

Deferring Prescribing in Nursing Home Residents with Asymptomatic Bacteriuria:

A Pilot Study

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Title and Abstract

Title

The purpose of this research study is to identify risk factors for unnecessary antibiotic use by prescribers and to assess the impact of educational interventions impact for nursing home residents that have asymptomatic bacteriuria (ASB). Antibiotic use in nursing homes creates several harmful patient outcomes including; the emergence of multi-drug resistant bacteria, adverse drug events, polypharmacy, and higher health care costs.

Abstract

Urinary tract infections (UTIs) are the most commonly treated infection among nursing home residents; patients are commonly treated even in the absence of signs or symptoms of a UTI being present. This research study's objective is to reduce the amount of unnecessary antibiotic prescribing and assess the impact of educational interventions in nursing home residents that have asymptomatic bacteriuria (ASB). The design of this research study is quasi-experimental. The setting is Butler Memorial Hospital, a non-profit organization and an independent community hospital with 296 beds located in rural Pennsylvania. Population of interest includes nursing home residents that present to Butler Memorial Hospital's Emergency Department with consecutive positive urine cultures. A multifaceted educational intervention will be provided to Emergency Department staff to reduce the number of unnecessary antibiotic prescribing in ASB cases.

There were 105 in the sample population that resided in an institutional facility for the elderly that were seen in Butler Health System's Emergency Department. Out of the

105-sample population, 73 were encountered before educational intervention. Twelve out of the 73 pre-educational sample population met the study's inclusion criteria. Out of the 105 sample population, 32 were encountered after educational intervention. 4 out of the 32 post-educational sample population met the study's inclusion criteria. In conclusion, this pilot study showed that there was a 3.9 percent overall reduction in nursing home residents that were being inappropriately diagnosed with a UTI and placed on unnecessary antibiotics when in fact they had ASB and met the criteria to defer prescription. While this was a small change the potential for changing prescribing habits with educational programs is encouraging and more studies should be done with larger samples sizes.

Introduction

Problem Description

Nursing home residents frequently suffer from ASB; often this is mistreated as a urinary tract infection. Providers therefore place patients on unnecessary antibiotic therapy that can have harmful patient effects. Butler Health System's Emergency Department along with nursing home providers have voiced the need for antibiotic stewardship in nursing home residents that enter for treatment showing signs and symptoms of ASB. Neighboring nursing homes have expressed concern due to all of the antibiotic complications they have encountered after ASB patient cases were mistreated with an antibiotic. Researchers identified that unnecessary treatment of ASB is a common clinical practice and seen in nearly 50% of ASB cases, and this indicates a significant problem (Irfan, Brooks, Mithoowani, Celetti, Main & Mertz, 2015). Antibiotic use in nursing homes creates several harmful patient outcomes including: the emergence of multi-drug resistant bacteria; adverse drug events; polypharmacy; and higher health care costs.

A knowledge gap exists between emergency department providers and healthcare staff regarding the treatment of ASB. Education on this topic is crucial for positive patient outcomes. Educational interventions implemented in this study include: an overview of the evidence; clarification of misconceptions related to ASB management; discussion of cases that residents had recently encountered and appropriate indication for urine cultures; specifically, for patients with symptoms of UTI the presentation of asymptomatic bacteriuria education. The primary investigator distributed pocket cards to emergency department staff highlighting the Infectious Diseases Society of America guidelines for ASB treatment to reinforce the program and offer references for future review. Implementing educational interventions aim is to help reduce the amount of unnecessary antibiotics prescribed to nursing home residents with ASB.

The research question for this study is, “Will educational interventions reduce the amount of unnecessary antibiotic prescribing in nursing home residents that have asymptomatic bacteriuria that present to Butler Health System’s Emergency Department?”

The following hypotheses will be tested in this research study.

H₀: There is no reduction in the amount of antibiotics prescribed to nursing home residents that have asymptomatic bacteriuria that present to Butler Health System’s Emergency Department.

H₁: There is a reduction in the amount of antibiotics prescribed to nursing home residents that have asymptomatic bacteriuria that present to Butler Health System’s Emergency Department.

