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Educating Nurse Practitioners to Avoid Urine Cultures to Prevent Overuse of Antibiotics

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Abstract

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MS, Seton Hall University, 2005

BS, Cedar Crest College, 1992

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Unnecessary antibiotics are often ordered for positive urine cultures in long-term care (LTC) residents despite a lack of symptoms, indicating asymptomatic bacteriuria (ASB). Treating ASB with antibiotics can result in antibiotic-resistant organisms, allergic reactions to antibiotics, and secondary infections such as clostridium difficile. The purpose of this DNP project was to provide an evidence-based education intervention regarding management of ASB and UTIs with the hope of increasing the knowledge among nurse practitioners (NPs) that could be translated into practice and result in a decreased antibiotic use in LTC patients. The DNP project was grounded in Knowles' adult learning theory and used a pretest, posttest, and survey to assess for increased knowledge. Forty-four individuals completed the pretest, 44 participated in the educational intervention; and 38 participants completed the posttest. Twenty participants completed the survey (n = 20), which suggested 95% of the participants were female and the majority of the participants (65%) were masters-prepared NPs. The average pretest score was 8.02 (SD =1.73) and the average posttest score was 9.63 (SD = 0.675). Since there was no unique identifier to match the pretest and posttest scores, a one-sample t-test was used to estimate the data. There was a statistically significant difference between the pretest and the posttest scores ($t = 14.72$, $p < 0.001$), indicating an increase in knowledge among the participants. Translated into practice, the ordering of urine cultures and unnecessary use of antibiotics will decrease, resulting in positive patient and organizational outcomes and ultimately lead to positive social change.

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Dedication

This DNP project is dedicated to my family. My son, daughter-in-law, and grandson have supported me through this process. We have missed out on family events together, for me to complete this DNP project.

Acknowledgments

I would like to acknowledge Dr. Mattie Burton, who supported me through the process of completing the prospectus, proposal, and the DNP final project. I would like to also acknowledge Dr. Lyn Losty, who provided support to complete the final project.

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Section 1: Nature of the Project

Introduction

Urinary tract infections (UTI) are among the most common infections in long-term care (LTC) residents (Avelluto & Paul, 2018). Residents are treated with antibiotics for positive urine cultures despite having no UTI symptoms, also known as asymptomatic bacteriuria (ASB). It is unnecessary to treat ASB with antibiotics and potentially harmful. Unnecessary use of antibiotics can lead to antibiotic resistant organisms, allergic reactions to antibiotics, secondary infections such as clostridium difficile (c. diff), and increased healthcare costs. This project provided updated clinical guideline education that identified UTI versus ASB with the aim of decreasing the ordering of urine cultures for LTC residents who do not exhibit symptoms of UTI. With the decreased ordering of urine cultures, there will be a decrease in the ordering of antibiotics, which will result in decreased c. diff, fewer adverse reactions to antibiotics, decreased antibiotic resistance and lower healthcare costs. In this section of the project, I discuss the problem statement, the purpose of the project, the nature of the project, and the significance of the project.

Problem Statement

UTIs are common infections in LTC residents (Avelluto & Paul, 2018) and ASB is overtreated in LTC facilities (Eyer et al., 2016). ASB is the presence of bacteria in the urine with the absence of UTI symptoms (Redwood, et al., 2018). Contrary to existing best practice, LTC residents with vague symptoms that do not meet UTI guidelines continue to have urine cultures ordered (Eyer et al., 2016). Many urine culture results are

positive despite the resident having no symptoms, which leads providers to order unnecessary antibiotics (Eyer et al., 2016).

Unnecessary antibiotic prescriptions can lead to other health issues (Avelluto & Paul, 2018). Nicolle (2014) noted that 47% to 79% of LTC residents are prescribed at least one antibiotic each year. Van Buul et al., (2014) found that for many LTC residents treated with antibiotics, there is no indication for antibiotic use. Antibiotic overuse causes secondary infections such as c. diff, increased potential for adverse reaction to medication, and leads to antibiotic resistance (Avelluto & Bryman, 2018). Avoiding urine cultures in LTC residents without UTI symptoms will prevent the unnecessary ordering of antibiotics.

Redwood et al. (2018) found a common belief in the myth that dark-colored urine and/or foul-smelling urine is an indication of UTI. Despite a lack of evidence there is a myth that delirium and UTI are linked. Balogun and Philbrick (2014) reported that nurses use this as an indication to request urine cultures. Delirium alone is not listed as UTI criteria and LTC residents need to be assessed for other causes of delirium when there are no symptoms of UTI. Cortes-Penfield et al. (2017) discussed the controversy of falls as an indication for urine cultures as studies have shown no correlation between fall and UTIs.

Cortes-Penfield et al. (2017) reviewed The Society for Post-Acute and Long-Term Care Medicine (AMDA) and The American Geriatric Society's position that urine cultures should not be ordered if there are no UTI symptoms. Van Buul et al. (2014) found nursing staff can influence providers' decisions on course of treatment. Redwood

et al. (2018) reported the activity of the nurse looking up guidelines or guideline pop-ups on electronic medical records as an inconvenience. This leads nurses to ignore the UTI criteria guidelines and request urine cultures that are not based on UTI guidelines.

Redwood et al. (2018) found a 20%-80% gap in recommended practice to actual practice. Redwood et al. (2018) found one reason for a gap in practice is the lack of provider knowledge regarding symptoms that are part of UTI criteria. LTC providers receive information from the LTC facility's nurses reporting a urine culture result or requesting to have a urine culture ordered. When reviewing the symptoms, the nurse may report confusion or agitated behaviors with no symptoms that meet UTI criteria guidelines. Some providers will order antibiotics and/or urine cultures despite the absence of UTI symptoms (Redwood et al., 2018). After discussing the issue with the practicum organization's national on-call medical director, this was identified as a gap in practice worthy of attention (personal communication, October 27, 2019).

An education program was provided to the organization's on-call nurse practitioners that will impact their practice of ordering of urine cultures for LTC residents who do not display urinary symptoms. The decreased ordering of urine cultures will lead to decreased ordering of inappropriate antibiotics. Nicolle (2014) found a 7% decrease in the number of inappropriate antibiotics being ordered for ASB when UTI criteria guidelines are used. Avelluto and Bryman (2018) discussed the use of UTI criteria guidelines as a way of decreasing the inappropriate ordering of urine cultures and antibiotics. The organization's on-call medical director believes providers were once told to obtain urine cultures for changes in behavior and mental status changes and education

is needed to change the mindset of the providers to focus on the current guidelines (personal communication, October 27, 2019).

Purpose Statement

A meaningful gap persists between the UTI criteria guidelines and actual practice at the practicum organization. The outdated ways of ordering urine cultures, despite a change in guidelines, continues. If a resident is having a change in behavior, delirium, falls, dark-colored and/or foul-smelling urine, many nurses believe the myths that these are symptoms of UTI and request a urine culture to be ordered (Redwood et al., 2018; Balogun & Philbrick, 2014, Cortes-Penfield et al., 2017). Van Buul et al. (2014) and Redwood et al. (2018) found that belief in UTI myths and the inconvenience of looking up the UTI guidelines resulted in nurses influencing the ordering of urine cultures. Cortes-Penfield et al. (2017) reviewed AMDA and The American Geriatric Society's position that urine cultures should not be ordered if there are no UTI symptoms.

