Mylotte, 2005). These factors made the outcome and process indicators of the project pertinent to the attainment of the project overall goal of improving quality of care for residents of a LTC center through best practices in UTI prevention and management and were critical indicators of project success.

The outcome indicators of incidence of UTI per 1000 resident days, number of unplanned discharges to acute care/ER for UTI/urosepsis, and antibiotic usage were collected from the MDS and resident charts at both pre-intervention for baseline data and post-intervention for evaluation data. The process indicators of: 1) evidence of process of suspected UTI risk, 2) evidence of suspected UTI assessment in compliance with the *AMDA CPG: CI*, 3) evidence of appropriate diagnostics for suspected UTI in compliance with the *AMDA CPG: CI*, 4) evidence that residents with suspected UTI being treated with antimicrobial therapy meet criteria for UTI, and 5) evidence that appropriate transmission precautions are implemented for UTI caused by MDRO's were evaluated through the post-intervention chart audit with the audit tool based on the *AMDA CPG: CI*(Appendix I). Appendix G outlines the evaluation components and measures utilized in the project.

Cost Considerations

Infections are a significant source of morbidity and mortality in the LTC setting (Tsan et al., 2010). The infection rates for patients in LTC ranges from 1.8-13.5 infections per 1,000 resident-care days (Smith et al., 2008). Infections are the reason for nearly half of all unplanned discharges from LTC facilities to acute care and result in an estimated financial burden to the nation's healthcare system of as much as \$2 billion annually (Strausbaugh & Joseph, 2000). Additionally, estimates of the cost of antibiotic

therapy for infection in LTC are as high as \$137 million annually (Smith et al., 2008) and account for up to 60% of systemic antimicrobials prescribed in the LTC setting (Nicolle, 2001). This has significant implications for the potential for widespread antimicrobial use and the contribution to antimicrobial resistance (Van Buul et al., 2012).

The cost considerations specific to this project included the material expenses associated with development time and production of written education materials and tools, which are presented in Table 3. There were no capital expenses incurred. There was no cost to the participants. The project team activities were implemented as part of the existing Quality Committee activities within the center. Therefore, additional compensation outside of that routinely expected from team members, as Quality Committee members were not required. The center administration supported project team activities by allotting time from regular scheduled work hours to be utilized for the project team activities by salaried employees who were project team members.

Table 3: Project-related Costs

Project-related Costs	\$\$Amount
Material Expenses	
<ul style="list-style-type: none"> Paper and ink for fliers and project introduction materials for stakeholders, and chart audit tools(4 reams @ \$6.79/ream and 2 ink cartridges @ \$25.09each) 	\$77.34
<ul style="list-style-type: none"> Paper for educational handouts, sign in sheets, and other printed materials (10 reams @ 6.79/ream) 	\$67.90
<ul style="list-style-type: none"> Additional office supplies for folders, pens, markers- approximated costs 	\$ 50.00
Labor Expenses	
All project team member compensation to be covered by facility within the Quality Committee responsibilities.	\$0.00
Total	\$195.24

Summary of Implementation Methods

In this section, the strategy for implementing the AMDA *CPG:CI* in the pilot center was described. The strategy involved systematic evaluation of center practices compared to the *AMDA CPG: CI* to determine gaps in practice, plan interventions to address those gaps, and finally to implement those interventions. This process led to the development of a nursing-driven protocol worksheet designed to facilitate integration of critical *AMDA CPG: CI* elements into center practices. The implementation process included interdisciplinary contributions, support, collaboration, and communication. The plan for data analysis of clinical outcomes as well as process outcomes was also described.

IV. OUTCOMES

In this section, the outcomes of the clinical change project will be presented. A description of the data collection, preparation, and entry processes utilized for evaluation of the clinical and process outcomes is included.

Population

The population for this project consisted of all patients of a 98-bed dually Medicare/Medicaid certified, for-profit long-term care center. Two primary care physicians and a physician assistant provide attending medical management of center patients. The majority of facility patients have Medicaid as a payor source although Medicare, private pay, and commercial insurance are also accepted. The facility has a frail, elderly population with a majority of long-stay (>30 days) patients. A representative sample of the patients in the center is provided (Table 4). The project sample was a convenience sample of patients in the center over the six-month project pilot period. Patient charts were included in the project review for process indicators if during the review period they were: 1) diagnosed with a UTI, 2) had an antibiotic prescribed for a UTI, or 3) had urinalysis/culture performed. The total number of patient charts reviewed at baseline was 49 and post- intervention was 31.

Table 4: Characteristics of a Representative Sample at the Nursing Center

Number of Patients	N= 89
Average age (years)	76
Females	77%
Males	23%
Payor Source	
Medicare	10%
Medicaid	55%
Commercial	19%
Self/private pay	17%

Reliability

The forms used for this project were developed by the DNP student who was also the Project Leader, based on current and relevant research and with the approval of the Medical Director of the center who is an expert in long-term care medicine. The Project Leader provided all education for this project and collected and recorded all data. This added to the consistency with which the education occurred and with which the process and outcomes were evaluated both of which enhanced reliability.

Project Measures and Results

Data collected is presented in the sUTI project measures and outcome indicators tables (Table 5 and Table 6). The data collected reflects both clinical outcome indicators and process indicators. For the outcome indicators, incidence rates per 1000 resident days were calculated and for the process indicator, percentages were calculated. Incidence rates per 1000 resident days were calculated using this formula: number of infections per month/average monthly resident care days x 1000. The average monthly resident care days were calculated as the sum of daily census in that month.

Table 5: sUTI Project Measures and Outcome Indicators

Outcome Indicator	Pre-Intervention Measurement	Intervention Measurement	Difference (pre-post)
Incidence of UTI per 1000 resident days	5.4	3.5	-2.0
Incidence of unplanned discharges from the center to acute care facilities/ER for UTI/urosepsis per 1000 resident days	0.3	0	-0.3
Incidence of antibiotic usage in Center per 1000 resident days	13.9	10.7	-3.2

A chi-square test was used to test the rate difference between the pre-intervention and intervention incidence of UTI per 1000 resident days. The pre-intervention period incidence rate of UTI was 5.4, whereas incidence rate in the intervention period was 3.5. The rate difference was 2.0 and it was not significant ($\chi^2(1) = 1.28, p = 0.258$). A chi-square test was also used to test the difference in the incidence rate of patients prescribed antibiotics in the center during the pre-intervention and intervention periods. In the pre-intervention the incidence rate of antibiotic usage per 1000 resident days was 13.9, whereas the incidence rate was 10.7 during the intervention period. There was a non-significant decrease of 3.2 ($\chi^2(1) = 1.23, p = 0.268$). To test the incidence rate difference between pre-intervention and intervention periods number of unplanned discharges, a Fisher's exact test was used because the number of unplanned discharges in both pre-intervention and intervention periods was <10 . The incidence rate of unplanned discharges for the pre-intervention period were 0.3 and for the intervention period were 0, the rate difference of -0.3 was not statistically significant ($p = 1.000$).

