

2018

Antibiotic Overuse in the Geriatric Population

Kimberley Allison Kelly
Walden University

Follow this and additional works at: <https://scholarworks.waldenu.edu/dissertations>

 Part of the [Family, Life Course, and Society Commons](#)

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact ScholarWorks@waldenu.edu.

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Kimberley Kelly

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee

Dr. Susan Hayden, Committee Chairperson, Nursing Faculty

Dr. Tanya Cohn, Committee Member, Nursing Faculty

Dr. Deborah Lewis, University Reviewer, Nursing Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2018

Abstract

Antibiotic Overuse in the Geriatric Population

by

Kimberley Kelly

MS, Walden University, December 2013

BS, The Ohio State University, 1986

Project Submitted in Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

August 2018

Abstract

The Centers for Medicare and Medicaid are requiring long-term care facilities (LTCFs) to implement antibiotic stewardship programs (ASPs) to alleviate overuse of antibiotics in the nursing home population. Current research shows that the benefits of ASPs include improved patient outcomes, reduced adverse events related to *Clostridium difficile* (C-diff) infection, improvement in rates of antibiotic susceptibilities, and optimized resource utilization. This project addressed the problem of antibiotic overuse and misuse in the geriatric population and whether the implementation of an ASP reduced the overuse of antibiotics, C-diff infection, and resistance rates in the LTCF. Application of the Johns Hopkins nursing model and Centers for Disease Control framework informed this project. An ASP was implemented by the organization. This project evaluated the program preASP and postASP over a 10-month period. A descriptive analysis was used to compare the number of new antibiotic starts, C-diff cases, and resistant cases before and after ASP implementation. The total number of cases of resistance declined from 12 to 10 cases after the ASP was implemented, which was a 16.67% decline. The number of monthly new antibiotic orders for the time period evaluated declined from 120 to 110 respectively, which was an 8.3% change. There was no change in the number of C-diff infections. The results demonstrated that implementing the ASP led to a decline in antibiotic misuse, overuse, and resistance cases. This project supports social change by expanding the healthcare team's knowledge regarding the project problem and informing future interventions to be implemented to help reduce antibiotic overuse and misuse in the geriatric population.

Antibiotic Overuse in the Geriatric Population

by

Kimberley Kelly

MS, Walden University, December 2013

BS, The Ohio State University, May 1986

Paper Submitted in Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

August 2018

Dedication

This doctoral project is dedicated to Larry J. Richlak and Marilyn L. Richlak, my parents who predecease me. Throughout my life my parents have supported and encouraged education beyond a high school diploma. My parents believed in the institution of education and wanted their children to succeed in life. My father's goal was for me and my sister to be self-sufficient and to be able to go through life independently if necessary. My parents believed in a good work ethic, devoting oneself to God, their family, and to their employer. Both of my parents were generous and giving of themselves in helping others, which is where my desire to become a nurse originated. My father was a fire fighter and Emergency Medical Technician. This project would not have been possible, nor the furthering of my own education without the influence of Larry J. Richlak and Marilyn L. Richlak in my life. Thank you from the bottom of my heart for being my parents and instilling the drive in me to succeed, explore, and give back.

-Your loving daughter, Kimberley A. (Richlak) Kelly

Acknowledgments

I would like to acknowledge the faculty of Walden University for their support, assistance, and guidance on this journey. I would like to thank my Doctoral Project Chair, Dr. Susan Hayden, who has patiently read, red-penned, and assisted me with this project. I would also like to thank my husband, Ronald Maden, and my children Kaitlyn Kelly, Kaleigh Kelly, and Zachary Maden for missing time with me while I worked on my Doctorate in Nursing Practice, spent hours away during practicum, and supporting this educational opportunity and fulfillment of this degree. I would also like to thank Robin Christie and Kerri Robinson who held down the ship at work many times so that I could attend practicum and took on extra responsibilities to enable me to pursue and complete this degree.

Table of Contents

List of Tables	iii
Section 1: Nature of the Project	1
Introduction.....	1
Problem Statement	2
Purpose Statement.....	3
Nature of the Doctoral Project	3
Significance.....	4
Summary	6
Section 2: Background and Context	8
Introduction.....	8
Concepts, Models, and Theories.....	8
Relevance to nursing practice	12
Local Background and Context	14
Role of the DNP student	16
Role of the Project Team	17
Summary.....	20
Section 3: Collection and Analysis of Evidence.....	21
Introduction.....	21
Practice-Focused Question.....	21
Sources of Evidence.....	22
Analysis and Synthesis	25

Summary	26
Section 4: Finding and Recommendations	28
Introduction.....	28
Findings and Implications.....	29
Recommendations.....	31
Contribution of the Doctoral Project Team	32
Strength and Limitations of the Project	33
Section 5: Dissemination Plan	36
Introduction.....	36
Plans for Dissemination	36
Analysis of Self.....	37
Completion of Project.....	40
Summary.....	41
References.....	42
Appendix A: Institutional Review Board Approval	48
Appendix B: Chart Audit Tool	49
Appendix C: New Antibiotic Starts- Phase One Monthly Results	50
Appendix D: Inter-facility Infection Control Transfer Form.....	51

List of Tables

Table 1. Stakeholders Roles, Responsibilities, and Tasks.....	5
Table 2. Antibiotic Stewardship Measurement Framework.....	10
Table 3. AACN Essential Competencies of the DNP Student.....	15
Table 4. ASP Team Member Roles.....	19
Table 5. ASP Outcome Indicators	33
Table 6. Limitations of the ASP Study.....	37

Section 1: Nature of the Project

Introduction

Antibiotic overuse and over ordering is a problem nationwide. Antibiotics are to be used to fight infections caused by bacteria (U.S. Food and Drug Administration, 2017). Slowing down the use of antibiotics and assessing the need for them will help retain the efficacy of the antibiotics (Sprenger, 2015). Antibiotic stewardship programs (ASPs) have been proven to reduce antibiotic overuse, over ordering, and the adverse effects of resistance and *Clostridium difficile* (C-diff) (Sprenger, 2015). In a study conducted in 610 general practices in the United Kingdom, researchers found that prescribing fewer antibiotics for colds, ear infections, and coughs helped to prevent resistance (Guilford et al., 2016). The Centers for Disease Control (CDC) stated that any action taken regarding improving antibiotic use is expected to have a positive impact on the residents, resistance, and the adverse effect of C-diff (U.S. Department of Health, 2015). Improving the quality of care provided and safety for one's patients is the rationale for implementing ASPs. The implementation of an ASP at a long-term care facility (LTCF) impacts social change within the elderly population by affecting the residents, hopefully, with positive outcomes of lowered C-diff infections and resistant cases. The awareness of antibiotic usage will increase nursing knowledge, potentially leading to social change. This project supports Walden University's mission to promote positive social change. The question I sought to answer with this project is: In the geriatric population, does the implementation of an ASP reduce the overuse of antibiotics, C-diff, and resistance rates in the LTCF compared with no ASP?