Eyer et al. (2016) identified that despite having guidelines available, the guidelines are not being used with respect to ASB. Additionally, ordering urine cultures for residents who do not have symptoms that meet the UTI guidelines may be a result of a lack of education. The organization's on-call medical director at the practicum site identified the need for education of the UTI guidelines with on-call nurse practitioners (personal communication, October 27, 2019). Thus, the guiding practice-focused question for this doctoral project was:

PFQ: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics for LTC patients?

The provided education to the organization's on-call nurse practitioners will affect the ordering of urine cultures and inappropriate antibiotics. The ultimate goal of this project was to educate the nurse practitioners to avoid the ordering of urine cultures for LTC residents who do not meet the UTI criteria guidelines. The change to not ordering urine cultures for LTC residents who do not meet the UTI guidelines will decrease the inappropriate ordering of antibiotics, which will limit the incidence of adverse effects of antibiotics, decrease the side effects such as c. diff, and most importantly, diminish the resistance to antibiotics.

Nature of the Doctoral Project

This project was a staff education program for nurse practitioners who work for a company that provides nurse practitioner services to LTC facilities. The education was presented to approximately 100 nurse practitioners. Forty-four participants completed the pre-test, 38 participants completed the post-test, and 20 participants completed the satisfaction survey. The nurse practitioners who participated in the educational program work in geriatrics. The participants included on-call nurse practitioners, who provide care to LTC patients via telephone during nonbusiness hours, and field nurse practitioners, who provide face-to-face care to LTC patients during business. The educational project curriculum was guided by several key articles. Nicolle et al. (2019) had the most up to date UTI clinical guideline updates for LTC residents. Schulz et al. (2016) reviewed 10

myths for the diagnosis and treatment of UTI, which guided the development of a slide deck for the education program (Appendix). The pre- and post- knowledge-based evaluations were developed using Avelluto and Bryman (2018) as a reference. Avelluto and Bryman's (2018) article has questions that helped identify pre- and post-knowledge regarding recognizing ASB versus UTI. An expert team of stakeholders was established as the project team, and they provided formative evaluation of the curriculum and oversaw the evaluations.

This project was a staff education project. The *Walden Manual for Staff Education* guided the development, implementation, and evaluation of the project. Knowles' theory of adult learning (Knowles et al, 2011) underpinned the development and delivery of this education program and Kirkpatrick's Levels 1 and 2 of training evaluation model (Kirkpatrick & Kirkpatrick, 2016) guided the evaluation. Level 1 evaluation from Kirkpatrick's levels of training evaluation determined the satisfaction of the learning materials and delivery of the learning program. Level 2 evaluation of the learning program provided pre-education and post-education questions to demonstrate that the knowledge of UTI versus ASB had improved. The analysis used demographic descriptive statistics that described the project participants. A one-sample *t-test* was used for descriptive statistics to evaluate for gained knowledge from the pretest and posttest scores. This analysis was used to answer the project question:

PFQ: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics in LTC patients?

Significance

The stakeholders identified for this project were senior management, clinical managers, and on-call nurse practitioners. This project is important to these stakeholders because, despite identification of best practices, LTC residents with vague symptoms that do not meet UTI criteria guidelines continue to have urine cultures ordered (Eyer et al., 2016). Many urine culture results are positive despite the resident having no symptoms, which leads providers to order unnecessary antibiotics (Eyer et al., 2016), thus causing secondary infections such as c. diff, increased potential for adverse reactions, potential antibiotic resistance, and increased healthcare costs (Avelluto & Bryman, 2018; Doernberg et al., 2015).

This project provided education to the on-call nurse practitioners with updated UTI criteria guidelines. The education gave the nurse practitioners a way to identify UTI versus ASB. This provided a way to determine when to avoid ordering urine cultures and unnecessary antibiotics. The change to not ordering urine culture for LTC residents who do not meet the UTI guidelines will decrease the inappropriate ordering of antibiotics, and limit the incidence of adverse effects of antibiotics, decrease the side effect of c. diff and most importantly, the resistance to antibiotics.

This educational project can be introduced to LTC facilities' nursing and provider staff. Providing this education to the nursing staff and the providers of the LTC facilities would significantly limit the ordering of urine cultures for residents who do not meet the UTI criteria guidelines. Ultimately leading to decreased use of antibiotics, which would affect adverse reactions, secondary infections, antibiotic resistance, and healthcare costs.

Smelov et al. (2016) noted that UTI substantially impacts society financially. Each year there are seven million physician office visits and one million emergency room visits, which results in 100,000 hospitalizations for UTI. In the LTC setting, 75% of antibiotics ordered are inappropriate. Inappropriate antibiotic ordering leads to a major public health threat from antibiotic resistant organisms (Pulia et al., 2018). The LTC setting is a reservoir for resistant organisms in the community. Nicolle et al. (2019) noted the consequences of antibiotic resistance have negative effects on society. Providing education that decreases the ordering of urine cultures and inappropriate antibiotics, which leads to decreased adverse reactions, decreased secondary infections, decreased antibiotic resistance, and decrease healthcare costs, results in a positive social change.

Summary

Urine cultures and antibiotics are being ordered, even if the UTI criteria guidelines are not met. Avoiding urine cultures for residents that do not meet the UTI criteria is the best solution. However, in LTC facilities, providers are pressured to obtain urine cultures by the family or nursing staff for residents with vague symptoms, even if the UTI criteria guidelines are not met. Educating the organization's on-call nurse practitioners of UTI criteria guidelines has empowered the nurse practitioners to order urine cultures and antibiotics only for residents with symptoms that meet the UTI criteria guidelines.

Section 2: Background and Context

Introduction

UTIs are one of the most common infections in LTC facilities (Avelluto & Paul, 2018). Residents are treated with antibiotics for positive urine cultures despite having no UTI symptoms, also known as ASB. It is unnecessary to treat ASB with antibiotics. Unnecessary use of antibiotics can lead to antibiotic resistant organisms, allergic reactions to antibiotics, secondary infections such as c. diff, and increased healthcare costs. Discussions with the practicum organization's on-call medical director confirmed the need for education of the UTI criteria guidelines with the on-call nurse practitioners (personal communication, October 27, 2019). Thus, the practice-focused question for this capstone project was:

PFQ: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics for LTC patients?

The education project has stimulated changes to ordering urine culture for LTC residents who do not meet the UTI criteria guidelines. This will decrease the inappropriate ordering of antibiotics, which will decrease adverse reactions, decrease secondary infections, decrease drug resistance, and decrease healthcare costs.

In Section 2, I examine the background and of the project by reviewing concepts, models. and theories. I also provide the relevance of this project to the nursing practice, and local background and context. Finally, I review my role as the DNP student and the role of the project team.

Concepts, Models, and Theories

This staff education program was guided by the *Walden Manual for Staff Education*. Knowles' theory of adult learning (Knowles et al., 2011) underpinned the development and delivery of this education program. Knowles et al. (2011) identified the concept that children and adults learn differently. For adult learners, there are six principles to use to plan learning: (a) the learner's need to know, (b) the learner's concept of learning," (c) the learner's prior experiences, (d) the learner's readiness to learn, (e) the learner's orientation to learning, and (f) the learner's motivation to learn. When establishing this staff education program, the six concepts of adult learning were identified and incorporated into the educational program.