Table 6: Project Measures and Process Indicators

Process Indicator	Pre-intervention Measurement <i>n= 49</i>	Intervention Measurement <i>n= 31</i>	Difference (pre-post)
Evidence of process for sUTI risk	24.49%	61.29%	36.80%
sUTI assessment present	22.45%	51.61%	29.16%
Diagnostics for sUTI in compliance with CPG	14.29%	54.84%	40.55%
Patients with sUTI being treated with antimicrobial therapy meet criteria for UTI	22.45%	61.29%	38.84%
Appropriate transmission precautions are implemented	100%	100%	

Chi-square and Fisher's exact tests (depending on the sample size) were used to test the proportion difference between the pre-intervention and intervention periods occurrence of specific process indicators in patient records. A chi-square test was used to compare the proportion of the process indicator of the evidence of process for sUTI risk between the pre-intervention and intervention periods. During the pre-intervention period, the measure for this indicator was 24.49% which increased to 61.29% during the intervention period, there was a significant 36.80% increase ($\chi^2(1) = 10.83, p= 0.001$). A chi square was also utilized to test the proportion difference between the pre-intervention and intervention periods of the process indicator of sUTI assessment. The process indicator of sUTI assessment documented for pre-intervention period was 22.45%, this number increased to 51.61% in the intervention period. The increase of 29.16% was significant ($\chi^2(1) = 7.22, p=0.007$). For the process indicator of diagnostics for sUTI in compliance with the CPG, pre-intervention measure, a Fisher's exact test was utilized

since the number of patients with this indicator was <10 in the pre-intervention period. The measure of this indicator during the pre-intervention period was 14.29% while the intervention period measure was 54.84%. The 40.55% increase was significant ($p < 0.001$). For the process indicator for those patients being treated with antimicrobial therapy meeting the CPG criteria for UTI, the pre-intervention measure was 22.45% whereas, the intervention period measure was 61.29%, a chi-square test was utilized to test the difference and resulted in a significant 38.84% increase ($\chi^2(1) = 12.22, p < 0.001$). The final process indicator of appropriate transmission precautions being utilized for UTI caused by MDRO's was not subjected to statistical analysis as both pre-intervention and intervention period measures were 100%.

In addition to the process indicator measures, the process of the implementation of the project was evaluated through the use of focus groups. Three focus group sessions were held during the project (once monthly during the intervention period). These focus groups involved nursing staff, were informal and consisted of three questions:

1. What is going well with the project?
2. What are the challenges of the project?
3. What changes do you think should be made to the project?

Each focus group session lasted approximately 15 minutes. Results from these focus groups included that overall, staff felt the project was going well, that the project goals were important to quality of care, and that the protocol was easy to understand and implement. The perceived challenges of the project related mainly to the time required to document. Suggestions for improvements included project tools that were displayed more prominently in the nursing areas and incorporation of protocol elements into the

Medicare charting flowsheet. Table 7 displays the full results of the outcome measures and statistical tests for the project including differences and confidence intervals for each outcome.

Table 7: Project Measures and Statistical Test/Results

Outcome Indicator	Pre-intervention	Intervention	Post – Pre			Chi-Square Test	
			Difference	Lower CI	Upper CI	$\chi^2(1)$	p-value
Incidence of UTI per 1000 resident days	5.4	3.5	-2.0	-5.4	1.4	1.28	0.258
# of unplanned discharges	0.3	0.0	-0.3	-1.0	0.3		*1.00
# of patients prescribed an antibiotic	13.9	10.7	-3.2	-8.8	2.5	1.23	0.268
Evidence of process for sUTI risk	24.49%	61.29%	36.80%	15.85%	57.75%	10.83	0.001
sUTI assessment present	22.45%	51.61%	29.16%	8.05%	50.28%	7.22	0.007
Diagnostics for sUTI in compliance with CPG	14.29%	54.84%	40.55%	20.48%	60.63%		* < 0.001
Patients with sUTI being treated with antimicrobial therapy meet criteria for UTI	22.45%	61.29%	38.84%	18.09%	59.59%	12.22	< 0.001
Appropriate transmission precautions are implemented	100%	100%					

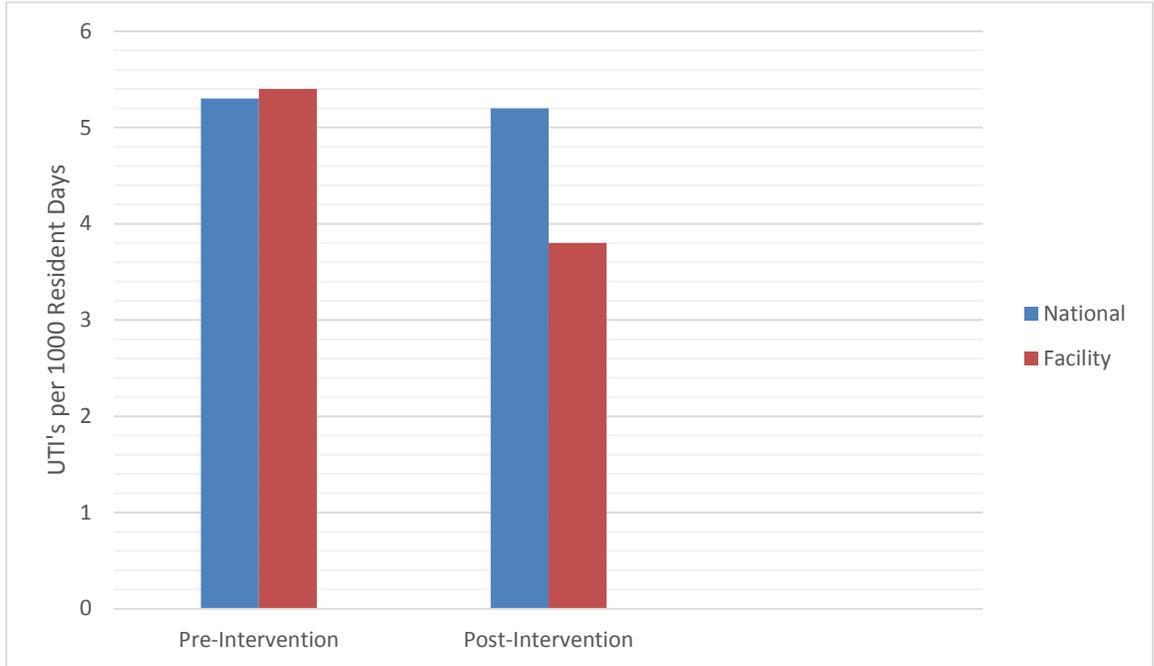
*= Fisher's Exact Test used to compute proportional difference

Clinical Significance

The results for the project process indicators support the use of education and the sUTI protocol as an effective intervention to improve compliance with CPG recommendation related to sUTI recognition and management in the LTC setting. There was statistically significance improvement in each of the process indicators supporting that there was a relevant clinical change that occurred as a result of the project.

For the outcome indicators of the project, the results were not statistically significant, but there is clinical significance in the reduction of the incidence of UTI per 1000 resident days from 5.4% which was above the national benchmark of 5.3% (identified from the national MDS system) during the pre-intervention period to 3.5% which was below the national benchmark of 5.2% for the post-intervention period. This outcome is not only a project indicator but also a critical quality indicator for the center. Despite the lack of statistical significance of the reduction in incidence of UTI, the clinical implications from a quality of care perspective are significant. Figure 2 displays the comparison of the baseline (pre-intervention) incidence of UTI to the 3-month intervention period of incidence of UTI and the corresponding national benchmarks.