Available Knowledge

UTIs are the most commonly treated infection among nursing home residents. Even in the absence of specific (e.g., dysuria) or non-specific (e.g., fever) signs or symptoms, residents frequently receive an antibiotic for a suspected infection (Phillips et al., 2012). In the absence of urinary symptoms, a diagnosis of ASB is given to patients. The 2005 Infectious Diseases Society of America guidelines define ASB as the specified quantitative number of bacteria in the urine without any typical symptoms of a UTI (Nicolle, et. al., 2005). These guidelines recommend no antimicrobial treatment for ASB unless the patient is pregnant or anticipating a urologic interventional procedure. ASB is common and often leads to unnecessary antibiotic use. Reducing antibiotic overuse for ASB is therefore an important issue for antimicrobial stewardship (Lee et al., 2015). A need for antibiotic stewardship in regard to ASB in Butler Health System's Emergency Department has been expressed from the health system itself as well as the nursing home providers. Antibiotic therapy for ASB in the institutionalized elderly population has not been shown to be of benefit and may in fact be harmful; however, antibiotics are still frequently used to treat ASB in this population (Walker et al., 2000).

Rationale

ASB is prevalent in the elderly institutionalized population and there have been various studies conducted involving the inappropriate treatment of ASB. A study conducted by Irfan, Brooks, Mithoowani, Celetti, Main & Mertz (2015) regarding ASB was to reduce risk factors and assess the impact of educational interventions. Variables included appropriateness of ASB management, physicians' knowledge and practice regarding ASB. The sample population of interest was defined as consecutive patients with positive urine cultures and the study was conducted in two tertiary teaching adult care hospitals.

Educational sessions were implemented that provided a) an overview of the evidence, b) feedback of findings during baseline assessment c) clarification of misconceptions related to ASB management (i.e. risk factors associated with inappropriate treatment of ASB identified during the period of baseline data collection), d) feedback about the initiative, e) discussion of cases that residents had recently encountered and f) appropriate indication for urine cultures, specifically, for patients with symptoms of UTI (Irfan et al., 2015).

Educational session interventions were effective in reducing inappropriate use of antibiotics in ASB cases to less than 10%. Researchers demonstrated that their educational interventions were not only successful in reducing inappropriate use of antimicrobials for ASB cases in short studies but also in a long term follow up over two years (Irfan et al., 2015).

Another study conducted by Walker, McGeer, Simor, Armstrong-Evans & Loeb (2000) aimed to explore the perceptions, attitudes and opinions of physicians and nurses involved in the process of prescribing antibiotics for ASB in institutionalized elderly people. Focus groups were conducted among physicians and nurses who cared for to residents of long term care facilities. The focus group discussions were tape recorded and the transcripts for each session were analyzed to determine the uses and themes emerging from the text (Walker et al., 2000). It was observed that the ordering of urine cultures and the prescribing of antibiotics for residents with ASB were influenced by a wide range of nonspecific symptoms or signs in residents. The physicians believed that the presence of these signs justified a decision to order antibiotics. Nurses played a central role in both the ordering of urine cultures and the decision to prescribe antibiotics through their awareness of changes in residents' status and communication of this to physicians. The study concluded that education about ASB was viewed as an important priority for both

physicians and nurses (Walker et al., 2000). The presence of non-urinary symptoms and signs was an important factor in the prescription of antibiotics for ASB in the institutionalized elderly population. However, ASB doesn't necessarily warrant antibiotic treatment (Walker et al., 2000).

These studies show the significance of inappropriately treated ASB and how prevalent it is in the institutionalized elderly population. Two theories explained below can be applied to the healthcare providers behavior in treating ASB.

One theory that supports this research study's focus is Albert Bandura's Social Learning Theory. Albert Bandura's social learning theory hypothesizes that individuals learn from one another by means of observing, imitating, and modeling. Bandura (1977) stated, "Most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action" (p. 22).

Another theory that could be applied is Rodgers' Diffusion of Innovations Theory. Rogers (2003) discussed the innovation-diffusion process as "the process through which an individual (or other decision-making unit) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (p. 168). Both of these theories can directly relate to a healthcare providers' approach in the treatment or deferment of prescribing in ASB cases.

Specific Aims

The purpose of this research study is to reduce the amount of unnecessary antibiotic prescribing and assess the impact of educational interventions in nursing home residents

that have ASB that present to Butler Health System's Emergency Department. This research aims to improve patient outcomes and therefore increase quality care delivered by Butler Memorial Hospital's Emergency Department. An assumption can be made that patients will benefit from this research study by being accurately treated for ASB and avoid harmful side effects from mistreatment.

Methods

Context

UTI's are the most common bacterial infection in elderly people, causing more than 50% of all infection episodes requiring treatment during institutional care (Hedin, Petersson, Widebäck, Kahlmeter, & Mölsted, 2002). However, ASB is also prevalent and commonly mistreated as a UTI with inappropriate antibiotics. Institutions for the elderly most commonly include nursing homes, sheltered homes, and service houses of various sizes. Due to the prevalence of ASB in the institutionalized elderly appropriate treatment is essential in delivering quality patient care. Other differential diagnoses other than a UTI should be considered before antibiotic treatment is given (Hedin, et. al., 2002).