The Kirkpatrick model described four levels of training evaluation (Kirkpatrick & Kirkpatrick, 2016). Level 1 of the Kirkpatrick's evaluation is the reaction, which involves evaluation of the participants' reaction to the learning program. Level 1 asks whether the participant believed the program was educational and if the learning environment optimal for learning. Level 2 of Kirkpatrick's training evaluation is learning, which asks whether the participant learned from the program. This evaluation is done with a pre and posttest. Level 3 relates to behavior, whether the participant applied what was learned from the program, Level 4 is results, asking whether the learning program resulted in improved outcomes. For this doctoral project, Kirkpatrick's Level 1 and 2 were used to evaluate the learning program as time constraints preluded use of the other levels.

Relevance to Nursing Practice

Eyer et al. (2016) defined ASB as a urine culture with positive bacteria where the LTC resident has no symptoms of UTI. A study conducted by Lin et al. (2006) found 57.8% of the LTC residents participating in the study had ASB. Although treating ASB with antibiotics is not indicated, a third of these residents are treated with antibiotics (Nicolle et al., 2019). AMDA and The American Geriatric Society's position recommends urine cultures should not be ordered if there are no UTI symptoms. Eyer et al. (2016) reported that despite having guidelines available, the guidelines are not being used with respect to ASB. Additionally, ordering urine cultures for residents that do not have symptoms that meet the UTI guidelines may be a result of lack of education. Discussions with the national on-call medical director at the practicum site confirmed the need for education of the UTI guidelines with the national on-call nurse practitioners (personal communication, October 27, 2019). Thus, the practice-focused question for this capstone project was:

PFQ: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics for LTC patients?

UTIs are a leading type of infection seen in LTC residents (Avelluto & Paul, 2018). ASB is overtreated in LTC facilities (Eyer et al., 2016). ASB is the presence of bacteria in the urine with the absence of UTI symptoms (Redwood et al., 2018). Despite identifying best practices, LTC residents with vague symptoms that do not meet UTI guidelines continue to have urine cultures ordered (Eyer et al. 2016). Many urine culture

results are positive, despite the resident having no symptoms, which leads providers to order unnecessary antibiotics (Eyer et al., 2016). Unnecessary antibiotics given to LTC resident can lead to other health issues (Avelluto & Paul, 2018). Nicolle (2014) noted that 47% to 79% of LTC residents are prescribed at least one antibiotic each year. Van Buul et al. (2014) found that for many LTC residents treated with antibiotics, there is no indication for antibiotic use. Antibiotic overuse causes secondary infections such as c. diff, increases the potential for adverse reaction, and leads to antibiotic resistance (Avelluto & Bryman, 2018).

Avoiding urine cultures in the LTC residents without symptoms will prevent the unnecessary ordering of antibiotics. Redwood et al. (2018) found there continues to be the myth that dark-colored urine and/or foul-smelling urine is an indication of UTI. Despite a lack of evidence that delirium and UTI are linked, Balogun and Philbrick (2014) reported that nurses use this as an indication to request urine cultures. UTI criteria does not list delirium alone and LTC residents need to be assessed for other causes of delirium when there are no symptoms of UTI. Cortes-Penfield et al. (2017) discussed the controversy of falls as an indication for urine cultures as studies have shown no correlation between fall and UTIs. Cortes-Penfield et al. (2017) reviewed AMDA and The American Geriatric Society's position that urine cultures should not be ordered if there are no UTI symptoms. Van Buul et al. (2014) found nursing staff can influence providers' decisions on course of treatment. Redwood et al. (2018) reported the activity of the nurse looking up guidelines or guideline pop-ups on electronic medical records are

seen as an inconvenience. This leads to nurses requesting urine cultures that are not based on UTI guidelines.

Nicolle et al. (2019) updated the guidelines for identifying UTI versus ASB. Cortes-Penfield et al. (2017) developed an algorithm to follow when identifying UTI versus ASB. This project educated the on-call nurse practitioners on the updated UTI versus ASB criteria guidelines, which provided the nurse practitioners with a way to identify UTI versus ASB. This education identified when to avoid ordering urine cultures and unnecessary antibiotics.

Local Background and Context

Despite antibiotic treatment for ABS not being indicated, Morrison-Pandy et al. (2015) found that over 78% of LTC residents were treated with antibiotics and that evidenced-based UTI criteria guidelines were not used regularly in the LTC setting. Morrison-Pandy et al. (2015) discussed providing education on the UTI criteria guidelines as the first intervention.

Redwood et al. (2018) found a 20%-80% gap from recommended practice to actual practice. Redwood et al. (2018) found one reason for a gap in practice is the lack of provider knowledge regarding symptoms that are part of UTI criteria. LTC providers receive information from the LTC facility's nurses reporting a urine culture result or requesting to have a urine culture ordered. When reviewing the symptoms, the nurse may report confusion or agitated behaviors with no symptoms that meet UTI criteria guidelines. Some providers will order antibiotics and/or urine cultures despite the absence of UTI symptoms (Redwood et at., 2018). The organization's on-call medical director, at

the practicum site identified the need for education of the UTI guidelines with the national on-call nurse practitioners (personal communication, October 27, 2019).

LTC facilities are surveyed by the department of health annually. The Centers for Medicare and Medicaid Services found approximately 40% to 75% of antibiotics were prescribed inappropriately (Davis, 2017). Because of the high rate of antibiotic resistance, the Centers for Medicare and Medicaid Services developed a regulation for antibiotic stewardship. Davis (2017) noted that antibiotic stewardship is necessary to prevent antibiotic reactions and secondary infections. Beginning November 28, 2017, it was required that all Medicare-certified LTC facilities have an antibiotic stewardship program in place. Under this regulation, LTC facilities are to use antibiotic-use protocols, such as UTI criteria guidelines, and the appropriate antibiotic, dose, and length of course are reviewed. Providers need to be aware of this regulation and receive education on the UTI criteria guidelines to prevent inappropriate antibiotic ordering.

Role of the DNP Student

I currently work on the national on-call team of the practicum organization that works with LTC facilities. I receive several phone calls from nurses requesting urinary culture or to report the results of urinary cultures. During the call, I review the reason for wanting a urine culture or why the urine culture was done. Often the nurse gives vague symptoms that do not meet the UTI criteria guidelines, or there is no documentation why the resident had a culture obtained. I then need to review symptoms compared to the UTI criteria guidelines. For most of these calls, I do not order a urine culture or antibiotics for a positive urine culture. I often get calls for clarifications regarding antibiotics that are

ordered by other on-call nurse practitioners who are not following the UTI criteria guidelines. Additionally, many field-based nurse practitioners order the urine culture with no documentation. Therefore, in agreement with the organization's medical director, I believe an educational program for the UTI criteria guidelines is needed. As leader of the project team, I developed, implemented, and evaluated an educational program that reviewed the UTI versus ASB criteria guidelines.

I have a high standard for myself and the care that I provide. Knowing the need for antibiotic stewardship, when I see antibiotics inappropriately ordered, I often become frustrated. I have reviewed the UTI criteria guidelines for LTC facility nurses and on-call coworkers. I continue to see urine cultures and antibiotics being ordered with no documentation of UTI symptoms. By performing this DNP project of staff education, the ordering of urine cultures and inappropriate antibiotics prescriptions will be limited.

Role of the Project Team

A project team was organized with the director of clinical operations for the on-call team, the clinical service managers from on-call team, and the medical director of the on-call team. The project team provided formative evaluation of the educational program that was developed. The team gave critical insight into the information that was presented. The project team evaluated the educational intervention, the pretest questions, posttest questions, and the satisfaction survey, which included four demographic questions. The pre- and posttests established the knowledge gained from the education provided (see Polit, 2010). The project team members were available during the training sessions to assist with answering questions.