Figure 2: Comparison of UTI Incidence per 1000 Resident Days to National Benchmarks



There are clinically significant implications related to cost savings that can be extrapolated from the project outcomes. There was the marked decrease in unplanned discharges related to UTI/urosepsis to zero. Although the statistical analysis did not show significance in this measure, the clinical significance is great when considering the potential impact on quality of life, morbidity and associated costs related to UTI/urosepsis on the LTC patient population. The cost benefits of the project include a reduction in lost revenue from bed hold days required when Medicaid recipients experience an unplanned discharge to an acute care facility; the LTC center is reimbursed only a fraction of the daily rate when a patient is on a bed hold day. For example, a Medicaid patient for whom Medicaid is reimbursing the facility \$164.80/day at the regular daily rate who is admitted to the hospital will have the room reimbursed at only \$26.98/day. The facility is required to bed hold these rooms for up to thirty days per year per patient. Additional cost savings can be inferred from reduced laboratory costs for

urinalyses and cultures completed on those who do not meet criteria for UTI and subsequent costs associated with antimicrobial treatment for asymptomatic bacteriuria. There is also the potential for prevention/reduction of MDRO's and *Clostridium difficile* gastroenteritis, which is associated with overuse of antimicrobials (Dellit, Owens, & McGowan, 2007).

Consider the following case scenario:

Anne Marie is a 74 year old white female residing in a long-term care facility. She has a medical history significant for moderate Alzheimer's Dementia, hypertension, and diabetes mellitus type 2. Today, staff in the center has noted that Anne Marie is more irritable than usual and seems more confused. She denies any dysuria, or other urinary symptoms. She is afebrile and her vital signs are within normal parameters for her. The nurse believes that Anne Marie's symptoms could indicate a UTI. She obtains a mid-stream urine specimen and sends it to the laboratory for analysis. The initial urinalysis is leukocyte esterase negative but shows a few bacteria. The specimen has been sent for culture. Three days later the culture results come back with >10,000 cfu's of E.Coli. In the meantime, Anne Marie was much better the day following the collection of her urinalysis and the nurse was notified by the oncoming evening shift that Anne Marie's family had taken her to a family birthday party the evening before and that could have explained her behavior change. Her attending physician is notified of the culture results and she is prescribed a seven-day course of levofloxacin 500 mg by mouth daily. Subsequently she develops diarrhea requiring her to wear adult incontinence pads to prevent soiling her clothing, which is embarrassing to her, and she does not participate in meals in the dining area or center

activities for four days. She also develops incontinence dermatitis and requires one week of treatment with a zinc oxide cream to resolve.

This case illustrates a common occurrence in the LTC setting. A patient has a urinalysis obtained for non-specific symptoms and the subsequent culture reflects incidental asymptomatic bacteriuria. Although the patient is not symptomatic for a UTI, treatment is instituted based on culture results. The estimated costs for this uncomplicated UTI are presented in Table 4. In addition to the obvious monetary costs, the cost to the patient’s dignity related to the need for incontinence supplies and the discomfort associated with the diarrhea and related symptoms stand to significantly impact the patient’s quality of life.

Table 8: Suspected UTI and Associated Costs

Suspected UTI-related service/product	\$\$ Cost
Routine urinalysis with culture	\$98.00
Levofloxacin 500 mg 7 day regimen	\$18.42
Incontinence supplies (6 days)	\$80.00
Additional staff time required for care of Incontinence and associated symptoms @ Additional .75 hr/8 hour shift x 3 shifts/day x 6 days x \$9.60/hr	\$129.60
Zinc oxide cream x 1 tube	\$5.50
	Total= \$331.52

V. IMPLICATIONS AND RECOMMENDATIONS

This evidence-based clinical change project addressed the clinical problem trigger of increased rates of urinary tract infections in a rural southwestern Ohio nursing center. The clinical change involved the systematic implementation of the *American Medical Director's Association (AMDA) Clinical practice Guideline for Common Infections* into the center. An interdisciplinary team approach to evidence-based clinical change was utilized through use of the IOWA model of evidence-based practice. The significant implications for this project include support for the use of a nursing-driven, evidence-based protocol to facilitate systematic implementation of CPG's in the LTC setting and evidence to support the efficacy of the *AMDA CPG: CI* guideline for reduction of UTI rates and antimicrobial usage in the LTC setting.

Strengths and Limitations

The strengths of this project included the involvement of the stakeholders (providers, nurses, administration, and nursing leadership) who were able to provide input, knowledge, and support for the project. This project represented the first evidence-based team project in the center and process evaluation indicated that this approach is well received by staff which paves the way for future projects in the center. This project is one of very few available examples of systematic evaluation and integration of a CPG in the LTC setting.

Limitations of the project included the convenience sample, the relatively short project time period of three months and the resulting lack of ability to establish statistical significance for project outcomes. Another limitation inherent to the process of this project is that the project site is also an active clinical site. Processes to improve quality

in the center are ongoing and the census is not static, but rather subject to daily changes in patient mix, which means that, a variety of uncontrolled variables could also be potentially impacting outcomes.

Recommendations

This clinical change project was an important step toward measuring the impact and evaluating the process of systematic implementation of CPG's to reduce UTI and improve UTI management in this rural southwestern Ohio LTC setting. The findings of this project determined a marked improvement in compliance with critical elements of the *AMDA CPG: CI* through use of a nursing-driven, evidence-based protocol. There was also a clinically significant reduction in the overall incidence of UTI, antimicrobial usage, and unplanned discharges related to URI/urosepsis. Recommendations for future EBP application include:

- Implementation in LTC centers that are in a variety of geographical locations to determine the applicability to a variety of settings.
- Measure of outcomes across a greater duration of time to gauge impact across time and sustainability of interventions.
- Development of additional tools for staff to use as reference for following *AMDA CPG: CI* recommendations (i.e. poster with charting elements and criteria).

Summary

The project had a clinical problem trigger of UTI incidence greater than the national benchmark and increased unplanned discharges related to UTI/urosepsis. The overall project goal was to improve the quality of care of LTC residents through use of best practices for the prevention and management of UTI. The Iowa Model of Evidence-based

Practice was used to guide the project. Through an interdisciplinary team approach to EBP. An assessment of internal and external data led to the identification of the PICOT question: In patients living in a LTC facility (P), how does implementation of the *AMDA Clinical Guideline: Common Infections (AMDA CPG: CI)* (I) compared to current practices(C) affect urinary tract infection rates, antimicrobial usage, unplanned discharges (O) over three months (T).

A systematic evaluation of current center practice compared to the *AMDA CPG: CI* recommendations led to the project team development of a nursing-driven protocol for sUTI recognition and management as an intervention to close the gaps between current practice and best practice as defines by the CPG. The protocol was implemented in the center and both outcome and process indicators were measured and analyzed. Incidence of UTI, antimicrobial use, and unplanned discharges were reduced during the intervention period though these were not statistically significant upon computation. Process indicators supporting the evidence of compliance with *AMDA CPG:CI* recommendations were also improved and these were statistically significant.

Dissemination of the project results is an important step in advancing future CPG integration and evaluation in the LTC setting and is critical in promoting the clinical practice doctorate in nursing (Melnik & Fineout-Overholt, 2011). Abstracts for this project have been submitted to the national Geriatric Advanced Practice Nurses' Association (GAPNA) and the national DNP conference in 2015. A manuscript for publication is also planned to disseminate the results of the project.