Although current guidelines suggest screening for ASB and treating it in specific circumstances such as during pregnancy or before invasive urologic procedures, antibiotic overuse for ASB seems to be overwhelming in clinical practice, as supported by several studies reporting that 20–80 % of cases of ASB are inappropriately treated (Lee et al., 2015). The overuse of antibiotics in nursing home settings leads to the various complications and potential harm to patients. Treatment of ASB has been shown to have no clinical benefit in lowering the frequency of symptomatic UTI or ASB, whereas it predisposes the patient to increased risk of development of resistant organisms or adverse

effects (Kelley, Aaronson, Poon, McCarter, Bato, & Jankowski, 2014). The American Geriatrics Society, (2013) has emphasized the importance of not treating elderly people with ASB with antibiotics (Leduc, 2014). ASB can be harmful because of the possibility of adverse drug reactions, especially in the frail elderly population with frequent comorbidities.

Up to 70 percent of nursing home residents may receive at least one antibiotic agent a year (McMaughan et al., 2016). This statistic is staggering and can lead to unwarranted negative patient outcomes. The emergence of multidrug resistant organisms in nursing homes and consequent spread to the community combined with other negative outcomes of antibiotic overuse, such as adverse drug events, hospital admissions, and higher health care costs, calls for optimizing antibiotic stewardship in nursing homes (McMaughan et al., 2016).

ASB is often times mistreated due to a lack of knowledge on the part of the healthcare providers and staff. This knowledge is crucial in accurately diagnosing and treating patients. National guidance indicates that men and women over 65 years should not receive antibiotic treatment for ASB (McNulty, 2014). Providing educational sessions regarding published guidelines to healthcare providers will help to eliminate any mistreatment of ASB cases. According to Lee et. al., (2015), "Physicians' lack of knowledge and misperceptions contribute to the misuse of antibiotics" (p. 2). Inappropriate treatment methods need to be addressed to improve patient outcomes and avoid any harm in patients.

Zabarsky, Sethi, & Donskey (2008), found that an educational intervention directed at nursing staff and primary care providers resulted in significant reductions in inappropriate submission of urine cultures and in the overall rate of treatment of ASB.

Antibiotic stewardship is a necessity to decrease bacterial drug resistance and is significant in this research setting.

Interventions

This study uses observational methods, a chart review will be conducted pre-educational intervention and post-educational intervention. A multifaceted educational intervention will be provided for Emergency Department staff at Butler Memorial Hospital. Educational interventions implemented in this study include; an overview of the evidence, clarification of misconceptions related to ASB management, discussion of cases that residents had recently encountered and appropriate indication for urine cultures, specifically, for patients with symptoms of UTI the presentation of asymptomatic bacteriuria education. Pocket cards for emergency department staff highlighting the Infectious Diseases Society of America guidelines for ASB treatment will be provided to staff for practice reference. Appendix A & B.

The Infectious Diseases Society of America guidelines state that ASB is defined as two consecutive voided urine specimens with isolation of the same organism in quantitative counts $\geq 10^5$ cfu/mL in women with no signs or symptoms of UTI, or a single, clean catch voided urine specimen with one bacterial species isolated in quantitative count $\geq 10^5$ cfu/mL without any signs or symptoms of UTI in men (Nicolle, et. al., 2005). In both men and women, a single catheterized urine specimen with one bacterial species isolated in a quantitative count $\geq 10^2$ cfu/mL were defined as having bacteriuria (Nicolle, et. al., 2005). The pocket cards include an algorithm of when to screen and treat ASB patients and

the Infectious Diseases Society of America guidelines and criteria for the diagnosis of bacteriuria. Appendix B. The primary investigator created an algorithm as part of the study assist providers with a clear and concise method to help guide treatment.

The educational presentation and materials were provided to the emergency department staff to emphasize the importance of not treating the institutionalized elderly population or patients that meet the Infectious Disease Society of America's criteria for no treatment.

Study of the Interventions

Data for the research was collected over ten months' pre-educational intervention to obtain baseline observation. Educational interventions were provided for emergency department providers and healthcare staff and, then post-educational intervention data was collected over 3 months' time. Next, data was collected based upon the inclusion and exclusion criteria listed. This data was then analyzed to determine the outcome of the pilot study.

Measures

Butler Memorial Hospital served as the setting for my research project and research will be conducted specifically in the Emergency Department. Butler Memorial Hospital is an independent community, 296 bed hospital that opened in 1898. It is a non-profit organization located in the rural community of Butler Pennsylvania. Butler Memorial Hospital's Emergency Department encounters several nursing home residents from the surrounding community.