An email was sent to the clinical service managers and senior leadership to introduce the education program. A request was made for any clinical service managers who would like to participate to become part of the project team. Information regarding the goals of the educational program were reviewed. The leadership that is part of the project team determined who should attend the learning sessions.

The timeline for the educational program was quick once Institutional Review Board approval was obtained (approval number 12-21-20-1011856). There were three meetings before the education program was provided. In those meetings, the clinical service managers were able to provide formative evaluation of the educational program. The leadership from the organization has maintain ownership of the data from the pre- and posttest and the satisfaction survey, which are de-identified and were shared for analysis purposes.

Summary

Urine cultures and antibiotics are being obtained even if the UTI criteria are not met. Avoiding urine cultures for residents who do not meet the UTI criteria is the best solution. However, in the LTC facilities, nurse practitioners are pressured to order urine cultures by the family or nursing staff for residents with vague symptoms, even if UTI criteria are not met. Educating the on-call nurse practitioners on UTI criteria guidelines empowers the nurse practitioners to only order urine cultures for those residents who meet the UTI criteria.

Section 3: Collection and Analysis of Evidence

Introduction

UTIs are one of the leading infections seen in LTC residents (Avelluto & Paul, 2018). ASB is overtreated in LTC facilities (Eyer et al., 2016). ASB is the presence of bacteria in the urine with the absence of UTI symptoms (Redwood et al., 2018). Despite identification of best practice, LTC residents with vague symptoms that do not meet UTI guideline criteria continue to have urine cultures ordered (Eyer et al., 2016). Many urine culture results are positive despite the resident having no symptoms, which leads providers to ordering unnecessary antibiotics (Eyer et al., 2016). Unnecessary antibiotics in the LTC resident can lead to other health issues (Avelluto & Paul, 2018). Nicolle (2014) noted that 47% to 79% of LTC residents are prescribed at least one antibiotic each year. Van Buul et al. (2014) found that for many LTC residents treated with antibiotics, there is no indication for antibiotic use. Antibiotic overuse causes secondary infections such as c. diff, increases the potential for adverse reaction, leads to antibiotic resistance, and increases healthcare costs (Avelluto & Bryman, 2018).

The staff education program provided included UTI guideline criteria aimed to decrease ordering of urine cultures. Decreased urine cultures will decrease the inappropriate use of antibiotics. Nicolle (2014) found a 7% decrease in the number of inappropriate antibiotics being ordered for ASB when guidelines are used. Avelluto and Bryman (2018) discussed the use of the UTI criteria guideline as a way of decreasing the inappropriate ordering of urine cultures and antibiotics.

In Section 3 I review the practice focused question and how answering the question was approached. I review the sources of evidence, and the manner in which the evidence was collected and analyzed. In this section I also discuss published research outcomes, operational data, and generated evidence. Lastly, I review the analysis and synthesis of the data collected during the project.

Practice-Focused Question

Eyer et al. (2016) defined ASB as a urine culture with positive bacteria where the LTC resident has no symptoms of UTI. A study conducted by Lin et al. (2006) found 57.8% of the LTC residents participating in the study had ASB. Treating ASB with antibiotics is not indicated; however, a third of these residents are treated with antibiotics (Nicolle et al, 2019). AMDA and The American Geriatric Society's position recommends urine cultures should not be ordered if there are no UTI symptoms. Eyer et al. (2016) reported that despite having guidelines available, the guidelines are not being used in respect to ASB. Additionally, ordering urine cultures for residents who do not have symptoms that meet the UTI guidelines may be due to a lack of education. Discussions with the national on-call medical director at the practicum site confirmed the need for education of the UTI guidelines with field-based nurse practitioners and national on-call nurse practitioners (personal communication, October 27, 2019). Thus, the practice-focused question for this capstone project was: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics for LTC patients?

This project included education for the on-call nurse practitioners with the updated UTI versus ASB criteria guidelines, which will allow the nurse practitioners a way to identify UTI versus ASB. This education identified when to avoid ordering urine cultures and unnecessary antibiotics.

Sources of Evidence

Eyer et al. (2016) defined ASB as a urine culture with positive bacteria where the LTC resident has no symptoms of UTI. A study conducted by Lin et al. (2006) found 57.8% of the LTC residents participating in the study had ASB. Treating ASB with antibiotics is not indicated, however, a third of these residents are treated with antibiotics (Nicolle et al., 2019). AMDA and The American Geriatric Society's position recommends urine cultures should not be ordered if there are no UTI symptoms. Nicolle et al. (2019) have updated the guidelines for identifying UTI versus ASB. Cortes-Penfield et al. (2017) have developed an algorithm to follow when identifying UTI versus ASB.

The development of this education project was guided by several key articles. Nicolle et al. (2019) provided the most up to date UTI clinical guidelines for LTC residents. Schulz et al. (2016) reviewed 10 myths for diagnosis and treatment of UTI. This article guided the development of the slide deck for this educational program. The pre- and post-knowledge-based evaluations were developed using an article by Avelluto and Bryman's (2018). This article had questions that helped to test the pre- and post-knowledge of identifying ASB versus UTI. The evaluation was developed based on standard satisfaction surveys.

Analysis and Synthesis

This project was a staff education program and the *Walden Manual for Staff Education* guided the development, implementation, and evaluation of the project. Knowles' theory of adult learning (Knowles et al, 2011) underpinned the development and delivery of this education program, and Kirkpatrick's Levels 1 and 2 of training evaluation model (Kirkpatrick & Kirkpatrick, 2016) guided the evaluation. Level 1 evaluation from Kirkpatrick's levels of training evaluation determined the satisfaction of the learning material and location of the learning program. The satisfaction survey included four demographic information questions that were used to describe the sample and six questions rating the satisfaction of the education program. Level 2 evaluation of the learning program provided pre-education and post-education questions to determine if knowledge of UTI versus ASB had improved. The pre- and posttest included 10 questions that were similar in content that allowed for comparison to determine the change in knowledge.

I used the literature as a basis to identify and create an educational program using the evidence-based best practice recognized by the stakeholders. A pre-test and post-test were developed based on the educational program. The stakeholders reviewed and established a face validity of the educational program, pretest, posttest, and satisfaction survey. The content of the education intervention was validated, and the educational intervention was scheduled for the on-call nurse practitioners and delivered via web-ex. The pretest was offered prior to and at the start of the education program. The posttest was given at the end of the intervention, after the education was completed. The

questions were designed so the pretest and posttest questions were similar in content. The similar content was used to determine the difference in scores between the pre- and posttest which served as a proxy for increased knowledge. The satisfaction survey was offered at the conclusion of the educational program and included four demographic questions and five satisfaction questions that demonstrated approval of the education program. No identifying information was collected.

Summary

The practice-focused question proposed was: Will an evidence-based education program regarding management of ASB and UTI increase the knowledge of nurse practitioners toward the goal of decreasing antibiotics for LTC patients? This project was a staff education project. Providing a staff education program that included UTI guideline criteria will decrease ordering of urine cultures. Decreased urine cultures will decrease the inappropriate use of antibiotics. The data collected was the pre-test, post-test, and satisfaction evaluation.