Problem Statement

The Centers for Medicare and Medicaid (CMS) is requiring LTCFs to implement ASPs (Mongan, 2015, para. 1). These stewardship programs are to alleviate overuse of antibiotics in the nursing home population (citation). Current research shows that the benefits include improved patient outcomes, reduced adverse events related to C-diff infection, and improvement in rates of antibiotic susceptibilities to targeted antibiotics with optimized resource utilization across the continuum of care (Barlem et al., 2016). Antibiotic overuse is of great concern in LTCFs and, in response to this concern, the CDC and the CMS have mandated that LTCFs implement ASPs to help eliminate the overuse of antibiotics in the elderly population (citation). Antibiotic use in LTCFs is an issue that needs to be addressed nationwide to slow the emergence of antibiotic-resistant bacteria (Dall, 2016).

According to Johns Hopkins (Ahern Gould, 2017), antibiotic resistance is an issue that must be addressed by healthcare providers and patients. The increasing cost of antibiotics, the rate of new antibiotics being introduced, and the resistance issues being seen makes it difficult for the health care provider to choose the optimal antibiotic today (citation). It has been through history that if health care professionals are not careful, antibiotics will lose their efficacy (Ahern Gould, 2017). On a local level, the city of Houston, Texas has established its own Antimicrobial Stewardship Committee, comprised of clinical experts, to address the antibiotic resistance problem in the Houston area with the goal to work with other community members in the area to preserve antibiotics (Offiong, 2017). In addition, the CDC has provided the city of Houston with a grant to host an annual symposium to combat this practice problem of antibiotic resistance (Offiong, 2017).

Purpose Statement

According to the CDC (2017) antibiotic stewardship requires national attention. The CDC has identified antibiotic misuse and overuse as a gap in practice and has developed multiple goals to address this issue. The goals include establishing national guidelines on antibiotic use and cutting inappropriate prescribing (citation). In addition, the CDC includes the initiative that CMS (2015) adopted for implementation of ASPs, which is mandated in LTCFs (U.S. Department of Health, 2017). The practice question is: In the geriatric population does the implementation of an ASP reduce the overuse of antibiotics and affect C-diff rates in the LTCF compared with no ASP? Doctor of Nursing Practice (DNP) scholarly projects are those that are focused on changing outcomes using evidence-based practice (Terry, 2015). In this doctoral project, the problem was antibiotic overuse, and the intervention to address the problem was a newly implemented ASP at the practicum site. The scholarly project focused on whether antibiotic overuse declined with the implementation of the ASP and whether the development of the adverse outcome of C-diff and resistance was affected by the implementation of an ASP. This scholarly project evaluated a current healthcare practice or program, the ASP. Antibiotic overuse is of great concern in LTCFs and in response to this concern the CDC and the CMS have mandated that LTCFs implement ASPs to help eliminate the overuse of antibiotics in the elderly population (citation). Antibiotic use in LTCFs is an issue that needs to be addressed nationwide to slow emergence of antibiotic-resistant bacteria (Dall, 2016).

Nature of the Doctoral Project

In this doctoral project, I evaluated the problem of antibiotic overuse and the effects of a newly implemented ASP at the practicum site. The project focused on whether antibiotic overuse

declines with the implementation of the ASP and whether the development of the adverse outcome of C-diff and resistance is affected by the implementation of an ASP within this LTCF. The sources of evidence that were collected for this project included the number of new antibiotic starts and the number of C-diff and resistant infections comparing pre-ASP to post-ASP implementation. The nurses documented monthly on antibiotic tracking logs all new antibiotic starts, cases of resistance, and positive cultures for C-diff. The facility staff collected and de-identified the data for the project and provided it to me. The approach used to organize and analyze the evidence was the CDC and Institute for Healthcare Improvement (IHI) for effective implementation of an ASP change driver framework (U.S. Department of Health, 2017). It was anticipated that the prevalence of new antibiotics ordered, the number of resistant cases, and C-diff infections would decrease post-ASP implementation.

Significance

The stakeholders at the LTCF for the ASP included the director of regulatory compliance, quality assurance nurse, medical director, laboratory consultant, pharmacist consultant, director of nurses (DON), assistant director of nurses (ADON), nursing staff, physicians, and family members. Table 1 describes the roles, responsibilities, and tasks for each stakeholder for this project. Each stakeholder had an important part in the successful implementation and maintenance of the ASP. The stakeholders had a vested interest in reducing antibiotic use and the adverse effect of resistance and C-diff which will benefit the residents and the LTCF.

Table 1

Stakeholder roles, responsibilities, and tasks

Director of Nurses (DON)	Co-champion and infection control lead. Co-develop agendas. Lead / Supervise trainings. Ensure Monitoring of the new interventions. Help develop staff training. Review whether materials are used. Develop findings with PIP related to monitoring the new intervention.
Director of Regulatory Compliance	Champion
Medical Director	Champion
Quality Assurance (QA) Nurse	Monitoring Staff: Collect/Analyze/Aggregate Data to evaluate program effectiveness and sustainability
Assistant Director of Nurses (ADON)	Stewardship Staff: Assist with program education to nurses and implementation of program
Minimum Data Set (MDS) Nurse	Stewardship Staff: Assist with program education to nurses and implementation of program
Consulting Pharmacist	Co-champion Antibiotic Stewardship trainee or infectious disease knowledgeable
Laboratory Consultant	Co-champion Assist with antibiogram annually and provide culture reports and summaries for the LTCF

The end users, which are those individuals who will be implementing/using the ASP, included the lab personnel, pharmacy personnel, physicians, nurse practitioners, nurses, administrator, and the QA registered nurse (RN). Engaging the stakeholders and end users was an important step in the success of sustaining the ASP. Ensuring that one considers the opinions, key information, and input of the stakeholders helps to establish the plan with everyone's input (Young, 2012). Lowering antibiotic overuse and over ordering was the desired outcome of this

project. Slowing down the use of antibiotics and assessing the need for them will help retain the efficacy of the antibiotics (Sprenger, 2015).

Block (2016) shared that ASPs have been proven to reduce antibiotic overuse, over ordering, and the adverse effects of resistance and C-diff. If antibiotic prescriptions are appropriate and careful consideration is employed when ordering antibiotics, resistance will decline, which will improve patient safety from adverse effects and improve the quality of care provided (Lee, Cho, & Lee, 2013). A desired result of implementing an ASP at this LTCF was to improve the quality of patient care in that there will be a sustained reduction in inappropriate antibiotic therapy being prescribed and a reduction in adverse effects from antibiotic overuse and over ordering. Antimicrobial stewardship is an important step in reducing resistance (Zukowski, 2016). This doctoral project could potentially be modified to be used in clinics, doctor offices, and home health agencies. Increasing nurses' awareness of antibiotic usage, this practice problem, and implementing antibiotic stewardship programs will increase nursing knowledge, potentially effecting social change in this practice area by reducing overuse and misuse of antibiotics.

Dall (2016) shared that between 40% and 70% of antibiotics prescribed are inappropriate to residents in LTCFs. Over 23,000 people die each year due to the adverse effect of antibiotic resistance and more than 2 million people become infected with resistant bacteria (citation). If nothing is done this can become over 10 million lives by 2050 (Nevada Public Health, 2017).