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Appendix A

Identified Barriers and Facilitators for EBP Change Project

Barriers	Action Plan
Need for staff/team buy-in and accountability for utilizing EBP project process	Met with key stakeholders and discussed proposed EBP Clinical Change Project in relationship to quality, cost, and outcomes
Acceptance of EBP project process by medical providers in the center	Worked through center Medical Director to encourage acceptance and participation
Lack of history of culture of support for EBP within the center	Introduced EBP principles to the Interdisciplinary Project Team and educated all clinical staff on the project and basic EBP principles
Sustainability of the CPG across shifts and over time	Targeted educational intervention to promote compliance with the CPG
Historical limited engagement by professional pharmacy and medical professionals in quality improvement activities in the center.	APRN met individually with pharmacy consultant and medical providers to provide information about the project and gain buy-in and commitment for participation
Facilitators	Action Plan
Currently established support from the center Administrator, nursing leadership and Medical Director with the clinical problem identified as an organizational priority	Continuous communication and update on project implementation schedule
Administrator support for compensation of staff/team members for team meeting time	Provided cost-benefit analysis to center Administrator to provide support for rationale of compensation for project time Administrator communicated her support of the project to staff
Medical director is familiar with AMDA guidelines, is an active MADA member and has expressed support for use of the AMDA CPG: CI	Continuous communication and update on project implementation schedule Medical director communicated his support of the project to staff and providers

Appendix B
Search Strategy

Date of Search	Keyword(s) used	Database/Source used	# of Hits Listed	# of Hits Reviewed	# of Hits Used
2/3/12	UTI	CINAHL	834		
2/3/12	UTI or Urinary Tract Infection AND long term care	CINAHL	876		
2/3/12	UTI OR Urinary Tract Infection AND LTC OR Long Term Care	CINAHL	2157		
2/3/12	UTI OR Urinary Tract Infection AND LTC OR Long Term Care Plus limits of EBP and English articles only	CINAHL	62	62	2
9/12/13	UTI OR Urinary Tract Infection AND LTC OR Long Term Care Plus limits of EBP and English articles only plus date range 2012-2013	CINAHL	15	15	3
2/3/12	Clinical Practice Guidelines AND long term care	CINAHL	9	9	6
9/12/13	Clinical Practice Guidelines AND long term care plus date range 2012-2013	CINAHL	10	10	1
2/3/12	UTI	PubMed(Medline)	8809		
2/3/12	Urinary Tract Infection	PubMed(Medline)	28,891		
2/3/12	UTI or Urinary Tract Infection	PubMed(Medline)	32,938		
2/3/12	UTI or Urinary Tract Infection AND long term care	PubMed(Medline)	28,918		
2/3/12	UTI or Urinary Tract Infection AND long term care OR LTC with limits of: human, age 19+ years, date range 1/01/2000-12/31/2012, clinical trials, meta-analysis, rct, practice guideline, English, PLUS EBM	PubMed(Medline)	16	16	3

9/26/13	UTI or Urinary Tract Infection AND long term care OR LTC with limits of: human, age 19+ years, date range 12/31/2012-9/26/2013, clinical trials, meta-analysis, rct, practice guideline, English, PLUS EBM	PubMed(Medline)	0	0	0	
2/3/12	Clinical Practice Guidelines AND Urinary Tract Infections with limits of: humans, aged 65+ years, English	PubMed(Medline)	47	47	2(same 2 as in CINAHL)	
9/26/13	Clinical Practice Guidelines AND Urinary Tract Infections with limits of: humans, aged 65+ years, English	PubMed(Medline)	1	1	0	
9/26/13	Urinary Tract Infection(keyword) and older adults or long term care	Cochrane Library	3	3	1	# of Hits Used

Appendix C
Evidence Included and Excluded with Rationale

Citation First Author (Year)	Citation Title	Included/Excluded and Rationale
Hooton, T. et al. <i>Clinical Infectious Diseases</i> , 50, 625-663 (2010)	Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 international clinical practice guidelines from the Infectious Diseases Society of America	Included- CPG related to CAUTI with specific considerations for LTC included. This CPG is included in the <i>AMDA CPG: CI</i> .
Gould, C. et al. <i>HICPAC</i> (2010)	Guidelines for prevention of catheter-associated urinary tract infections 2009	Included- CPG for CAUTI with comprehensive grading of evidence for each intervention. This CPG is not included in <i>AMDA CPG: CI</i> due to its release in late 2010.
Smith, et al. <i>American Journal of Infection Control</i> , 36, 504-535(2008)	SHEA/APIC guideline: Infection prevention and control in the long term care facility	Included- general CPG for infection prevention in LTC, includes recommendations for UTI prevention. This CPG is included in <i>AMDA CPG: CI</i> .
Deuster, S. et al. <i>Journal of Clinical Pharmacy and Therapeutics</i> , 35, 71-78. (2010)	Implementation of treatment guidelines to support judicious use of antibiotic therapy	Include- Intervention study on education on treatment guideline for UTI.
Genao, L. et al. <i>Annals of Long Term Care</i> , 20(4), 33-38.	Implementation of a UTI algorithm to reduce inappropriate antibiotic treatment and rate of UTI in LTC.	Include-Intervention study on implementing clinical guidelines in LTC
Citation First Author (Year)	Citation Title	Included/Excluded and Rationale
Woodford, H. <i>Journal of the American Geriatric Society</i> , 57, 107-114. (2009)	Diagnosis and management of urinary tract infection in hospitalized older people	Excluded- setting is acute care

Juthani-Mehta, M., et al. <i>Journal of the American Geriatric Society</i> , 57, 963-970. (2010)	Clinical features to identify urinary tract infection in nursing home residents: A cohort study	Included- this is a study that supports the use clinical criteria for accurate UTI diagnosis.
Colon-Emeric, C. <i>Journal of the American Geriatrics Society</i> , 55, 1404-1409. (2007)	Barriers to and facilitators of clinical practice guideline use in nursing homes	Included- addresses potential barriers and suggestions for implementation of CPG
Resnick, B., et al. <i>Journal of the American medical Directors Association</i> , Jan-Feb, 1-8. (2004)	Testing the feasibility of implementation of clinical practice guidelines in long term care facilities	Included- provides qualitative data regarding implementation of CPG in LTC.
Wipke-Tevis, et al. <i>Journal of the American Geriatric Society</i> , 52, 583-588. (2004)	Nursing home quality and pressure ulcer prevention and management practices	Included- Provides a basis for developing educational and quality improvement programs related to use of CPG and quality in LTC.
Hutt, E, et al. <i>Journal of the American geriatric Society</i> , 54, 1694-1700. (2006)	A multifaceted intervention to implement guidelines improved treatment of nursing home acquired pneumonia in a state veteran's home.	Included- Demonstrates effectiveness of evidence-based guidelines in improving compliance with current practice standards.
Berlowitz, D. et al. <i>American Journal of Medical Quality</i> , 16, 189-195.	Clinical practice guidelines in the nursing home.	Included- Supports that CPG's are not systematically implemented in nursing homes.