Section 4: Findings and Recommendations

Introduction

UTIs are among the most common infections in LTC facilities (Avelluto & Paul, 2018). Residents are treated with antibiotics for positive urine cultures despite having no UTI symptoms, also known as ASB. It is unnecessary to treat ASB with antibiotics and potentially harmful. Unnecessary use of antibiotics can lead to antibiotic resistant organisms, allergic reactions to antibiotics, secondary infections such as c. diff, and increased healthcare costs. This project provided updated clinical guideline education that identified UTI versus ASB with the aim of decreasing the ordering of urine cultures for LTC residents that do not exhibit symptoms of UTI. With the decreased ordering of urine cultures, there will be a decrease in the ordering of antibiotics which will result in decreased c. diff, fewer adverse reactions to antibiotics, decreased antibiotic resistance and lower healthcare costs. The education project has stimulated changes to ordering urine culture for LTC residents who do not meet the UTI criteria guidelines.

The development of this education project was guided by several key articles. Nicolle et al. (2019) provided the most up to date UTI clinical guideline updates for LTC residents. Schulz et al. (2016) reviewed 10 myths for diagnosis and treatment of UTI. This article guided the development of the slide deck for this educational program (Appendix). The pre- and post-knowledge-based evaluations were developed using an article by Avelluto and Bryman (2018). This article had questions that helped to test the pre- and post-knowledge of identifying ASB versus UTI. The evaluation was developed based on standard satisfaction surveys.

Findings and Implications

The education program was reviewed by the on-call clinical leadership of the project location and found to have an overall face validity for proceeding with the project. Following the review, the intervention was presented on four different occasions to enhance participation. The targeted participants were on-call nurse practitioners, field-based nurse practitioners, and geriatric nurse practitioners. Of the 100 targeted participants, 44 (n = 44) were recruited and agreed to participate in the educational intervention for a 44% response rate. Forty-four individuals completed the pretest, 44 individuals participated in the educational intervention; and 38 participants completed the posttest. Ninety-five percent of the participants that completed the survey (n = 20) were female with an age range of 25 to 74 years with 10% (n = 2) of the participants being 25 to 34 years of age; 30% (n = 6) being 35 to 44 years of age; 35% (n = 7) being 45 to 54 years of age; 15% (n = 3) being 55 to 64 years of age; and 10% (n = 2) being 65 to 74 years of age. Twenty-five percent of the participants (n = 5) had less than 5 years of experience; 40% (n = 8) had 6 to 10 years of experience; 10% (n = 2) had 11 to 15 years of experience; and 25% (n = 5) had greater than 15 years of experience. The majority of the participants (65%) were MS/MSN prepared and 30% were DNP prepared nurse practitioners. The average pre-test score was 8.02 (SD = 1.73) and the average post-test score was 9.63 (SD = 0.675).

Table 1

Demographic Descriptive Statistics and Pretest and Posttest Scores

	N	Frequency (%)	MEAN (SD)	Range
Gender				
Male	1	5%		
Female	19	95%		
Age				
25 to 34 years	2			
35 to 44 years	6			
45 to 54 years	7			
55 to 64 years	3			
65 to 74 years	2			
Years of experience				
Less than 1 to 5 years	5	25%		
6 to 10 years	8	40%		
11 to 15 years	2	10%		
Greater than 15 years	5	25%		
Education				
MS/MSN	13	65%		
DNP	6	30%		
Pretest Score	44		8.02 (1.73)	2 to 10
Posttest Score	38		9.63 (0.675)	8 to 10

The participants were not asked to create a unique identifier; thus, it was not possible for the pretest scores to be matched to the posttest scores. Further, six of the participants did not complete the posttest. A one-sample *t* test may be used when there are unmatched scores from the same sample (York, 2017), thus, the mean of the pretest score was calculated and used as the threshold score for the comparison of the posttest scores. The average pre-test score was 8.02 (*SD* =1.73) and the average posttest score

was 9.63 (SD = 0.67). Using the one-sample t test, to estimate the data, there was a statistically significant difference between the pretest and the posttest (t = 14.72, $p <$ 0.001), indicating an increase in knowledge among the participants.

The satisfaction survey demonstrated a 75% net promoter score for the presentation. Per Mackintosh (2015), a net promoter score is a simple and reliable tool used to identify a person's satisfaction. The simple question asking, "would you recommend this program" provides the insight to the satisfaction of the program. The goal net promoter score is 80% or higher (Mackintosh, 2015). If the score is less than 80%, the follow-up questions give the information of ways to improve the program. Per the survey, 55% of the respondents felt most of the information was not new, 10% responded that all the information was already known; and 35% of the respondents felt some of the information was not new information. When asking "how much of this information is new to you," 15% responded none, 45% responded a little, 35% responded moderate amount, and 5% responded a lot. When asked about the length of the presentation, 90% felt the program length was just right, 5% felt it was too long, and 5% felt it was too short. In response to rating the program, 30% rated it excellent, 50% rated it very good, and 20% rated it good.

The results of the DNP project were presented to the organizations on-call team and field-based team and members of a national nurse practitioner organization. This gain in knowledge should impact how those in attendance order urine cultures, which in turn will impact the number of unnecessary antibiotics ordered. It is hoped that the long-term effect of this presentation will be that it decreases the number of urine cultures

ordered. Sharing this knowledge with nurse practitioners who have access to other organizations can result in the united front to educate families and other health care providers on the importance of ordering urine cultures only when UTI symptoms are present. The social change can ultimately affect families requesting urine cultures for non-specific symptoms that are not UTI symptoms

Recommendations

The education program was provided to close the gap-in-practice due to lack of knowledge of the new recommended guidelines. While most of the information was said to not be new to the participants, there were a few questions from the pretest to the posttest that demonstrated a lack of knowledge of the new guidelines. As the guidelines are updated, education with the updates to the nurse practitioners is necessary to prevent future gaps in practice. This education program was only offered to a small number of the nurse practitioners employed by a national organization. Offering this education to all the nurse practitioners employed by the organization could have the potential to impact LTC patient nationally.

Contribution of the Doctoral Project Team

I developed this doctoral project. The project team was composed of the director of clinical operations, clinical service managers, and the medical director, they provided a formative evaluation of the presentation, pretest, posttest, and survey. The participants in the educational project were determined by the project team. I delivered the presentation. The project team attended the education sessions and were available for questions that would address the policy of the organization. As the questions for the presentation were

related to the guideline updates that were presented, no organizational policies were questioned. The organization's educational department is taking steps to have the educational presentation recorded and continuing education hours be awarded. The educational program will then be available for all the organization's nurse practitioners. The plan for this future education is to include the on-call medical director, who would review antibiotic choices for UTIs.

Strengths and Limitations of the Project

This project's most impressive strength is that it demonstrated the importance of education being used to fill a specific gap in nursing knowledge. It is hoped that the nurse practitioners' newfound knowledge will be translated into practice and result in positive patient and organizational outcomes. Another strength is that the project involved many critical stakeholders in the organization. The inclusion of these key stakeholders provided me with access to many individuals across the organization who may be useful in future collaborative projects. Finally, a major strength of this project was the generous commitment of the 44 individuals who participated in the project. Without them, this project would not have been possible.

Despite these strengths, there are some limitations to this project. Firstly, the nurse practitioners targeted for this project were recruited from a convenience sample of nurse practitioners working at one facility, thus the results may not be generalizable to other groups of nurse practitioners. Secondly, face validity was used to validate the content of the pretest, posttest, and educational intervention. Face validity is the weakest form of validity as it does not include objective measurements. The use of content

validity such as the item-content validity index and scale-content validity index may have strengthened the content of the pretest, posttest and educational intervention and may have influenced the overall outcome of the project. In this case it is recommended that future projects use content validity as compared to the use of face validity. Lastly, a unique identifier was not used by the participants, thus the pretest scores and the posttest scores were unmatched, and a one-sample *t* test was used to estimate the data. The mean of the pretest score was calculated and used as the threshold for the comparison of the posttest scores rather than the actual pretest scores of each of the individuals (see York, 2017).