Population of interest in this study include patients that reside in institutional facilities for the elderly. The sample population must meet these inclusion criteria: asymptomatic of urinary symptoms, discharged back to the nursing home, patients with a first positive urine culture, defined as growth of greater than or equal to 10^5 colony forming units per milliliter (CFU/mL) of bacteria. Urinary symptoms are defined by any one of the following: urgency, dysuria, frequency, suprapubic tenderness, flank pain, costovertebral angle pain and tenderness, rigors, gross hematuria, delirium, and new or worsening fever (High, Bradley, Gravenstein, Mehr, Quagliarello, Richards, & Yoshikawa 2009).

General demographic data was collected on sample population including: age, gender and if they have an indwelling catheter present. Inclusion criteria for the sample population includes; the sample population must be a nursing home resident, discharged back to the nursing home, patients with a first positive urine culture, defined as growth of greater than or equal to 10^5 colony forming units per milliliter (CFU/mL) of bacteria, and asymptomatic of urinary symptoms. Urinary symptoms are defined by any one of the following: urgency, dysuria, frequency, suprapubic tenderness, flank pain, costovertebral angle pain and tenderness, rigors, gross hematuria, delirium, and new or worsening fever (High, et. al., 2009).

Exclusion criteria for the sample population includes; non-nursing home residents, admission to the hospital and the presence of signs and symptoms of a UTI. A UTI is defined by any one of the following: urgency, dysuria, frequency, suprapubic tenderness, flank pain, costovertebral angle pain and tenderness, rigors, gross hematuria, delirium, and new or

worsening fever, patients with a first positive urine culture of mixed growth, defined as greater than 3 organisms (High, et. al., 2009).

Additional data collected will include if the patient was discharged on an antibiotic for urinary symptoms both before and after educational interventions.

Analysis

The most accurate research design for this project is a quasi-experimental design. There will be manipulation of the independent variable or the healthcare providers by providing educational sessions for ED staff. The study shows a comparison of treated ASB patients prior to educational sessions and then after education sessions. There will be no control over what nursing home residents present to the emergency department or how the provider treats the patient.