Appendix D
Clinical Practice Guideline Appraisal Summary

Appraisal Question	AMDA CPG:CI 2011	IDSA CAUTI CPG 2009	CDC CAUTI CPG 2009	SHEA/APIC CPG 2008
Who were the CPG developers?	AMDA	IDSA in collaboration with American Geriatrics Society, American Society of Nephrology, American Urological Association	HICPAC	SHEA/APIC
Were the developers representatives of key stakeholders?	Y	Y	Y	Y
Who funded the guideline development?	AMDA	U	U	U
Were any guideline developers funded researchers of the reviewed studies?	Y	U	U	U
Appraisal Question	AMDA CPG:CI 2011	IDSA CAUTI CPG 2009	CDC CAUTI CPG 2009	SHEA/APIC CPG 2008
Was an explicit, sensible and impartial process used to	Y	Y	Y	U

select and combine evidence?					
Did developers carry out a comprehensive, reproducible literature review within the past 12 months of its publication?	Y	Y	Y	Y	Y
Were all important options and outcomes considered?	Y	Y	Y	Y	Y
Is each recommendation in the guideline tagged by level of strength and linked with evidence?	Y Level of evidence is not graded or explicitly stated, but each recommendation is linked to evidence.	Y	Y	Y	Y Level of evidence is not stated. Data from the literature is provided for each recommendation.
Appraisal Question	AMDA CPG:CI 2011	IDSA CAUTI CPG 2009	CDC CAUTI CPG 2009	SHEA/APIC CPG 2008	
Has the guideline been subjected to peer review and testing?	N	U	U	U	
Is the intent of use provided?	Y	Y	Y	Y	Y
Are recommendations clinically relevant?	Y	Y	Y	Y	Y

Will the recommendations help me in caring for my patients?	Y	Y	Y	Y
Are the recommendations practical/feasible?	Y	Y	Y	Y
Are the recommendations a major variation from current practice?	N	N	N	N

Appraisal Question	AMDA CPG:CI 2011	IDSA CAUTI CPG 2009	CDC CAUTI CPG 2009	SHEA/APIC CPG 2008
Overall Conclusions	The CPG is evidence-based, has expert consensus, quality is good.	CPG has well-documented levels of evidence to support recommendations, quality is high	CPG is a targeted SR of CAUTI literature, strength and quality of each recommendation is provided, gaps in literature for each recommendation is also noted.	This guideline is not as explicit as the others in regard to specific recommendations. It does provide a comprehensive literature review and provides consideration of unique aspects of LTC.

Y= yes; N= no; U= unknown
Form from Melnyk & Fineout-Overholt (2011).

Appendix E
Synthesis of CPG in LTC Evidence

Study	Design	Sample	Outcome
Deuster, S. et al. <i>Journal of Clinical Pharmacy and Therapeutics</i> , 35, 71-78. (2010)	Before-After Interventions Study Purpose: To evaluate the use of treatment guidelines to improve antibiotic therapy.	N= 100 Consecutive patients chart analysis before and after intervention	Treatment guidelines for common infections occurring in hospitalized patients resulted in significant increase in appropriate antibiotic use
Flodgren, G., et al. <i>Cochrane Database of Systematic Reviews</i> , 3, DOI:10.1002/14651858.CD006559.pub2	SR Purpose: To assess effectiveness of different interventions which target healthcare professionals or organizations to improve adherence to infection control guidelines on device-related infections	13 studies included; one cluster randomized controlled trial and 12 interrupted time series studies. Setting: hospitals	Insufficient evidence to determine which interventions are most effective at changing adherence behavior. Educational interventions involving more than one active element considered worth further investigation.
Study	Design	Sample	Outcome
Colon-Emeric, C. <i>Journal of the American Geriatrics Society</i> , 55, 1404-1409. (2007)	Qualitative analysis Purpose: Identify barriers to and facilitators of the diffusion of CPG's in nursing homes	N= 35 Setting: four community nursing homes	centers included in the study systematically adopted CPG's. Most frequently cited barriers included: CPG's viewed as checklists and not individualized, perceived conflict with patient/family

			goals, limited facility resources, lack of communication between providers between shifts, facility policies that conflict with CPG's.
Wipke-Tevis, et al. Journal of the American Geriatric Society, 52, 583-588. (2004)	Retrospective analysis Purpose: to measure quality indicator scores and describe prevention and treatment practices in LTC.	N= 362 Setting: nursing homes in Missouri	40% used assessment tool that was not evidence based. <13% used CPG.
Study	Design	Sample	Outcome
Berlowitz, D. et al. American Journal of Medical Quality, 16, 189-195.	Survey Purpose: To determine whether and how clinical practice guidelines were being used in nursing homes.	N=1065 Setting : Veterans Affairs Nursing Homes	79% reported familiarity with CPG's <50% reported adoption and use of CPGs. CPG's are not systematically implemented in nursing homes.

Appendix F
Literature Evaluation Table

Citation First Author (year)	Conceptual Framework	Design/Method	Sample	Variables with Definition	Measurement	Data Analysis	Findings
Hooton, T. et al. <i>Clinical Infectious Diseases</i> , 50, 625-663 (2010)	None	CPG from the IDSA Purpose: to provide recommendations for the diagnosis, prevention, and treatment of CAUTI in adults.	n/a	n/a	n/a	n/a	Strategies to reduce the use and duration of urinary catheterization are most effective at reducing CAUTI.
Gould, C. et al. <i>HICPAC</i> (2010)	None	CPG from HICPAC Purpose: Develop guideline for CAUTI Prevention based on targeted systematic review of the best available evidence.	n/a	n/a	n/a	n/a	Surveillance to ensure appropriate catheter use, aseptic insertion, and proper maintenance are necessary. QI program with attention to infection control and staff education is necessary to reduce CAUTI.
Deuster, S. et al. <i>Journal of Clinical Pharmacy and Therapeutics</i> , 35, 71-78. (2010)	None	Before-After Interventions Study Purpose: To evaluate the use of treatment guidelines to improve antibiotic therapy.	100 consecutive patients chart analyses before and after intervention	IV= Treatment Guideline DV= appropriate antibiotic use	Appropriate antibiotic use/compliance with treatment guideline	Frequency	Treatment guidelines for common infections occurring in hospitalized patients resulted in significant increase in appropriate antibiotic use

Citation First Author (year)	Conceptual Framework	Design/Method	Sample	Variables with Definition	Measurement	Data Analysis	Findings
Juthani-Mehta, M., et al. <i>Journal of the American Geriatric Society</i> , 57, 963-970. (2010)	None	Prospective, observational cohort study. Purpose: identify clinical features associated with bacteriuria plus pyuria in non-catheterized nursing home patients with clinically suspected UTI.	N= 551 Setting : 5 Connecticut nursing homes	UTI: bacteriuria (>100,000 CFU according to urine culture) plus pyuria(>10 white blood cells according to urinalysis).	Combined outcome of bacteriuria (>100,000 CFU from urine culture) and pyuria (>10 white blood cells from, urinalysis).	RR	Dysuria, change in mental status, and change in character of urine were significantly associated with the combined outcome of bacteriuria plus pyuria.
Resnick, B., et al. <i>Journal of the American medical Directors Association</i> , Jan-Feb, 1-8. (2004)	None	Quantitative single group repeated measure. Qualitative analysis. Purpose: explore the feasibility of implementing two specific AMDA CPG's	N= 40 facilities Setting : LTC in Maryland (23 centers)	CPG implementation-defined by process indicators for each CPG.	Process indicators of CPG implementation. Interviews.	Frequency	45% of facilities actually implemented at least one CPG. Four themes emerged from interview data: Challenges to implementations, Benefits of implementation, Process recommendations, Recommendations for changes to CPG's

Citation First Author (year)	Concept- ual Frame- work	Design/Method	Sampl e	Variables with Definitio n	Measure ment	Data Analysis	Findings
Berlowitz, D. et al. American Journal of Medical Quality, 16, 189-195.	None	Survey Purpose: To determine whether and how clinical practice guidelines were being used in nursing homes.	N=1065 Setting : Veterans Affairs Nursing Homes	Were staff familiar with clinical practice guidelines? Did staff report implementation and use of clinical practice guidelines?	Were staff familiar with clinical practice guidelines? Did staff report implementation and use of clinical practice guidelines?	Frequency	79% reported familiarity with CPG's <50% reported adoption and use of CPGs.