Summary

Antibiotic overuse and over ordering is a practice problem that must be addressed at this LTCF and worldwide. This is an issue that cannot be ignored, and the World Health

Organization (WHO) is requesting that all countries develop an antimicrobial action plan (WHO, 2016). The city of Houston has developed an antimicrobial stewardship committee and is working to reduce antibiotic overuse and over ordering (Offiong, 2017). CMS has mandated that LTCFs implement an ASP to assist in combating this problem (U.S. Department of Health, 2015). This doctoral project evaluated the effectiveness of implementing an ASP relating to antibiotic overuse and C-diff infection rates. The CDC/IHI framework was used to measure the effectiveness of the ASP program preimplementation versus postimplementation over a 10-month period. The facility staff documented, tracked, and collected data on logs capturing all new antibiotic starts, resistant cases, and C-diff infections before and after implementation of the ASP. It was anticipated that the implementation of the ASP would result in a decrease in antibiotic starts, cases of resistance, and in C-diff rates. The model, relevance to nursing practice, local background and context, role of the DNP student, role of the project team and will be discussed in the next section of this report.

Section 2: Background and Context

Introduction

Antibiotic overuse and misuse is a problem in LTCFs (Lockhart, 2017). Lockhart (2017) posited that overusing antibiotics leads to resistance and when one needs antibiotics they may not be effective. The purpose of this project was to evaluate the effectiveness of an ASP in the LTCF setting related to overuse, resistance, and clostridium difficile infections. The question I sought to answer in this project was: In the geriatric population, does the implementation of an ASP reduce the overuse of antibiotics, C-diff, and resistance rates in the LTCF compared with no ASP? ASPs are necessary to reduce the misuse and over ordering of antibiotics and the adverse effects of resistance and C-diff (Tiberg, Torney, & Vanderhorst, 2017). ASPs are required in the LTCF to provide a higher level of safety for all residents. Residents in high-use nursing homes are at risk even if they did not take antibiotics themselves (Daneman et al., 2015). When planning translational activities and goals for projects, it is important to include the mission and operational practices of the organization (White, Dudley-Brown, & Terharr, 2016).

I chose the Johns Hopkins model for the project, along with the CDC and IHI change driver framework for ASPs. In this section, I will discuss the concepts, models, and theories, relevance to nursing practice, local relevance of the problem, role of the DNP student in relation to the doctoral project, and role of the project team.

Concepts, Models, and Theories

The Johns Hopkins model was chosen as the project model for this ASP quality improvement project due to its viability and because it was the best fit. The Johns Hopkins model has three main components: practice question, evidence, and translation (Johns Hopkins

Medicine, 2017). The practice question is as follows: “In the geriatric population does the implementation of an ASP reduce the overuse of antibiotics and affect C-diff rates in the LTCF compared with no antibiotic stewardship program?”. According to the LTCF practicum site mission, vision, goals, and operational practices, their professional staff is "committed to serving the needs of the independent retirement, assisted living, and healthcare residents with respect, kindness, and hospitality" (citation, p.1). The mission statement further presented this LTCF as a place for everyone, regardless of how much help they need (citation). The fact that this LTCF community was described as being filled with loving people who are ready to welcome their patients (C. Klappenbach, personal communication, November 8, 2017) was part of the planning for this project. Application of the Johns Hopkins nursing model to the ASP project in the LTCF included development of the practice question, evidence searches, critique of the evidence, summary of the evidence, and evaluating the strength of the evidence (see White, 2016). The second phase (evidence) included searches regarding ASP development, implementation, and evaluation in the past 5 years that are authoritative (citation). The third phase included evaluation of the ASP at the LTCF. The final phase, per White (2016), included implementing, evaluating, developing tools, and communicating findings. The practicum site has implemented the ASP, collected the data, and communicated the findings through the ongoing quarterly quality assurance meetings. As a DNP student, I analyzed and evaluated the data related to the outcomes for antibiotic use, C-diff infection, and resistance rates before and after ASP implementation. The framework chosen for this project was the antibiotic stewardship measured framework established by the CDC in collaboration with the IHI for effective implementation of an ASP in the LTCF environment (U.S. Department of Health, 2017).

This model has been explained by Schaffer et al. (2013) as a nursing practice model that identifies the EBP question using a team approach, includes research and critique, and develops recommendations based upon the strength of the evidence. The model also helps determine the feasibility while creating an action plan, implementing change, evaluating, and communicating findings (Schaffer et al., 2013). Newhouse (2007) defined the Johns Hopkins evidence-based practice model as a model of evidence, whereby such evidence assists in making decisions about nursing practice, education, and research. The quality of the research, its relevance to the clinical setting, and whether the benefit of it is greater than any negative effects were considerations when choosing a model to affect nursing practice (Newhouse, 2007).

The framework (CDC/IHI Antibiotic Stewardship Drivers and Change Package) included the conceptual model with the key drivers for implementing and providing a change package for decreasing antibiotic misuse and assisting facilities to have positive resident outcomes (U.S. Department of Health 2017a). The intent of the change package was to establish a multidisciplinary team that works collaboratively to implement the interventions over time to positively impact and reduce inappropriate antibiotic use (U.S. Department of Health, 2017). The CDC/IHI antibiotic stewardship framework provided several options for selected measures to evaluate outcomes of an ASP (see Table 2).

Table 2

Antibiotic Stewardship Measurement framework

Outcomes	Measure
Healthcare-associated C. difficile infections	Rate of healthcare-associated C. difficile per 10,000 pt. days When C. diff is a “rare event”: days (or admissions) between C. diff associated disease
Pharmacy cost for antibiotics	Total pharmacy cost for antibiotics per month When census is variable: Pharmacy cost for antibiotics per discharge per month
Antibiotic-related adverse drug events (ADEs)	Currently not feasible with this method to evaluate this outcome in the time frame for evaluation
Antibiotic resistant healthcare associated pathogens	Percent of antibiotic resistant healthcare-associated pathogens i.e. prevalence. Note: targeting pathogens based on local circumstances, i.e., MRSA, VRE, etc.

(CDC, October 26, 2017).

The measures selected for this project included prevalence rate of C-diff and resistance per 300 patient days (10 months), or days between C-diff associated disease if found rare at the facility, and the number of new antibiotic starts comparing pre-ASP implementation with post-ASP implementation over a 10-month period from July 11, 2017 (ASP implementation date) to May 15, 2018. *Rare* is defined for the scope and timeframe proposed for this project as less than two positive resident resistant lab results per 300 resident days. I chose an evaluation period of 300 patient days because 10,000 days have not occurred since the regulations were first required and

implemented in July 2017. The pharmacy cost measure was not chosen by me due to a lack of available data and a change in the pharmacy company providing services to the LTCF in the fourth quarter of 2017 at the practicum site.

Relevance to nursing practice

CMS requires LTCFs to implement ASPs to alleviate overuse of antibiotics in this setting (Mongan, 2015, para. 1). According to Dall (2016), 40-70% of antibiotics prescribed are inappropriate to residents in LTCFs. Research has shown that the benefits of implementing an ASP include improved patient outcomes, reduced adverse events related to C-diff infection, and improved rates of antibiotic susceptibilities to targeted antibiotics with optimized resource utilization across the continuum of care (Barlem et al., 2016). Antibiotic overuse in LTCFs is a problem and in response, the government passed legislation mandating that LTCFs implement ASPs in 2017 to help eliminate the overuse of antibiotics in the elderly population. Lockhart (2017) noted that antibiotic resistance can lead to death. Add summary to fully conclude the paragraph.