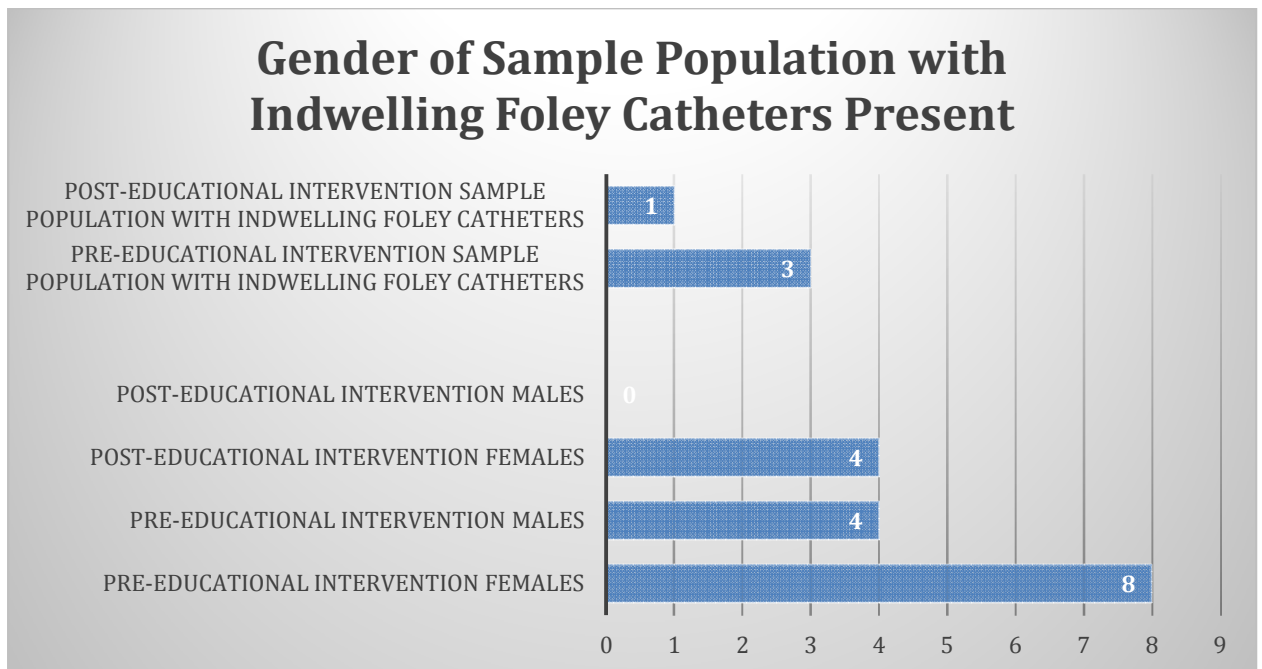
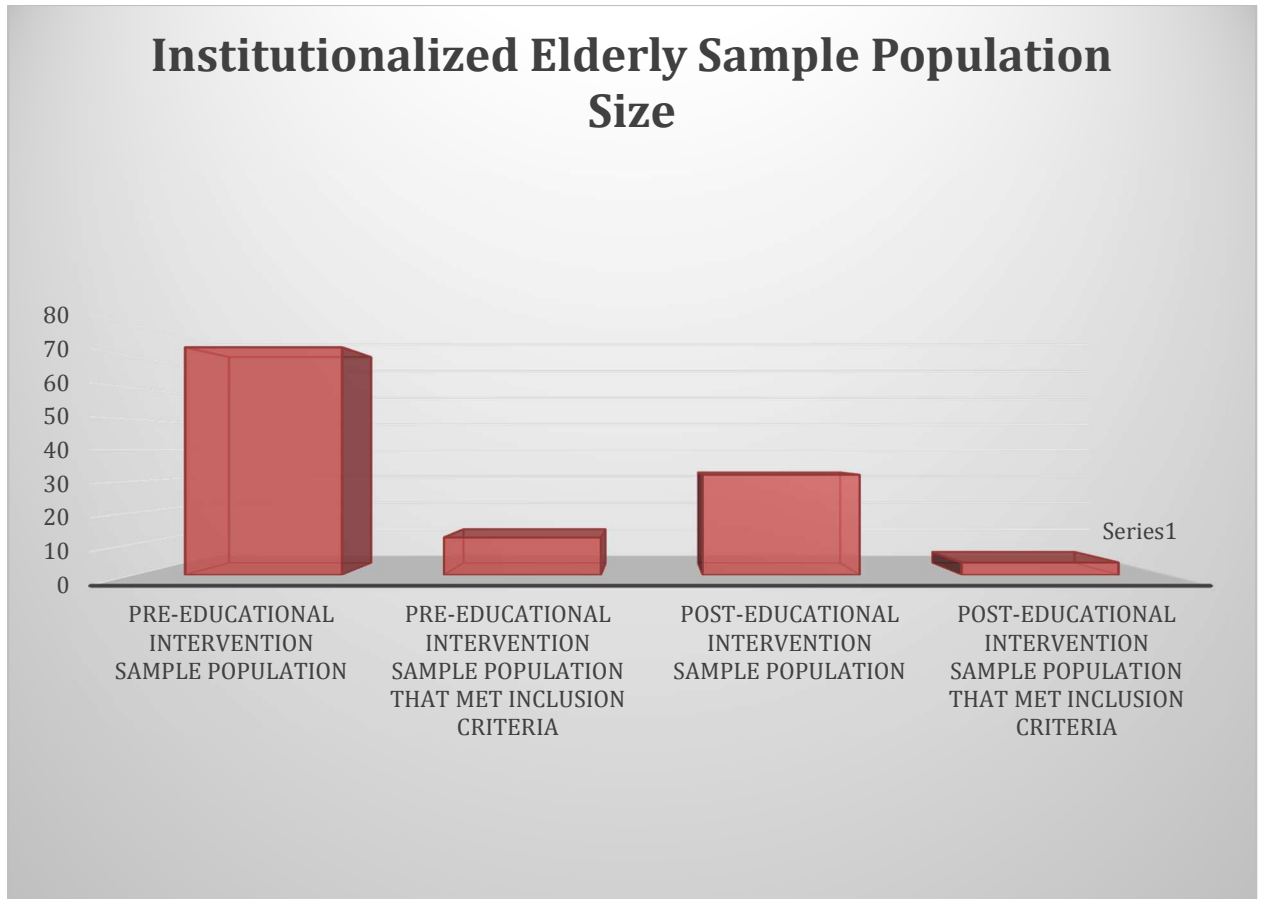
Ethical Considerations