Section 5: Dissemination Plan

I developed an education project with the focus on the on-call nurse practitioners of the organization where my practicum was completed. The education was designed for the on-call team but is appropriate for the field nurse practitioners and practicing nurse practitioners not employed by the organization. During the research on the topic and my working experience, I became very passionate about the topic. When presenting the education, the passion for the topic was displayed and enhanced the receptiveness of the participants. The presentation was so well received, I was able to provide the education to audiences that were not originally included in the project design. Additionally, the presentation will be recorded, and continuing education hours will be applied for future nurse practitioners to participate in the project.

At the end of my project there was increased interest that was not anticipated but much welcomed. The topic I chose was well received and has sparked increased interest. I have been asked to participate in a project being conducted by the medical director of the on-call team to pick a case when antibiotics were either used or not used and the rationale is to be explained to the national on-call team. My DNP project has sparked interest in antibiotic stewardship, and I am being asked to share my knowledge and insight with others.

Analysis of Self

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Summary

This DNP project was focused on the updated guidelines for ordering urine cultures. Avoiding urine cultures for the LTC residents who do not demonstrate UTI symptoms is recommended by AMDA and The Geriatric Society. ASB is common in the LTC population and should not be treated. Positive urine cultures cause the ordering of antibiotics that are not necessary. Avoiding urine cultures in the asymptomatic LTC resident will limit the unnecessary ordering of antibiotics. Limiting unnecessary

antibiotics will result in decreased secondary infections, adverse reactions, antibiotic resistance, and health care costs.

References

Avelluto, G. D., & Bryman, P. N. (2018). Asymptomatic bacteriuria vs. symptomatic urinary tract infection: Identification and treatment challenges in geriatric care. *Urologic Nursing, 38(3),* 129-143. https://doi.org/10.7257/1053816X.2018.38.3.129

Balogun, S. A., & Philbrick, J. T. (2014). Delirium, a symptom of UTI in the elderly: Fact or fable? A systematic review. *Canadian Geriatrics Journal,* 17(1), 22. https://doi.org/10.5770/cgj.17.90

Cortes-Penfield, N. W., Trautner, B. W., & Jump, R. (2017). Urinary tract infection and asymptomatic bacteriuria in older adults. *Infectious Disease Clinics of North America.* 31(4), 673-688. https://doi.org/10.116/j.idc.2017.07.002

Crnich, C. J., & Drinka, P. (2014). Improving the management of urinary tract infections in nursing homes: It's time to stop the tail from wagging the dog. *Annals of Long-Term Care*, 22(9), 32–36. https://www.managedhealthcareconnect.com/sites/managedhealthcareconnect.com/files/2019-06/Drinka%20PDF%20for%20Final%20Approval.pdf

Davis, C. (2017). F881: Keys to a compliant antibiotic stewardship program. *American Association of Directors of Nursing Services (AADNS)*. https://www.aadns-ltc.org/Resources/DNS-Navigator/details/post/f881-keys-to-a-compliant-antibiotic-stewardship-program

Doernberg, S.B., Dudas, V. and Trivedi, K.K. (2015). Implementation of an antimicrobial stewardship program targeting residents with urinary tract infections in three

community long-term care facilities: A quasi-experimental study using time-series analysis. *Antimicrobial Resistance and Infection Control*. 4(1). https://doi.org/10.1186/s13756-015-0095-y

Eyer, M. M., Läng, M., Aujesky, D., & Marschall, J. (2016). Overtreatment of asymptomatic bacteriuria: A qualitative study. *Journal of Hospital Infection.* 93(3), 297–303. https://doi-org/10.1016/j.jhin.2016.04.007

Kirkpatrick, J., D., & Kirkpatrick, W., K., (2016). *Kirkpatrick's four levels of training evaluation.* ATD Press

Knowles, M.S., Holton, E.F., & Swanson, R.A. (2011). *The adult learner: The definitive classic in adult education and human resource development* (7th ed.). Elsevier.

Lee, M. J., Kim, M., Kim, N-H., Kim, C-J., Song, K-H., Choe, P. G., Park, W. B., Bang, J. H., Kim, E. S., Park, S. W., Kim, N. J., Oh, M-D., & Kim, H. B. (2015). Why is asymptomatic bacteriuria overtreated?: A tertiary care institutional survey of resident physicians. *BMC Infectious Diseases,* 15(1), 289. https://doi.org/10.1186/s12879-015-1044-3

Lin, Y.-T., Chen, L.-K., Lin, M.-H., & Hwang, S.-J. (2006). Asymptomatic bacteriuria among the institutionalized elderly. *Journal of the Chinese Medical Association*, 69(5), 213–217. https://doi.org/10.1016/S1726-4901(09)70221-7

Mackintosh, D. (2015). Net promoter scores: Monitoring practice performance. *In Practice*, 37(7), 370. https://doi.org/10.1136/inp.h2645

McMillan, D. E., Bell, S., & Benson, E. E., Mandzuk, L. L., Matias, D. M., McIvor, M. J., Robertson, J. E., Wilkins, K. L. (2007). From anxiety to enthusiasm:

Facilitating graduate nursing students' knowledge development in science and theory. *Journal of Nursing Education,* 46(2), 88–91. https://doi.org/10.3928/01484834-20070201-10

Morrison-Pandy, L. E., Ross, C. A., Ren, D., & Garand, L. (2015). The role of the nurse practitioner and asymptomatic urinary treatments. *The Journal for Nurse Practitioners*, 11(9), 903-906. https://doi.org/10.1016/j.nurpra.2015.06.008

Nicolle, L. E. (2014). Antimicrobial stewardship in long term care facilities: What is effective? *Antimicrobial Resistance and Infection Control,* 3(1), 6-6. http://doi.org/10.1186/2047-2994-3-6

Nicolle, L. E., Gupta, K., Bradley, S. F., Colgan, R., DeMuri, G. P., Drekonja, D., Eckert, L. O., Geerligs, S. E., Köves, B., Hooten, T. M., Juthani-Mehta, M., Knight, S. L., Saint, S., Schaeffer, A. J., Trautner, B., Wullt, B., & Siemieniuk, R. (2019). Clinical practice guideline for the management of asymptomatic bacteriuria: 2019 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*, 68(10), 83–110, https://doi.org/10.1093/cid/ciy1121

Optimistic Project. (2018). Optimistic UTI protocol. https://www.optimistic-care.org/docs/pdfs/OPT_UTI_Protocol.pdf

Polit, D. (2010). *Statistics and data analysis for nursing research.* Pearson.

Pulia, M., Kern, M., Schwei, R. J., Shah, M. N., Sampene, E., & Crnich, C. J. (2018). Comparing appropriateness of antibiotics for nursing home residents by setting of prescription initiation: a cross-sectional analysis. *Antimicrobial Resistance and Infection Control*, *7,* 74. https://doi.org/10.1186/s13756-018-0364-7

Redwood, R., Knobloch, M. J., Pellegrini, D. C., Ziegler, M. J., Pulia, M., & Safdar, N. (2018). Reducing unnecessary culturing: A systems approach to evaluating urine culture ordering and collection practices among nurses in two acute care settings. *Antimicrobial Resistance & Infection Control,* 7(1), 1-8. https://doi.org/10.1186/s13756-017-0278-9

Rice, S. (2015). Nursing home reduces antibiotic use. *Modern Healthcare*, 45(45), 32.