Appendix G
Evaluation Measures

Evaluation Component	Measurement Approach
Outcome Indicators	
Incidence of UTI per 1000 resident days	System data for facility size and census
Incidence of unplanned discharges from the center to acute care facilities/ER for UTI/urosepsis	System data for facility size and census
Incidence of antibiotic usage in center	System data from monthly pharmacy report and retrospective chart audits
Process Indicators	
Evidence of process for suspected UTI risk	Included in the chart audit tool (developed by project team)
Evidence of suspected UTI assessment in compliance with AMDA CPG: CI	Records reviewed for pre-intervention and post-intervention (3month interval) using chart audit tool.
Evidence of appropriate diagnostics for suspected UTI in compliance with AMDA CPG:CI	Records reviewed for pre-intervention and post-intervention (3month interval) using chart audit tool
Evidence that residents with suspected UTI being treated with antimicrobial therapy meet criteria for UTI	Records reviewed for pre-intervention and post-intervention (3month interval) using chart audit tool
Evidence that appropriate transmission precautions are implemented for UTI caused by MDRO's.	Records reviewed for pre-intervention and post-intervention (3month interval) using chart audit tool
Staff evaluation of intervention	Focus group with nursing staff post-intervention

Appendix H

EBP Project Implementation and Evaluation Timeline

Activity	Timeline
Step 1: Selection of a Topic	
<ul style="list-style-type: none"> • Identification of problem trigger: Increased UTI and associated negative patient outcomes • Identify Stakeholders • Identify barriers and facilitators and strategies for minimizing barriers and maximizing facilitators 	Completed December 2011
Step 2: Form a Team	
<ul style="list-style-type: none"> • Determine team members and team roles • Develop PICO question 	Completed December 2011
Step 3: Evidence Retrieval	
<ul style="list-style-type: none"> • Conduct literature search 	Original literature search completed January-February 2012; updated literature search completed September 2013.
Step 4: Grading the Evidence	
<ul style="list-style-type: none"> • Complete appraisal of evidence (Search Strategy, Data Extraction, and Evaluation of Evidence tables) 	Original completed January-February 2012; update completed September 2013.
Step 5: Developing an Evidence-based Standard/Recommendation	
<ul style="list-style-type: none"> • Define project purpose • Define project outcome indicators of a successful project. • Develop data collection protocol • Develop process evaluation tool(s) • Develop project-related products • Develop evaluation plan • Develop project economic analysis • Complete presentation for dissemination of project initiation and educate stakeholders on project progress to date • Complete project proposal draft in NURS 7090 • Begin acquisition of necessary approvals (facility approval, IRB) 	December 2013
<ul style="list-style-type: none"> • Revise project proposal and share with Project Chair 	January-February, 2014
<ul style="list-style-type: none"> • Arrange Initial Proposal Defense with Project Chair and Committee 	March-April, 2014

<ul style="list-style-type: none"> Finalize project proposal Finalize necessary IRB approval and submit when committee approval received 	March-April, 2014
Step 6: Implementing the EBP Project	
Phase I: Timeline and Baseline Data Collection	
<ul style="list-style-type: none"> Meet with team and discuss project timeline and inform stakeholders of implementation date <ul style="list-style-type: none"> Develop formal schedule for implementation 	July 2014
<ul style="list-style-type: none"> Complete baseline data collection of outcome indicators 	September 2014
<ul style="list-style-type: none"> Complete process indicator evaluation <ul style="list-style-type: none"> This will be based on the AMDA CPG: CI and will involve a systematic assessment of current practices in the center as they compare to the CPG Complete baseline staff knowledge survey 	September 2014
Phase II: Design Clinical Change Intervention(s)	
<ul style="list-style-type: none"> Team will review baseline data and determine intervention where gaps between practice and CPG exist. Intervention(s) will be planned based on this assessment This will include development of additional project products required for the intervention(s) implementation and evaluation. Determine the “go live” date for intervention implementation 	September 2014
Phase III: Deploy Clinical Change Intervention(s)	
<ul style="list-style-type: none"> Complete formal education session(s) for intervention(s); this will include instructions for use of any project products necessary for intervention implementation 	September 2014
<ul style="list-style-type: none"> “Go Live” 	October 2014
Step 7: Evaluation of the Clinical Change	
<ul style="list-style-type: none"> Complete outcome indicator evaluation <ul style="list-style-type: none"> Monitor incidence of UTI per 1000 resident days over 3 month period following “go live” date Monitor incidence of unplanned discharges to acute care/ER for diagnosis UTI/urospesis over 3 month period following “go live” date Monitor antibiotic usage in center over 3 month period following “go live” date. 	October 2014- January 2015
<ul style="list-style-type: none"> Complete process indicator evaluation <ul style="list-style-type: none"> Evidence of process for suspected UTI risk Evidence of suspected UTI assessment in compliance CPG Evidence of appropriate diagnostics for suspected UTI in compliance with AMDA CPG: CI Evidence that residents with suspected UTI being treated with antimicrobial therapy meet criteria for UTI Evidence that appropriate transmission precautions are implemented for UTI caused by MDRO’s Complete focus groups with nursing staff 	February 2015
<ul style="list-style-type: none"> Data Analysis Completion 	March 2015

Appendix I

Suspected Urinary Tract Infection Chart Audit Guidelines

Background

Infections are common in Long Term Care (LTC), represent a major source of morbidity and mortality in LTC, and contribute significantly to unplanned discharges from LTC to acute care settings. Urinary tract infections (UTI) are one of the most common infections in LTC facilities.

Measure

This audit will determine the number of residents with suspected or diagnosed UTI in the LTC facility who met the American Medical Director's Association (AMDA) clinical practice guideline (CPG) for common infections in LTC standards.

Instructions

This CPG-specific chart audit tool is derived from the *AMDA CPG: Common Infections* and focuses on those aspects of the practice guideline pertaining to UTI. This tool is used to document the review of source documents and CPG for agreement. Source documents are original documents/data/records (i.e. clinic charts/notes, checklists, lab reports, diagnostic reports, etc.).

For each subject reviewed:

1. Begin using this tool by completing the header information (name of site, name of reviewer, date of review, review period).
2. For each section reviewed, check the appropriate boxes ('N/A', 'Yes', 'No'). If the 'No' box is checked for any question, provide a description for each 'No' response in the area provided within that section.
3. At the conclusion of the review, summarize findings in the Summary of Findings section.
4. The reviewer signs and dates the Chart Audit Tool and files it within the UTI Chart Audit binder.

Reference

American Medical Director's Association (2011). *Common infections in the long-term care setting clinical practice guideline*. Columbia, MD.

Suspected UTI Chart Audit Tool

Site: _____ Review Date: _____

Reviewed by: _____ Review Period: _____

Inclusion Criteria: (please check appropriate box)

- Diagnosis of UTI during review period
- Antibiotic prescribed for UTI during review period
- Urinalysis/urine culture performed during review period

If none of the above criteria are met, this chart is NOT eligible for this audit.