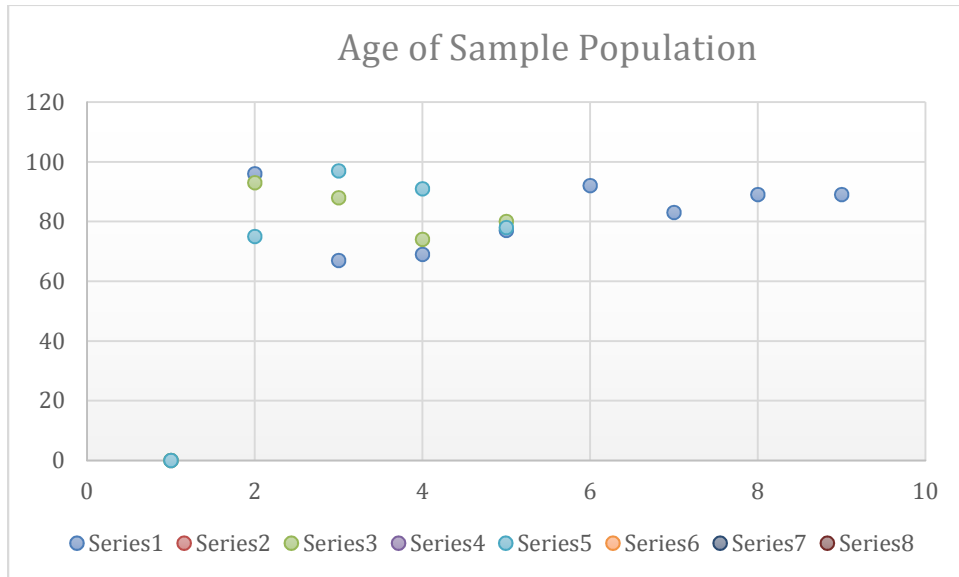
The Institutional Review Boards at Edinboro University of Pennsylvania and Butler Health System both approved the on-site data collection procedures for this study. Both boards gave the research team a waiver of written consent. There were no physical, psychological, financial, social/economic or legal risks, or harm from confidentiality to population of interest in this study.

Results

There were 105 of the sample population that resided in numerous institutional facilities for the elderly that were seen in Butler Health System's Emergency Department. Out of the 105 sample population, 73 were encountered before educational intervention. Data was collected between the dates of 2/1/18 through 7/31/18 for pre-educational intervention. Twelve out of the 73 pre-educational sample population met the following inclusion criteria; asymptomatic of urinary symptoms, discharged back to the nursing home, patients with a first positive urine culture, defined as growth of greater than or equal to 10^5 colony forming units per milliliter (CFU/mL) of bacteria. 8 of the 12-sample population were females ranging in the age of 67-96. 4 of the 12-sample population were males ranging in the age of 75-97. 3 of the 12-sample population had indwelling foley catheters in place.

Additional data, collected between 8/10/18 through 11/10/18 comprised post-educational intervention observations. Out of the 105 sample population, 32 were encountered after educational intervention. Four out of the 32 post-educational sample population met the following inclusion criteria; asymptomatic of urinary symptoms, discharged back to the nursing home, patients with a first positive urine culture, defined as growth of greater than or equal to 10^5 colony forming units per milliliter (CFU/mL) of bacteria. 4 of the 4-sample population were females ranging in the age of 74-93. 1 of the 4 sample population had indwelling foley catheter in place.