Schulz, L., Hoffman, R. J., Pothof, J., & Fox, B. (2016). Top ten myths regarding the diagnosis and treatment of urinary tract infections. *Journal of Emergency Medicine,* 51(1), 25–30. https://doi.org/10.1016/j.jemermed.2016.02.009

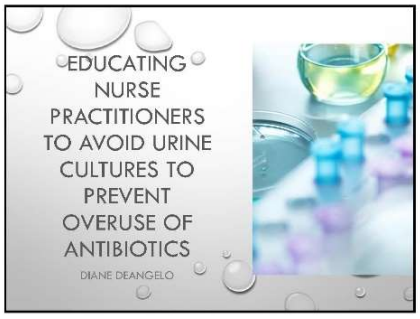
Smelov, V., Naber, K., & Bjerklund Johansen, T. E. (2016). Improved classification of urinary tract infection: Future considerations. *European Urology Supplements,* 15(4), 71–80. https://doi.org/10.1016/j.eursup.2016.04.002

Surr, C. A., & Gates, C. (2017). What works in delivering dementia education or training to hospital staff? A critical synthesis of the evidence. *International Journal of Nursing Studies*, 75, 172–188. https://doi.org/10.1016/j.ijnurstu.2017.08.002

van Buul, L. W., van der Steen, J. T., Doncker, S. M., Achterberg, W. P., Schellevis, F. G., Veenhuizen, R. B., & Hertogh, C. M. P. M. (2014). Factors influencing antibiotic prescribing in long-term care facilities: A qualitative in-depth study. *BMC Geriatrics*, 14(1), 136. https://doi.org/10.1186/1471-2318-14-136

York, R. O. (2017). *Statistics for human service evaluation*. Sage Publications.

Appendix: The Education Slide Deck



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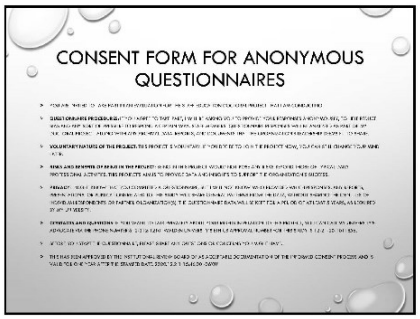

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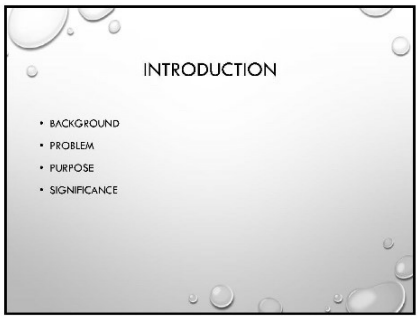

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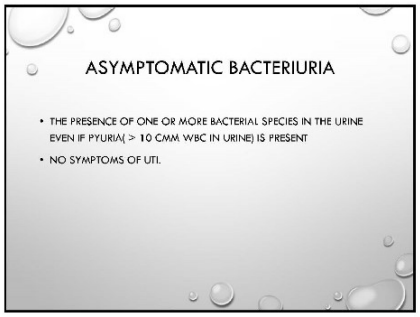

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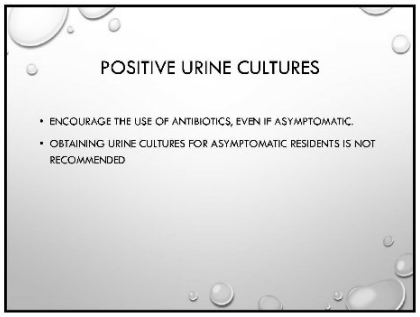


6

TREATING ASYMPTOMATIC BACTERIURIA

- LEADS TO SECONDARY INFECTIONS SUCH AS C. DIFF
- LEADS TO ANTIBIOTIC RESISTANCE
  - POTENTIAL FOR AFFECTING COMMUNITY WITH DRUG RESISTANT ORGANISMS
- LEADS TO POTENTIAL FOR ADVERSE REACTIONS
- LEADS TO INCREASED HEALTHCARE COSTS

7

UTI SYMPTOMS

- CLASSIC SYMPTOMS OF UTI
  - URINARY FREQUENCY
  - URGENCY OR INCONTINENCE (NEW OR WORSENING)
  - DYSURIA
  - COSTOVERTEBRAL ANGEL TENDERNESS
  - SUPRAPUBIC TENDERNESS
  - GROSS HEMATURIA
  - FEVER, RIGORS OR CLEAR-CUT DELIRIUM

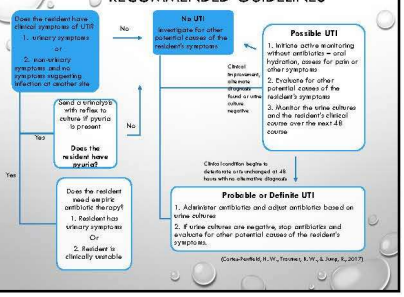
8

NOT UTI SYMPTOMS

- MYTHS OF DIAGNOSING UTI
  - CLOUDY URINE
  - FOUL SMELLING URINE
  - FALLS
  - MENTAL STATUS CHANGE
  - BACTERIA, NITRITES, LEUKOESTERASE, WBC(PYURIA - > 10CMM WBC IN URINE) IN URINALYSIS ALONE
  - PRESENCE OF YEAST OR CANDIDA IN A CATHETERIZED RESIDENT
  - SQUAMOUS EPITHELIAL CELLS MY INDICATE CONTAMINATED SPECIMEN

9

RECOMMENDED GUIDELINES



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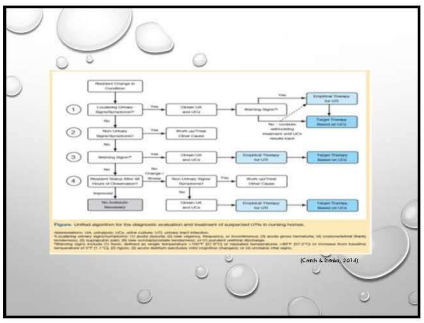

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CMS Certification Criteria for UTI

Urinary Tract Infection (up to 7 days)

MUST have:

☐ ≥ 100,000 colonies of bacteria growing in urine with no more than 2 species of microorganisms

AND One or more of the following:

☐ Fever ≥ 100°F (oral) or two degrees above baseline

☐ Peripheral WBC count ≥ 12,000

☐ In the case of catheter-associated UTI: acute back pain, flank pain, epididymis pain, purulent exudate from catheter insertion site, or prostate pain.