Exclusion Criteria:

None

Suspected UTI Chart Audit Tool

Site: _____ Review Date: _____ Review
 Period: _____

Reviewed by: _____

Element A: Recognition	Yes	No	n/a	Comments
1. Presence of dysuria OR two (2) or more of the following documented (Check those that are documented). <ul style="list-style-type: none"> <input type="checkbox"/> Fever(100 degrees F or 2.4 degrees above baseline) <input type="checkbox"/> Urinary frequency <input type="checkbox"/> Urinary urgency <input type="checkbox"/> Flank /suprapubic pain <input type="checkbox"/> Gross hematuria <input type="checkbox"/> New or worsened urinary incontinence <input type="checkbox"/> Shaking chills/rigors <input type="checkbox"/> New onset of delirium 				

Element B: Assessment	Yes	No	n/a	Comments
2. Documentation of nursing history and physical exam elements present at the time of initial symptom(s)?				
Physical assessment including body temperature				
Dipstick urine test results documented				
Medical provider notified of resident condition and symptoms				
Urinalysis ordered				
Urine culture completed: Pathogen identified: _____ @>100,000 cfu's				
3. MDRO identified as causative organism by culture?				
4. If answer to item 3 was "yes": Evidence of contact transmission precautions order present?				
5. Patient transferred to an acute care setting?				
6. If answer to item 5 was "yes":				

<p>Evidence of at least one (1) of the following are present in the record: Check those that are documented as present.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Resident's vital signs unstable and/or family /patient requests transfer or desire aggressive treatment. <input type="checkbox"/> Critical diagnostic tests are not available in the facility during the required time period. <input type="checkbox"/> Scope or intensity of required monitoring or treatment is beyond facility's capacity. <input type="checkbox"/> Specific infection prevention/control measures are not available in the facility. 				
<p>7. Evidence of ongoing monitoring documented in the chart in regard to resident response to treatment? (i.e. body temperature, presence of clinical s/s infection)</p>				

Element C: Treatment	Yes	No	n/a	Comments
<p>1. Antipyretic administered for fever greater than 100 degrees F?</p>				
<p>2. Antibiotic therapy prescribed before urine culture results were available? Antibiotic prescribed: _____ (please provide full Rx. Info including drug, dose, route, frequency, and duration)</p>				
<p>3. Urine culture negative?</p>				
<p>4. If answer to item 10 was "yes" was antibiotic therapy discontinued?</p>				
<p>5. Antibiotic therapy prescribed based on urine culture results? Antibiotic prescribed: _____ (please provide full Rx. Info including drug, dose, route, frequency, and duration)</p>				
<p>6. Antibiotic change indicated based on urine culture results?</p>				
<p>7. If answer to item 13 was "yes", was a change in antibiotic regime implemented?</p>				

Does the resident have any of the following? (Check those that apply)

_____ Intermittent bladder catheterization

_____ Indwelling foley catheter

_____ Supra-pubic catheter

_____ Ileoconduit device

If any of the above was checked, please list the diagnosis(es) associated with the urinary device: _____

—

Summary of Review Findings:

Signature of Reviewer: _____ Date: _____

Reference

American Medical Director’s Association (2011). *Common infections in the long-term care setting clinical practice guideline*. Columbia, MD.

Suspected Urinary Tract Infection (SUTI) Protocol Worksheet

Patient Name: _____

Step 1: Does the patient have a change in condition that suggests UTI?

The patient has had a change in: (Please circle all that apply)

- Vital signs: Temp, Resp rate, Pulse, BP
- ADL performance
- Food/fluid intake
- Mental status
- Skin temperature/color
- Sleep pattern
- Fall/balance/gait
- Chills
- Dizziness
- Dysuria
- Urinary frequency
- Urinary incontinence (new or increased)
- Hematuria

Step 2: Perform History and Physical Exam

- Vital Signs _____ T _____ P _____ R _____ BP
- Mental Status: Alert Lethargic Confused Other: _____
- FSBS if patient is diabetic: _____
- Urinary Symptoms: dysuria hematuria suprapubic/flank pain
 scrotal contents tenderness bladder distention _____ other (please specify)

Obtain a urine specimen and perform dipstick urine test and record:

Date: _____ Time: _____

Results: Positive for leukocyte esterase/WBC (Send specimen for UA/C&S)

Negative for leukocyte esterase/WBC (Consult physician/PA/NP)

Determine if patient meets criteria for empiric antibiotic therapy:

- Patients **WITHOUT** indwelling catheter (Must have at least 3)
- Patients **WITH** indwelling catheter (Must have at least 2)
 - Fever greater than 100 F or chills/rigors
 - New or increased dysuria, frequency, or urgency
 - New flank/suprapubic pain/tenderness
 - Change in character of urine
 - Worsening mental or functional status (includes urinary incontinence)

Does the patient meet criteria for empiric antibiotic therapy?

Yes- proceed to Step 3 and anticipate empiric antibiotic therapy

___No - proceed to Step 3 and anticipate ongoing infection surveillance

Nurse Initials: _____ Date: _____ Time: _____

Step 3: Notification of Provider

Date: _____ Time: _____ Provider: _____

Patient condition warrants transfer to acute care? ___Yes (Contact Physician/PA/NP) ___No

Further diagnostics ordered? ___No ___Yes: _____

Antibiotic therapy ordered? ___No ___Yes

* Communicate whether patient meets criteria for empiric antibiotic therapy

Nurse Initials: _____ Date: _____ Time: _____

Step 4: Treat Symptoms of SUTI

- Encourage fluid intake (target goal of 1500 ml over next 24 hours unless contraindicated)
- Treat fever if it is:
 - a) Causing discomfort
 - b) Resulting in S/S of hemodynamic instability (pulse > 100 bpm, hypotension)

Step 5: Develop Individual Acute Care Plan

- Communicate to care team members

Nurse Initials: _____ Date: _____ Time: _____

Step 6: Monitor Patient Response

- Assess and document every shift to include exam elements in Step 2
- Assess and document every shift response to treatment
- Report any deterioration or failure to respond to treatment to provider
- Communicate UA/urine culture results to provider

Step 7: Determine if Heightened Infection Control is Warranted

Urine culture results: _____

Is the causative agent identified by culture as a multi-drug resistant organism (MDRO)?

___No- Standard precautions

- Urine must be contained by patient continence, incontinence supplies, or catheter

___Yes- Contact Precautions

- Urine must be contained by patient continence, incontinence supplies, or catheter
- Order for Contact Precautions is written and implemented as appropriate

Nurse Initials: _____ Date: _____ Time: _____

Step 8: Communication

Communicate the following to the care team:

- Patient status
- Any heightened Infection Control

Please place the SUTI Protocol Worksheet in the protocol binder once the culture report has been received, reported, and noted above.

Reference

American Medical Directors Association (AMDA) (2011). *Common Infections in the Long term Care Setting Clinical Practice Guideline*. Columbia, MD: AMDA 2011.

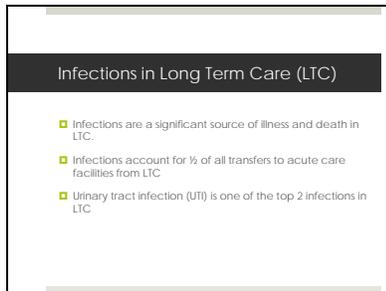
Appendix K

PowerPoint for sUTI Protocol Education

Slide 1



Slide 2



Slide 3

An Evidence-based Approach

- The SUII protocol has been developed by an interdisciplinary team to address the gaps between current facility practice and best practice.
- The American Medical Directors Association *Clinical Practice Guideline for Common Infection in LTC- and HCF* Infection Control policies have been used to create the protocol.
- The protocol is NURSING-DRIVEN!



Slide 4

THE GOAL

- Reduce the incidence of UTI and urosepsis
- Reduce incidence of MDRO UTI
- Reduce unplanned discharges related to UTI
- Reduce antibiotic usage for asymptomatic bacteriuria

Discuss asymptomatic bacteriuria

Slide 5

Step 1: Does the patient have a change in condition that suggests UTI?