The cost of antibiotics is increasing; the rate of new antibiotics being introduced and the resistance issues being seen makes it difficult for the health care provider to choose the optimal antibiotic today (Hopkins, 2017). Hopkins (2017) reported that if antibiotics are not prescribed and used carefully, the drugs can lose their efficacy. The CDC newsroom (2013) reported that over 20 billion dollars are spent annually on providing care to those with antibiotic resistance and 35 billion dollars per year are lost related to loss of productivity, when one cannot work due to illness. There are five core elements recommended to combat the antibiotic resistance and overuse problem which include preventing infections, preventing the spread of resistance,

tracking resistance patterns, improving use of antibiotics (antibiotic stewardship), and developing new antibiotics and diagnostic tests (CDC Newsroom, 2013). Michaelidis et al. (2016) described hidden societal costs related to antibiotic resistance (SCAR) related to ambulatory antibiotic prescriptions in the United States. The hidden SCAR per antibiotic prescribed in the United States averaged to be \$13.00 which, when calculating across four different methods, equated to an increase of 65% per ambulatory prescription ordered (Michaelidis et al., 2016). Knowing the cost of antibiotic resistance is difficult, but when comparing loss of work due to antibiotic resistance to other comparable health issues, the cost is conservatively from \$35,000 - \$55,000 and may be more (Smith & Coast, 2013). Additional research is needed on the cost related to antimicrobial resistance (Smith & Coast, 2013).

The use and misuse of antibiotics are major contributors to the development of antibiotic-resistant bacteria. A significant proportion of antibiotics used in LTCFs is inappropriate by drug selection or altogether unnecessary and places residents at risk for developing antibiotic-resistant infections (Hyuan, 2016). Antibiotic misuse (overordering, overusing, inappropriate use) leads to resistance and C-diff (Mayo Clinic, 2012). Trivedi and Schooneveld (2012) identified that 3.2 million people currently reside in nursing homes in the United States and it is expected that this number will double by 2050. One long-term care study has shown that antibiotics are over ordered and 35% of antibiotics ordered for wound/skin problems, 42% for lower respiratory infections, and 72% of urinary tract infections were not clinically justifiable (Trivedi, et al, 2012). According to the CDC (2017), antibiotic stewardship requires national attention. The CDC has identified a gap in practice and has developed multiple goals to address this issue. The goals include to set national guidelines on antibiotic use and cut inappropriate prescribing in

hospitals, physician offices, and other healthcare environments (citation). In addition, the CDC included the initiative which CMS (2015) has adopted for implementation of ASPs which is mandated in LTCFs (US Department of Health, 2017). This project will advance nursing practice by helping to reduce antibiotic overuse and costs associated with care for those with antibiotic resistance. This project will hopefully help reduce resistance in this LTCF setting and C-diff occurrences. Stone (2013) posited the consequence of antibiotic misuse in nursing homes as extremely high and reducing the misuse leads to less resistance and adverse effects. Implementing an ASP is one way to reduce misuse (Stone, 2013). The CDC (2017) shared the annual savings related to ASP implementation at hospitals or other healthcare facilities was \$200,000-\$400,000. Add summary and synthesis to fully conclude the section.

Local Background and Context

Texas is identified as prescribing antibiotics at the rate of 927/1000 population, which is higher than many other states in prescribing antibiotics outside of the hospital setting (Hicks, 2017). When examining antibiotic usage in the LTCF setting, it has been identified by the Houston Antimicrobial Symposium (Rios, 2017) that citywide antimicrobial stewardship programs may help to overcome some of the barriers. In LTCFs, over the course of a year, up to 70% of nursing home residents get an antibiotic (CDC, 2017). In nursing homes, high rates of antibiotics are prescribed to prevent urinary tract infections (UTI) and respiratory tract infections (RTI). Prescribing antibiotics before there is an infection often contributes to misuse (CDC, 2017).

The practice setting for this scholarly project was a 62-bed long-term care skilled nursing facility located in South Houston, Texas. In addition to the long-term care skilled nursing facility

there is an independent living (IL) facility and an assisted living facility (ALF). The federal government is requiring all LTCFs to implement ASP's (Stone, 2013). Under the Centers for Medicare and Medicaid, rule F881, ASP's must be in place by November 2017 (Dall, 2016). The facility had no ASP prior to July 1, 2017 and recently developed and implemented its antibiotic stewardship program in July 2017. The facility had an average census of 36 residents from July 1, 2016 to July 1, 2017 with 8.75 new antibiotic starts per month. Twenty-two percent of the population had antibiotics started each month and not all residents had a culture to substantiate the antibiotic. my role within this project was to lead and analyze the data collected by the practicum site and evaluate the outcomes based on the data provided. I had worked with this site during the clinical practicum for the doctoral program developing and implementing an evidence-based project which was the development and implementation of an ASP. The proposed time for the stewardship program was over a 10-month period from July 2017 through May of 2018. The data collection was conducted daily by the facility nurses each time a new antibiotic was ordered. The data collected by the facility included capturing new starts, resistant organisms, and those who were diagnosed with C-diff. This ongoing data collection was used for the doctoral project. The facility staff was educated on data collection and the ASP program during the evidence-based project development phase and will be re-educated as needed. In addition to data collection on monthly flow logs, chart audits were conducted on each client with a new antibiotic start to ensure all components of the ASP were being followed. The Quality Assurance department captured the data in a summary format and presented it to management on a quarterly basis. The number of new antibiotic starts, cases of resistance, and number of C-diff infections prior to the ASP were compared to post ASP. If the occurrence of the C-diff infections

is less than two resident occurrences in the proposed time, this was defined as *rare* and if this occurred then the number of days between diagnosis of C-diff occurrences were counted.

Role of the DNP student

The role of the DNP student was to lead the doctoral scholarly project in collaboration with the site, review the data collected, evaluate the data, communicate with the ASP team, synthesize the outcomes, and develop an outcome report. The doctoral student functioned as the interim leader for the project and provided guidance and a quality review of the data collected and aggregated to ensure the program was being implemented and sustained as designed and in accordance with the federal regulations. The doctoral student evaluated the data outcomes to determine if the implementation of the ASP in this LTCF reduced the number of new starts, resistance, and C-diff cases. The motivation in choosing this project was the desire to positively affect outcomes in the geriatric population related to antibiotic overuse. The elderly population is one that is vulnerable to antibiotic overuse and needs assistance in this area due to their health and frailty. This student had a bias which is that not all staff may want to do their best in focusing on implementing and sustaining the ASP. To overcome this bias, the doctoral student recognized the bias and to overcome the bias, maintained an open mind when working with the staff and maintained objectivity throughout the project by being open-minded. Friedman (2017) shared being open and aware of one's own bias will help to deepen relationships and remove barriers. The doctoral student employed the American Association of Colleges of Nursing (AACN, 2007) eight fundamental essentials demonstrating the doctoral student competencies in all eight areas. The table 3.0 on the next page outlines the project as it related to the AACN fundamental essentials:

Table 3

AACN Essential Competencies of a DNP student

DNP Essential	Tasks in the course project/DNP Essential
1. Scientific Underpinnings for Practice	DNP student to assess patterns of human behavior related to their environment (elder persons, their environment, antibiotic use and resistance) and develop and apply nursing actions or processes to affect antibiotic misuse and provide positive change in health status
2. Organizational and Systems Leadership for Quality Improvement and Systems Thinking	Target population- geriatric; DNP student to propose strategies for improvement in practice related to antibiotic use
3. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	Literature search, best practices, design, direct, evaluate a quality improvement related to antibiotic stewardship program in a LTCF
4. Information Systems/Technology and Patient Care Technology for the improvement and Transformation of Health Care	DNP student to use web-based learning for staff needs assessment and design evaluation for this quality improvement activity
5. Health Care Policy for Advocacy I Health Care	DNP student assumes leadership role for this quality improvement activity advocating for improvement in antibiotic stewardship in this LTCF
6. Inter-professional Collaboration for Improving Patient and Population Health Outcomes	DNP student will lead and employ effective communication among the team at this LTCF for this quality improvement project
7. Clinical Prevention and Population Health for Improving the Nation's Health	DNP student will collect and analyze data for the geriatric population relating to antibiotic misuse and apply strategies for improvement
8. Advance Nursing Practice	A comprehensive and systematic assessment of the geriatric population in a LTCF for antibiotic stewardship programming will be conducted and evaluated by the DNP student

(ACCN, 2006)

Role of the Project Team

The role of the ASP project team assembled for this project was multi-faceted. The ASP project team was used to evaluate ongoing goal achievement, review reports prepared and

submitted by the QA nurse; work with the team in identifying areas needing improvement, remediation, re-education of the staff, and established plans to implement the next phase of the ASP as mandated by federal law which is the Infection Preventionist infection control position by November 28, 2019 (Tritz, 2016). The Infection Preventionist is an individual who is highly qualified in infection control and either has a bachelor's degree in epidemiology, microbiology, medical technology, public health, or other healthcare science or is a healthcare professional with specialized training in infection prevention and control beyond their initial professional degree as outlined in federal regulation for LTCF 483.80 (CMS, 2017). Ongoing specialty training in infection prevention and control through accredited continuing education and a nationally certification in Infection Prevention and Control by NADONA (IP-BC Credential) or completion of certification (CIC) Certification in Infection Control, or Certification Board of Infection Control (CBIC) within 12 months of employment may also be required (CMS, 2017).

The process by which the team was presented with background information, evidence, and other forms of information was two-fold, by email and face-to-face meetings. The team members were expected to have shared their expertise with the internal/external organizational operating systems within the facility, knowledge of the residents and rules and regulations, and provided feedback within a timely manner to the members of the team. The team members did not provide evidence for the project. Timely team communication was defined as within two business days. Sandau and Dedrick (2012) shared evidence-based projects are a life-long process and one should continue to research and find the most recent evidence to continually evaluate the project and move forward. As the practicum site began this long journey of sustaining the ASP one ASP leader the QA nurse, was assigned to continue to evaluate, research, and make changes

based on the most current research. In December 2017 the facility QA Nurse retired after 25 years of service and the DON assumed the QA Nurse position. The DON had been on the ASP team and has the knowledge for the program but changed roles within the team. This has benefited the facility in that their QA department gained a previous ASP team member with familiarity and leadership within the program previously. The LTCF has an antibiotic stewardship team who will continue working, evaluating, and identifying the outcomes of the program and reviewing its effectiveness and sustainability over time, beyond this project. The ASP team members have defined roles in the program which are outlined in Table 4.

Table 4

ASP team member roles

DON	Co-champion and infection control lead. Lead / Supervise trainings. Ensure monitoring of the interventions. Monitor staff training. Review whether materials are used Develop findings with Performance Improvement Plan (PIP) related to monitoring the new intervention.
Administrator	Champion
Medical Director	Champion
Doctoral Student	Evaluate program implementation, effectiveness, data collection, trends, barriers, challenges, sustainability, outcomes
Quality Assurance Nurse	Monitoring staff: Collect/analyze/aggregate data monthly to evaluate program effectiveness and sustainability
Assistant Director of Nurses	Stewardship staff: Assist with ongoing program education to nurses and ongoing implementation of program
Minimum Data Set Nurse (MDS)	Stewardship staff: Assist with ongoing program education to nurses and ongoing implementation of program

Consulting Pharmacist	Co-champion, Antibiotic stewardship trained and infectious disease knowledgeable, reviews antibiotics monthly for the facility residents who are ordered antibiotics
Lab	Co-champion Antibiotic stewardship bio gram and meet with stakeholders on cost and reports monthly

Summary

This section focused on the CDC/IHI and Johns Hopkins model for ASPs, the relevance of antibiotic misuse and overuse in the geriatric population, the relevance to nursing practice, and discussed antibiotic stewardship issues and efforts in Houston, Texas. In addition, the role of the DNP student and ASP project team were discussed in detail. Next, the problem of antibiotic overuse in Houston, Texas, the project plan for addressing this issue, an introduction to the sources of evidence, operational data, and an analysis and synthesis of the data to be collected will be discussed.

Section 3: Collection and Analysis of Evidence

Introduction

The use and misuse of antibiotics are major contributors to the development of antibiotic-resistant bacteria. A significant proportion of antibiotics used in LTCFs is inappropriate by drug selection (or choice), or altogether unnecessary, and places residents at risk for developing antibiotic-resistant infections (Hyuan, 2016). Houston, Texas has developed an Antibiotic Stewardship Community Symposium to address the issues of antibiotic misuse and overuse (Rios, 2017). In this section, I will further explore and explain the problem, gap-in-practice, and project purpose. The sources of evidence relied upon to address the practice-focused question and collection of data with analysis are presented and approved. I will also summarize the databases and search engines used for the project and discuss the organization's operational data used for the project. This section will also include analysis and synthesis of the participants, data collected, and evaluation methods.

Practice-Focused Question

Over prescribing antibiotics in the Houston area is a problem. Rios (2017) noted that a lack of appreciation for antibiotic resistance, knowledge, and a lack of resources are contributing to the problem. Implementing city-wide ASPs can help to reduce barriers (Rios, 2017). The purpose of this DNP project was to evaluate the effectiveness of reducing resistance, overuse, and C-diff and to determine whether, in the geriatric population, the implementation of an ASP reduces the overuse of antibiotics, C-diff, and resistance rates in the LTCF compared with no ASP. The ASP was implemented in July 2017 and included policies, procedures, forms, staff and practitioner education, online learning modules for newly hired nurses, data collection tools,

monthly analysis of new antibiotics ordered, and development of an ASP team. The QA nurse gathered the data collected and prepared the quarterly reports regarding the ASP program. The CDC (2017) recommends various ways in which a nursing home can measure the ASP and its outcomes. The outcome measures selected for this project included prevalence rate of resistance, C-diff per 300 patient days (10 months), or days between C-diff associated disease if found rare at the facility, and the number of new antibiotic starts before and after ASP implementation over a 10-month period. *Rare* was defined for the scope and timeframe proposed for this project as less than two positive resident resistant lab results per 300 resident days. The data collection methods included the LTCF nursing staff documenting entries daily as applicable on monthly logs on each unit in the LTCF of all residents with new antibiotic starts, cultures verifying positive C-diff or resistance, chart audits on those residents who have antibiotics ordered, laboratory antibiograms, and an analysis of the number of C-diff infections pre-ASP implementation versus postimplementation.