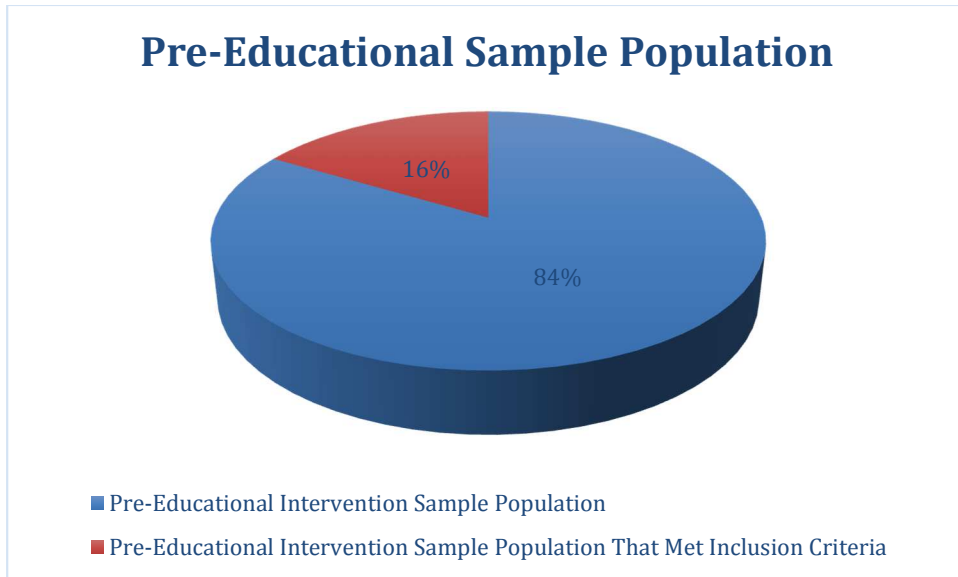
Discussion

Summary

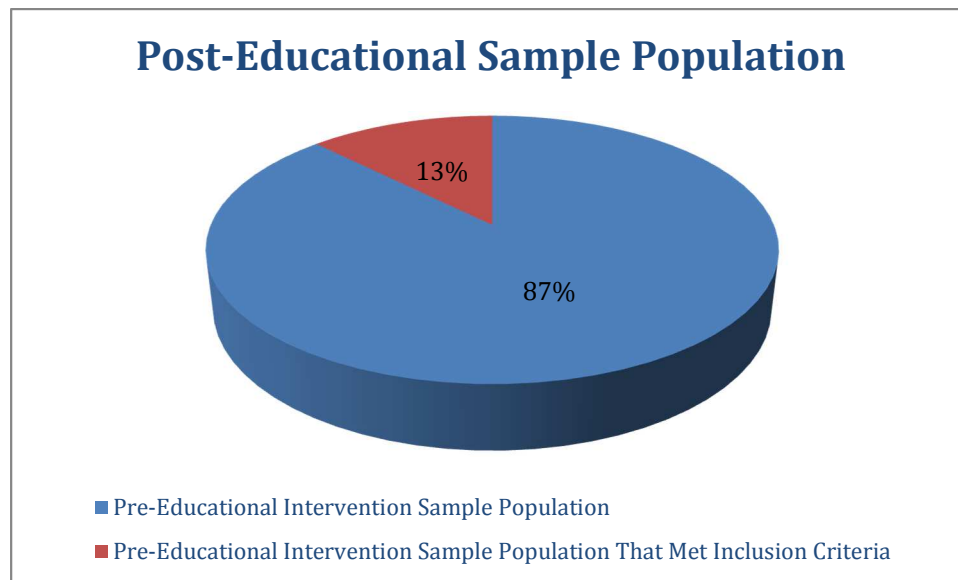
The data analysis validated that nursing home residents that meet the Infectious Disease Society of America’s guidelines for ASB do frequent Butler Health System’s Emergency Department. Patients have been found discharged with UTI’s when in fact they meet the criteria of ASB. This pilot study reveals that unnecessary antibiotics are being prescribed to nursing home residents that exhibit ASB.

Interpretation

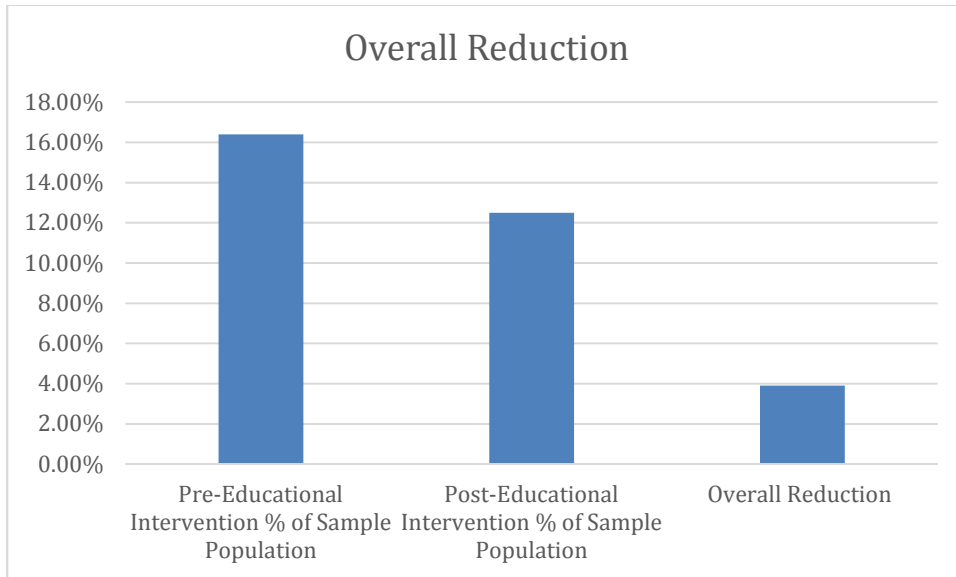
Out of the 73 pre-educational intervention sample population that met inclusion criteria, 16.4% were inappropriately treated. This group of individuals were discharged back to the nursing home facility on an antibiotic for an inaccurate diagnosis of a UTI.



Out of the 32 post-educational intervention sample population that met inclusion criteria, 12.5% were inappropriately treated. This group of individuals were discharged back to the nursing home facility on an antibiotic for an inaccurate diagnosis of a UTI.