☐ Symptoms, dysuria, new or increased urinary frequency, new or increased urinary incontinence, gross hematuria, or acute costovertebral angle pain or tenderness

(Optimatic UTI Protocol, 2019)

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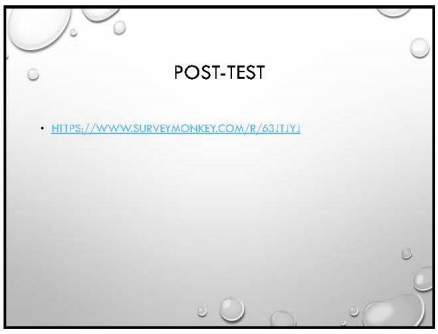

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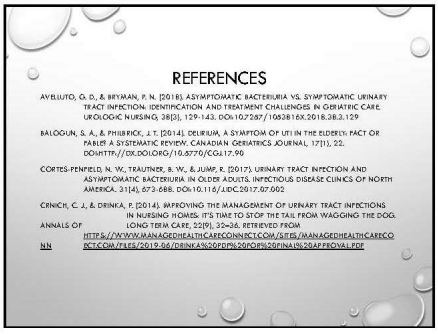

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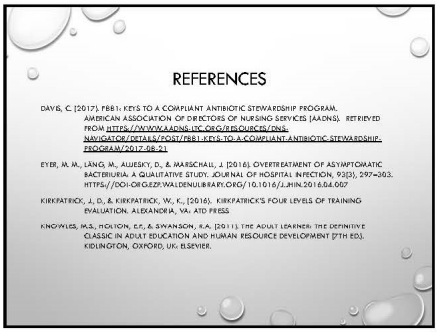

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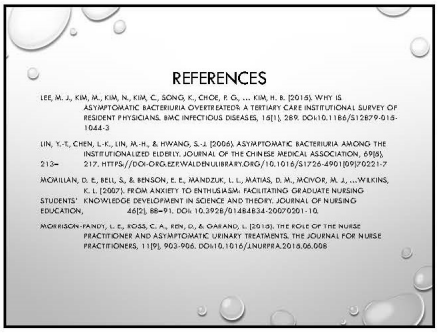

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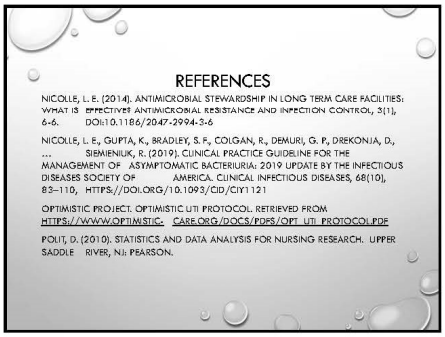
REFERENCES
NICOLLE, L. E. (2014). ANTIMICROBIAL STEWARDSHIP IN LONG TERM CARE FACILITIES: WHAT IS EFFECTIVE? ANTIMICROBIAL RESISTANCE AND INFECTION CONTROL, 3(1), 6-6. DOI:10.1186/2047-2994-3-6
NICOLLE, L. E., GUPTA, K., BRADLEY, S. F., COLGAN, R., DEMURI, G. P., DREKONJA, D., ... SIEMIENIUK, R. (2019). CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF ASYMPTOMATIC BACTERIURIA: 2019 UPDATE BY THE INFECTIOUS DISEASES SOCIETY OF AMERICA. CLINICAL INFECTIOUS DISEASES, 68(10), 83–110, HTTPS://DOI.ORG/10.1093/CID/CIY1121
OPTIMISTIC PROJECT. OPTIMISTIC UTI PROTOCOL. RETRIEVED FROM HTTPS://WWW.OPTIMISTIC-CARE.ORG/DOCS/PDFS/OPT_UTI_PROTOCOL.PDF
POLIT, D. (2010). STATISTICS AND DATA ANALYSIS FOR NURSING RESEARCH. UPPER SADDLE RIVER, NJ: PEARSON.

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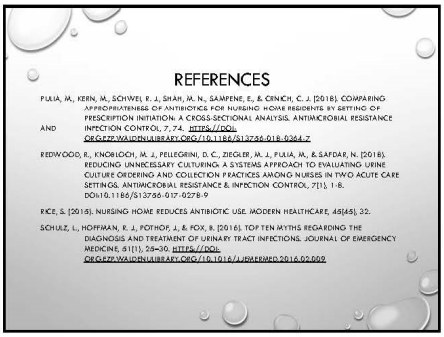
REFERENCES
PULIA, M., KERN, M., SCHWEI, R. J., SHAH, M. N., SAMPENE, E., & CRNICH, C. J. (2018). COMPARING APPROPRIATENESS OF ANTIBIOTICS FOR NURSING HOME RESIDENTS BY SETTING OF PRESCRIPTION INITIATION: A CROSS-SECTIONAL ANALYSIS. ANTIMICROBIAL RESISTANCE AND INFECTION CONTROL, 7, 74. HTTPS://DOI-ORG.EZP.WALDENULIBRARY.ORG/10.1186/S13756-018-0364-7
REDWOOD, R., KNOBLOCH, M. J., PELLEGRINI, D. C., ZIEGLER, M. J., PULIA, M., & SAFDAR, N. (2018). REDUCING UNNECESSARY CULTURING: A SYSTEMS APPROACH TO EVALUATING URINE CULTURE ORDERING AND COLLECTION PRACTICES AMONG NURSES IN TWO ACUTE CARE SETTINGS. ANTIMICROBIAL RESISTANCE & INFECTION CONTROL, 7(1), 1-8. DOI:10.1186/S13756-017-0278-9
RICE, S. (2015). NURSING HOME REDUCES ANTIBIOTIC USE. MODERN HEALTHCARE, 45(45), 32.
SCHULZ, L., HOFFMAN, R. J., POTHOF, J., & FOX, R. (2016). TOP TEN MYTHS REGARDING THE DIAGNOSIS AND TREATMENT OF URINARY TRACT INFECTIONS. JOURNAL OF EMERGENCY MEDICINE, 51(1), 28–30. HTTPS://DOI-ORG.EZP.WALDENULIBRARY.ORG/10.1016/J.JEMERMED.2016.02.009

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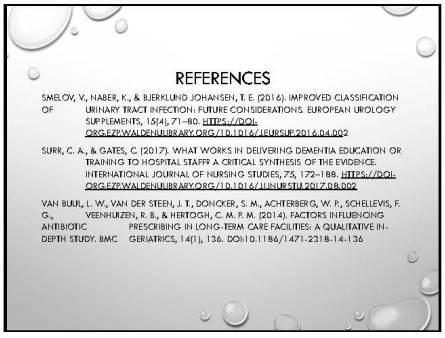
REFERENCES
SMELOV, V., NABER, K., & BJERKLUND JOHANSEN, T. E. (2016). IMPROVED CLASSIFICATION OF URINARY TRACT INFECTION: FUTURE CONSIDERATIONS. EUROPEAN UROLOGY SUPPLEMENTS, 15(4), 71–80. HTTPS://DOI-ORG.EZP.WALDENULIBRARY.ORG/10.1016/J.EURSUP.2016.04.002
SURR, C. A., & GATES, C. (2017). WHAT WORKS IN DELIVERING DEMENTIA EDUCATION OR TRAINING TO HOSPITAL STAFF? A CRITICAL SYNTHESIS OF THE EVIDENCE. INTERNATIONAL JOURNAL OF NURSING STUDIES, 75, 172–188. HTTPS://DOI-ORG.EZP.WALDENULIBRARY.ORG/10.1016/J.IJNURSTU.2017.08.002
VAN BUUL, L. W., VAN DER STEEN, J. T., DONKER, S. M., ACHTERBERG, W. P., SCHELLEVIS, F. G., VEENHUIZEN, R. B., & HERTOGH, C. M. P. M. (2014). FACTORS INFLUENCING ANTIBIOTIC PRESCRIBING IN LONG-TERM CARE FACILITIES: A QUALITATIVE IN-DEPTH STUDY. BMC GERIATRICS, 14(1), 136. DOI:10.1186/1471-2318-14-136

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