Sources of Evidence

The sources of evidence relied upon for the practice-focused question *Clostridium difficile* included searches using a variety of sources within the past 5 years (2012-2018). The search strategies implemented included data searches to acquire the necessary scholarly literature supportive of the project. The sources of evidence align with the purpose of the project, which was to evaluate the effectiveness of an ASP in the LTCF setting relating to overuse, resistance, and C-diff infections. The following is a list of sources of evidence used in this scholarly project:

- Walden Library
- Journal articles

- Governmental entities
- Centers for Disease Control
- Centers for Medicare and Medicaid Services
- Searches using key words *antibiotic stewardship*, *long-term care*, *CMS mega-rule*, *antibiotic misuse*, *antibiotic cost*, and *antibiotic resistance*
- CINAHL
- Medline
- Cochrane Database of Systematic Reviews
- Free Medical Journals
- Walden Research Center
- Agency for Healthcare Research and Quality
- Institute for Healthcare Improvement
- Google searches for antibiotic stewardship programs in long-term care facilities
- State Operations Manual
- World Health Organization
- Houston Antibiotic Stewardship Symposium

The data were collected by the LTCF QA nurse using the following tools: (a) a unit tracking log for nurses to document all new antibiotic starts, (b) a QA chart audit tool to evaluate whether antibiotics ordered have a diagnosis, lab result on file, or diagnostic test with result (prior to antibiotic being ordered), and duration for the antibiotic, as required by the ASP, (c) a monthly summary tool to capture and track new antibiotic start data on a spreadsheet, and (d) a QA quarterly report inclusive of new antibiotic starts to display outcome data quarterly.

The CDC (2017) indicated that tracking infections, conducting surveillance, auditing records, reviewing lab results, evaluating the antibiotic orders. In addition, documentation, use, and duration are all important elements in evaluating the ASP (U.S. Department of Health, 2015). Tracking the number of antibiotic starts, cases of C-diff, and resistance are approved methods for evaluating the impacts of the ASP (U.S. Department of Health, 2015) and are being employed for this quality improvement project.

Collecting data relating to the number of new antibiotic starts, cases of C-diff, and resistance before and after ASP implementation by the facility staff allowed for an evaluation of the effectiveness of the ASP program on resistance, overuse, and C-diff within this LTCF (Ibrahim & Polk, 2014). The staff had been collecting the number of new antibiotic starts, cases of C-diff, and resistance prior to the implementation of the ASP in July 2017 and continue to collect this data daily (C. Klapennebach, personal communication, November 8, 2017). Ibrahim and Polk (2014) explained that "measurement of antimicrobial use before and after an intervention and the associated outcomes are key activities of antimicrobial stewardship programs" (p. 1). Testing data before implementation of an ASP and after implementation is a recommended method called the nonexperimental design pre-and post-ASP design (Ibrahim, et al., 2014). This collection method provided appropriate outcome data to evaluate the outcome of the project, which was to evaluate the effectiveness of an ASP in a LTCF on C-diff, resistance, and overuse/misuse of antibiotics.

The data collection methods included the LTCF nursing staff documenting entries daily as applicable on monthly logs on each unit in the LTCF of all residents with new antibiotic starts, cultures verifying positive pathogens, C-diff or resistance, chart audits on those residents who

had antibiotics ordered, laboratory antibiograms, and an analysis of the number of C-diff infections pre-ASP implementation versus postimplementation. The data was collected by the LTCF QA nurse for evaluation and analysis: Unit tracking log for nurses to document all new antibiotic starts; a QA chart audit tool to evaluate if antibiotics ordered had a diagnosis; lab result on file or diagnostic test with result (prior to antibiotic being ordered); and duration for the antibiotic, as required by the ASP; a monthly summary tool to capture and track new antibiotic start data on a spreadsheet; and a QA quarterly report inclusive of new antibiotic starts to display outcome data quarterly.

The data was verified by the QA nurse while conducting reviews of the medical records, culture reports, Best lab monthly reports, and Relias documentation by the nursing staff. In addition, the unit manager verified the accuracy of the monthly log before it went to the QA nurse by reviewing the lab reports and orders and comparing the information to the log. The unit manager and QA nurse were responsible for ensuring that information was not missing and was correct by the reviews they were conducting.

Analysis and Synthesis

The systems used for recording, tracking, and organizing the evidence in this DNP ASP evaluation project included the following: Best lab monthly reports on the number of antibiotics ordered, an annual bio gram provided by Best lab, monthly infection control antibiotic unit logs, laboratory culture reports, resident medical records, and the Relias software system (Relias, 2018) used by the nurses and QA department. The lab was using its own software system that tracks each patient who has an antibiotic ordered, culture results, or cost related to antibiotic usage, and provided the facility with monthly reports with this coded data (C. Klappenbach,

personal communication, December 5, 2017). In addition, the facility, effective March 15, 2018, was using the Relias software to input antibiotic orders, track lab and culture orders, and print reports from this system monthly (K. Weathers, personal communication, February 27, 2018). The Relias system provides electronic data, unlike the manual logs the facility was keeping. The number of new antibiotic starts, number of C-diff cases, and number of resistant cases were counted for each month before ASP implementation and compared to the number of cases after ASP implementation to evaluate or determine the effect the ASP had on antibiotic overuse, cases of C-diff, and cases of resistance at this LTCF. I coded the data, some preset codes and some that evolved or emerged during data analysis. Outliers such as unnecessary therapy, prolonged durations, and unusual resistance patterns were evaluated by the QA nurse (Ibrahim, et al., 2014). Patient information was de-identified and summarized in the QA reports by the ADON which I used to evaluate and analyze the data to compare the number of new antibiotic starts, C-diff cases, and resistant cases before and after ASP implementation. I shared the data outcomes with the stakeholders via a formal presentation at the end of the project.

Summary

The practice problem of antibiotic overuse and misuse is an issue nationwide (Hyuan, 2016). In the Houston area, an antibiotic stewardship symposium group has been assembled to help combat this problem on a local level, and nursing homes have been mandated to implement ASPs. In this section, I identified many sources of evidence to support this practice problem and explained that data has been collected ongoing at the LTCF pre-ASP implementation (July 2017) and is ongoing. The number of new antibiotic starts, cases of C-diff, and resistance were captured monthly and were analyzed pre-ASP versus post-ASP over a 300-day period. The next

section will expand upon the findings, implications, and recommendations relating to the effect the ASP had on this facility. The project team's role, strengths and limitations of the project, and dissemination of this work will be presented and discussed. Finally, an analysis of self will be shared relating the dnp student to the different roles assumed throughout the project and in relation to the scholarly journey.