Changes in:

Vital signs	Chills
ADL performance	Dizziness
Food/fluid intake	Dysuria
Mental status	Urinary frequency
Skin temperature/color	Urinary incontinence (new or increased)
Sleep pattern	Hematuria
Fall/balance/gait	

Slide 6



Full Worksheet will be distributed and application reviewed.

Slide 7



Will do demonstration/return demo of dipstick urine test and interpretation

Slide 8



Slide 9

To treat (empirically) or not to treat?

- Patients WITHOUT indwelling catheter must have 3
- Patients WITH indwelling catheter must have 2
- Fever greater than 100 F OR chills/rigors
- New or increased dysuria, frequency, or urgency
- New flank/suprapubic pain/tenderness
- Change in character of urine
- Worsening mental or functional status (includes urinary incontinence)

Discuss role of nursing in assisting antibiotic stewardship along with providers.

Slide 10

SUTI Worksheet

Step 1: Review history and physical of patient

- 1. Date of admission
- 2. Patient's name
- 3. Room number
- 4. Unit
- 5. Date of catheter insertion
- 6. Catheter type
- 7. Indication for catheter
- 8. Date of last void
- 9. Date of last urine culture
- 10. Date of last urine specimen
- 11. Date of last void
- 12. Date of last void
- 13. Date of last void
- 14. Date of last void
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- 16. Date of last void
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- 99. Date of last void
- 100. Date of last void

Slide 11

Step 3: Notification of Provider

- Does the patient's condition warrant transfer to acute care?
- The patient has unstable vital signs and the patient/family desire aggressive intervention
- Required diagnostics are not available in an appropriate time period
- The scope or intensity of monitoring are beyond the facility's capacity
- Patient/family request a transfer
- The physician/PA/NP must be notified of any impending unplanned transfer to the hospital

Slide 12

Assisting the provider to make an informed treatment decision

- Provide a clear, concise picture of the patient condition
- Communicate whether the patient meets criteria for empiric SUTI treatment or not



Discuss the evidence concerning treatment of AB and infection surveillance while awaiting culture (many patients improve in this time).
Discuss antibiotic stewardship

Slide 13

SUTI Worksheet

Step 1: Identification of provider
 Date: _____ Time: _____ Provider: _____
 Patient condition warrants transfer to acute care? Yes (Contact Physician/PA/NP) No
 Further diagnostic ordered? No Yes
 Antibiotic therapy ordered? No Yes
 *Communicate whether patient meets criteria for empiric antibiotic therapy
 Nurse initials: _____ Date: _____ Time: _____

Slide 14

Step 4: Treat Symptoms of SUTI

- Encourage fluid intake
 - Target goal = 1500 ml over 24 hours unless contraindicated
- Treat fever if:
 - It is causing discomfort
 - There is hemodynamic instability
 - Pulse >100 bpm
 - hypotension

Discuss contraindications to pushing fluids.

Slide 15

SUTI Worksheet

Step 4: Treat all symptoms of SUTI

- Determine fluid status (target goal of 20cc/ml over next 24 hours unless contraindicated)
- Treat fever if it is:
 - a) Causing discomfort
 - b) Resulting in S/O of hemodynamic instability (Systolic BP < 100 bpm, hypotension)

Slide 16

Step 5: Develop an Individualized Care Plan



Slide 17

SUTI Worksheet

Step 5: Develop Individualized Acute Care Plan

- Communicate to care team members

Nurse Initials: _____ Date: _____ Time: _____

Step 6: Monitor Patient Response

- Assess and document every shift to include exam elements in Step 2
- Assess and document every shift response to treatment
- Report any deterioration or failure to respond to treatment to provider
- Communicate UA/lab/other results to provider

Slide 18

Step 6: Monitor Response

- Assessment and documentation every shift to include exam elements in Step 2
- Assessment and documentation of response to treatment (as appropriate)
- Report any deterioration or failure to respond to treatment to provider (refer to Change in Condition tool to determine whether immediate vs. non-immediate notification is appropriate)
- Communicate results of UA/C&S to provider
 - If the culture is negative, any empiric antibiotic therapy should be discontinued



Slide 19

Step 7: Determine if Heightened Infection Control is Warranted

- Standard Precautions are applied to all patients at all times
- Standard Precautions are acceptable for MOST SUTI's
- Contact Precautions may be necessary if the causative organism is a MDRO
 - Urine must be contained by patient continence, incontinence supplies, or catheter
 - Order for Contact Precautions should be written and implemented

Slide 20

SUTI Worksheet

Step 7: Determine if Heightened Infection Control is Warranted

Urine culture results: _____

Is the causative agent identified by culture as a multi-drug resistant organism (MDRO)?

____ No - Standard Precautions

- Urine must be contained by patient continence, incontinence supplies, or catheter

____ Yes - Contact Precautions

- Urine must be contained by patient continence, incontinence supplies, or catheter
- Order for Contact Precautions is written and implemented as appropriate

Nurse initials: _____ Date: _____ Time: _____

Slide 21

Step 8: Communication

- Communicate the following to the care team:
 - Patient status
 - Any heightened infection control measures



Slide 22

SUTI Worksheet

Step 8: Communication
Communicate the following to the care team:

- Patient status
- Any heightened infection control measures

Please place the SUTI Protocol Worksheet in the postural binder once the culture report has been received and noted above.

Slide 23

Mrs. P

- Mrs. P is an 81 year old patient who was admitted 3 days ago following a fall at home. She had no fractures but multiple contusions and was in the hospital for 24 hours prior to her admission here for rehab. She has DM2 and OA.
- During your morning med pass Mrs. P tells you that she has had some low back discomfort and feels nauseous today. She ate <25% of breakfast. Her STNA reports that she was incontinent of urine twice through the night though she has been continent until now. VS: T=99.1, P=84, R, 14, BP 126/76

Slide 24

Your assessment reveals + suprapubic tenderness but no distention. Mrs. P tells you that she has had to urinate 4-5 times this morning but "only go a little each time".

Dipstick urine is + for nitrites and leukocytes and urine is milky in appearance

Does Mrs. P likely has a UTI?
Does she meet criteria for empiric therapy?

You notify the physician and he orders Levaquin 500 mg once daily x 7 days. The urine is sent for culture. After approx. 14 hours Mrs. P reports she is feeling better. The urine culture revelas >100,000 E. coli which is sensitive to levofloxacin.

Slide 25

Mrs. M

Mrs. M is a 78 year old LTC patient at the center. She has mild to moderate Alzheimer's dementia and HIN. Her daughter took her on an LOA to a family birthday party this afternoon. Upon returning with Mrs. M to the center, Mrs. M's daughter reports that Mrs. M was confused and agitated and refused to eat or drink anything during the outing and she is concerned that something is wrong.

When you assess Mrs. M you find that she is alert, mildly agitated and more confused than her usual. VS: T= 97.4, R= 16, P= 74, BP= 116/70.

The SINA tolets Mrs. M and reports that her urine is dark and strong-smelling. She had no complaints of additional urinary symptoms.

What other assessment data might you collect?
Could this patient have a SUTI?

You decide to do watchful waiting for Mrs. M and encourage fluids over the evening and re-evaluate her . At bedtime Mrs. .M. Exhibits no agitation and seems more like her usual. She is still afebrile and has no localizing urinary symptoms. The next morning she seems per her usual.

Slide 26

An ounce of prevention.....

- Encourage adequate hydration
- Monitor personal hygiene of patients
 - Use of appropriate incontinence products
- Toileting program
- Avoid or limit bladder catheterization when possible

Slide 27