The pre- and post-educational intervention data revealed that there was a total of an overall 3.9% reduction in patients that were inappropriately treated. Validating that the educational interventions that were implemented in Butler Health System’s Emergency Department were effective for reducing the amount of potential harmful patient outcomes.



Limitations

One limitation to this study is the setting only includes one hospital; comparison to another comparable hospital would increase the interventional validity and generalizability. Another limitation is the small sample size of population interests based upon census.

Conclusions

This pilot study can conclude that there was a 3.9% overall reduction in nursing home residents that were being inappropriately diagnosed with a UTI and placed on unnecessary antibiotics when in fact they had ASB and met the criteria to defer prescription.

Further research needs to be conducted to assess the magnitude of inappropriate ASB treatment in the inpatient hospital setting. Researchers speculate that future research with a larger population of interest sample will yield a more validated study. Research findings were shared with Butler Health System's Infectious Disease Group, Emergency Department and the Pennsylvania Safety Advisory Committee. This research data will be beneficial to antibiotic stewardship initiatives.

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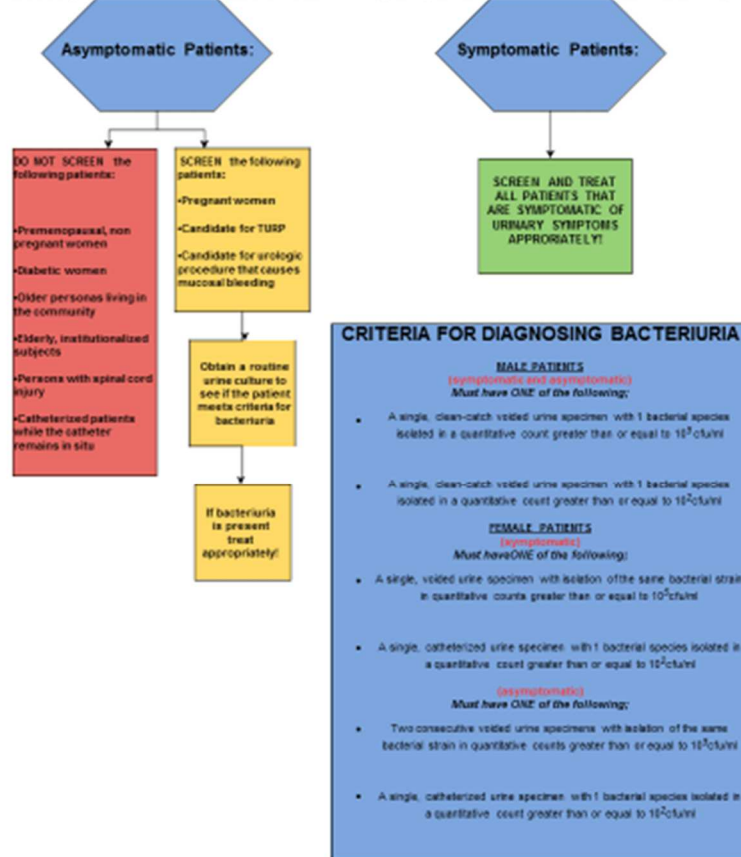
doi:10.1016/j.ajic.2007.11.007

Appendix A

Appendix B

Pocket Card:

Urinary Tract Infection or Asymptomatic Bacteriuria?



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Subject: Permission of Use Request

From: emluhill@yahoo.com

To: froberts@maccoalition.org

Date: Sunday, June 3, 2018, 6:14:01 PM EDT

To whom it may concern;

My name is Emilie Kennedy, I am a CRNP pursuing my DNP and am researching asymptomatic bacteriuria in my local community hospital. I came across your Treating Asymptomatic Bacteriuria: All harm, No Benefit document and am so impressed! I am writing to ask permission of use of your document for part of the educational intervention in my capstone project. Thank you very much for your time and consideration, I look forward to hearing back from you soon!

Sincerely,
Emilie Kennedy MSN, CRNP, FNP-C, DNP's

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Page 1 of 1

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Date: Monday, June 4, 2018, 12:21:10 PM EDT

Hi Emilie,

Thanks for reaching out.

We are delighted the document looks valuable for your work. By all means feel free to use it!

Amelia DeFelice (formerly Cook)
Program Manager
Massachusetts Coalition for the Prevention of Medical Errors
500 District Avenue
Burlington, MA 01803
phone: 781-262-6080
fax: 781-262-6180

From: Emilie Summerhill [mailto:emluhill@yahoo.com]
Sent: Sunday, June 03, 2018 6:14 PM
To: Amelia Cook
Subject: Permission of Use Request

To whom it may concern;

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