Section 4: Finding and Recommendations

Introduction

Antibiotic over use and inappropriate use continues to be problematic in the LTCF environment. There are four core elements to reducing resistance which include preventing infections, tracking resistance patterns, improving antibiotic use (stewardship), and developing new antibiotics and tests (U.S. Department Disease Control, 2013). The practice focused question is: In the geriatric population does the implementation of an ASP reduce the overuse of antibiotics and affect resistance and C-diff rates in the LTCF compared with no ASP? The purpose of the doctoral project was to evaluate the affect an ASP had on antibiotic use, overuse, cases of resistance, and C-diff.

The sources of evidence for this project covered the period from September 2016 through May 15, 2018 (10 months prior to ASP implementation to 10 months post-ASP implementation). Sources of evidence included the monthly antibiotic unit logs, physician orders for antibiotics, results of cultures obtained, type of infection documented on the logs and reports, monthly facility lab reports from Best care lab, facility census, and the quality assurance reports summarizing the number of new antibiotic starts monthly. The staff at the LTCF documented the information collected, provided the de-identified monthly antibiotic logs and lab reports for analysis, and assisted when questions arose, or verification of data was required. The monthly lab reports were compared against the unit monthly antibiotic logs to ensure that the correct number of resistances were recorded, the correct number of new antibiotic starts were recorded based on the number of positive culture results, and clarification was obtained for any discrepancies by asking the ADON. All infections that were present upon admission were

denoted on the monthly log and were not counted. Those patients who had re-treatments for existing infections were counted one time. The number and types of infections were reviewed to ensure duplication did not occur if a resident had an ongoing infection from one month to the next. If a resident was diagnosed and treated with a new infection from a different source, this was counted. For example, if a resident had an upper respiratory tract infection in January and then developed a urinary tract infection in February and was treated with different antibiotics, these were counted as two different new start orders. The resident information was de-identified on the logs so to eliminate possible duplication of entries the resident room numbers were tracked on the monthly logs as a part of the analysis process.

Findings and Implications

Upon reviewing, analyzing, and evaluating the data collected it was identified that the census for the facility remained fairly stable and the average daily census was 39 residents prior to ASP implementation and 37 after the ASP was implemented. When reviewing the effect the ASP had within the facility during this time period it was identified that antibiotic ordering declined. The facility ensured that it had culture reports consistently with results when ordering antibiotics. The facility reported that they did continue to use the orientation training modules for newly hired nurses for the stewardship program 100% of the time. The total number of cases of resistance over the time period evaluated declined from 12 cases prior to the ASP being implemented to 10 cases after the ASP was implemented. This equated to a 16.67% decline. The number of monthly new antibiotic orders for the time period evaluated declined from 120 to 110 respectively which was an 8.3% change. For this population, these numbers are statistically significant for the sample size used. The number of cases of C-diff remained unchanged. There

were zero cases of C-diff prior to the ASP implementation and zero cases afterwards. Table 5 outlines the findings.

Table 5

ASP Outcome Indicators

	Pre ASP 9/1/16-7/15/17	Post ASP 7/16/17-5/15/18
Average monthly census	39	37
# New antibiotic starts orders	120	110
Average monthly new antibiotic orders	11.43	10.48
#MRSA	5	3
#VRE	4	1
#ESBL*	3	6
#C-diff	0	0

*new tracking by facility during the project

One of the limitations of the project was that the history of antibiotic use and resistance was not always known for each of the residents. In addition, the accuracy of the monthly logs did not always match up 100% of the time with the lab reports requiring reverification. The time period since implementation of the ASP was less than 1 year, the months compared were not duplicative (i.e. January-December, one year) which made it more difficult to visually see the results comparatively. The sample size was small ranging between 37-39 residents and was limited to one facility. It was identified during the project that the Bestcare lab contract was not in effect until January 1, 2018, so data collection was done manually for September-December 2016. Finally, the duration of antibiotic use was not evaluated in this project.

Antibiotics are a limited resource and need to be used sparingly (U.S. Centers for Disease Control, 2013). The benefits of implementing an ASP at this LCTF showed a positive impact on the number of new antibiotics ordered, assisted in reducing the number of resistance cases, and ensured antibiotics were ordered as needed and verified by culture results. Not only do these outcomes positively impact this geriatric population but the community as well. Many of the nurses who work at this LCTF work part-time elsewhere, belong to local groups and associations, and have reported that they have shared their ASP program and what they have learned regarding becoming stewards of antibiotics with others outside of the facility. The findings from this project will be shared with the Houston Antibiotic Stewardship committee and will be presented in December 2018 in Las Vegas at the American Nursing Symposium conference in the hope of promoting positive social change on a state and national level.

Recommendations

As the facility's staff continues to be stewards of antibiotic use, there are several recommendations to implement so that the facility continues to improve and maintain its ASP program. The following are recommended solutions for not over ordering, overusing, or inappropriate use of antibiotics for the elderly population in this LCTF:

- Conduct chart audits on those residents with infections and use the audit tool in the ASP program developed and provided in Appendix B.
- Implement and use the monthly quality assurance summary form in Appendix C.
- Ensure all new hires are oriented to the ASP program and comply with the facility policies.

- Conduct biannual education with the staff to maintain awareness and discuss statistics ongoing.
- Continue to track number of new antibiotics ordered monthly and resistance cases monthly.
- Implement the federally mandated Infection Preventionist job position, which is required this November 2018.
- Customize the transfer form in Point Click Care to include antibiotic history of resident when transferring them out (when they were last on antibiotics or history of resistance) or use the form provided in Appendix C.
- Consider extending the project to December 2018 to have comparative data.
- Capture duration of antibiotic use as outlined in the QA policies.

Contribution of the Doctoral Project Team

The doctoral project team included the preceptor, administrator, quality assurance nurse, DON, ADON, and the laboratory representative. Each person on the team provided guidance and assistance as outlined in Table 4. The team members who provided the most support were the ADON and administrator. The DON and QA nurse delegated their responsibilities to the ADON and the medical director relied on the facility staff to work with me. The ADON provided the unit monthly logs, answered questions, verified data, and worked with the unit manager to ensure the data captured was complete, accurate, and de-identified prior to giving it to me. The administrator assisted when the lab reports were needed and, when there were delays due to changes in the LTCF nursing management, in getting the lab reports to the facility and assigning a secretary to de-identify the 20 months of data for the project. My preceptor reviewed the initial

findings, limitations, recommendations, and provided input on additional limitations to include in the report. The project team reviewed the final report and findings and are responsible for adoption of the final recommendations. It was mentioned by them director/preceptor that duration was not captured at this point and the project has the potential to be extended to include this data and to obtain a complete calendar year of data for comparison of July 2017 (pre-ASP) to July 2018 (post-ASP).

Strength and Limitations of the Project

This project had many strengths and limitations. One strength was that the project team was committed to the project and worked with me to implement the ASP. Another strength was the outcome evaluation of the project demonstrated implementing an ASP does help to reduce over ordering and overuse of antibiotics in this LTCF. The project also provided support for the argument that many health care professionals are not aware how severe the overuse, misuse, and inappropriate use of antibiotics is at their facility. When conducting orientation and training with the staff many did not understand ASPs or the importance of their role in helping to reduce the problem of over ordering, inappropriate use, or ensuring culture results were back prior to antibiotic ordering. In a study conducted with a long-term acute care (LTAC) hospital where a survey was completed by the staff relating to antibiotic stewardship it was found that most were aware of the resistant bacteria but only 35% were confident in how to treat or reduce them (Mushtaq, et al., 2018). Finding online training modules that could be loaded into the facility Relias learning management system for ongoing training and orientation of new staff members was another strength of the project. These modules will provide sustainability of knowledge for new and existing employees. The facility complying with using the training modules for all

newly hired nurses since inception of the ASP is another strength to increase knowledge and sustainability of this issue and project.

There were several limitations of the project as mentioned previously. These are summarized in Table 6.

Table 6

Limitations of the ASP Project

Limitation	Possible Solution
Antibiotic history not known for questionnaire on history the resident coordinator to collect	Implement for admission
Antibiotic resistance history not questionnaire on history known for the resident coordinator to collect	Implement for admission
Small Sample Size - 1 facility include more n = 37.5 Houston area	Increase sample size- facilities in the
Duration of antibiotic use not measured	Collect duration data
Manual logs maintained with no lab back up September 2016-December 2016	None available

It is recommended as a future project that this project be replicated and send an invitation to all Houston LTCFs to participate in providing monthly data on new antibiotic starts, cases of resistance, and C-diff with the goal of gaining 10% of the Houston area LTCFs to participate so

that we can evaluate the effects of ASPs over the course of 1-year postimplementation in the LTCFs of the Houston area.

Section 5: Dissemination Plan

Introduction

In this section, I describe the plans to disseminate ASP project work to the institution experiencing the problem in practice. The audiences and venues that would be appropriate for dissemination of the project to the broader nursing profession will be clarified and an analysis of self in my role as practitioner, scholar, and project manager drawing connections between this project experience, present state, and long-term professional goals will be presented. I also describe the completion of the project along with the challenges, solutions, and insights gained.

Plans for Dissemination

The results of the analyzed data were presented to the stakeholders and management team via a formal written report. The report summarized the number of new antibiotic starts, cases of C-diff, and resistance before versus after ASP implementation. In addition, findings regarding the monthly logs, quarterly QA reports, audits conducted, compliance with the ASP policies and procedures, and areas identified as needing improvement were incorporated into the report. Also included in the report were recommendations for the future and a request to allow me to return at the 24-month mark to evaluate the effectiveness over a 2-year period for publication. Audiences and venues that would be appropriate for dissemination of the project include the National Association of Directors of Nursing Association (NADONA), geriatric magazines, and Elsevier. In addition, I accepted an invitation to be a keynote speaker in Las Vegas at the annual American Nursing 2018 Symposium to sit on the scientific board and present this doctoral project. Another plan for dissemination includes working with the Houston Antibiotic Stewardship Committee to incorporate LTCFs so that they are represented and have an active role within the committee

because, currently, the city of Houston focuses on the hospitals and LTCFs have no representation.

Analysis of Self

One thing that I have learned about myself that I did not know prior to this project is that I truly enjoy quality improvement and evidence-based practice. During this DNP project journey, I have assumed the role of scholar by researching current evidence and applying it to the systems and processes relative to antibiotic stewardship programming at this LTCF. I have assumed the role of project manager, leader, and practitioner. Through my work with the staff, many staff members have developed a better understanding of antibiotic stewardship and are practicing not overusing or misusing antibiotics. I feel I personally have made a huge impact on the facility staff, and their practices have improved based upon this doctoral project and focus on ASPs in this LTCF. participating in these types of activities in the future. This project has motivated me to want to become involved in our local ASP Houston Committee and team and has promoted my confidence to approach the Houston ASP Committee with my ideas of incorporating LTCFs into their programs and goals for our city.

As a practitioner, I have grown tremendously during this project both professionally and personally. The specific areas I have grown in include integrating current science and evidence within an LTCF to benefit its residents, learning how to adapt to an ever-changing team of individuals throughout the length of the project, learning how to engage new and different team members throughout the project, gaining self-confidence as the leader of the project, overcoming my insecurities and working with a group that was initially strangers, researching and identifying the proper framework and tying it to the practice of antibiotic stewardship, learning how to

prepare a formal presentation, and disseminating the information to the stakeholders. Another area that was a personal challenge for me was working in an area that was neither quiet nor private, and therefore not conducive to effective critical thinking. I initially worked in a private office with the first QA nurse, but when the staff changed, the new administrator moved my work area to the front desk of the facility. I did request initially another place to work and suggested an alternative solution that was not an office, but I was told that the front desk was where I was to work. This work space posed many obstacles for me, such as visitors immediately coming to me all day thinking I worked for the facility, staff members asking me questions that I could not answer as I do not work at the facility, and residents coming up to me at the desk all day wanting help or to visit. The environment was very loud and full of distractions, such as call lights going off for extended periods, door alarms sounding, wheel chair alarms going off, staff hustling about me, and meetings taking place near my work area, sometimes with the door open. I am a person who generally requires a quiet place to work, so this was a huge challenge for me. I overcame these obstacles and learned to block out the sounds and focus on the work for the project. Another challenge was protecting the privacy of the documents I was working with and my laptop which I brought with me. Also, I was not allowed to eat at the front desk, so I had to secure my work if I wanted to take a break or get a staff member to keep an eye on it for me. I learned to adjust to the work space provided and work with the team so that there was no negativity with the project. I laugh when I picture myself on my knees crawling under the desk to plug my laptop in, which was not an easy task to do!

Another area of growth for me was balancing the relationship between the newly appointed administrator, the staff, and myself as the project lead. I was expected to lead the

project but was limited in my authority to do so. The administrator who replaced the one who was terminated in December 2017 made it very clear that if I needed anything for the project I was to go through her, exclusively. This basically eliminated my ability to work with the team. She shared with me that “we don't like chatty people.” I recall one time I asked the physical therapy (P.T.) director if they had gotten a set of policies and procedures in their office yet for ASP and was informed later in the same day by the administrator that she “heard I had talked with the P.T. director” and that if I have any questions I must go through her. I learned that I needed to tap into all my practitioner team leading skills to work with the administrator and staff to make this project work. I discussed ideas and the project with the staff to gain insight, and then I went to the administrator with what was discussed. This way, I was still going through the administrator for decision making but through these interactions I was able to build a team with the staff whom I needed to support the project. Another strategy I used to overcome this restriction was, when I did informal education with the staff, I used it as a chance to build our relationship further, connect on a personal level, have side-bar discussions regarding the ASP goals, and gain their support. I brought the staff donuts and cookies, provided positive verbal reinforcement, and remained positive throughout the process. This worked well, and as I concluded the project, the staff were friendly and supportive, and even the administrator warmed up to me. In conclusion, I feel as a practitioner now, I am ready, able, and willing to conduct further projects/studies in the nursing profession and am motivated to continuing research and improving practice.

Completion of Project

The completion of this doctoral project had its challenges. One challenge encountered was the lack of support by the nursing department in providing the collected data in a timely manner, and the administrator had to assist me in getting the data from the lab for the 20-month period enveloped within the project. In addition, the new DON had shown little to no interest in the project and was difficult to develop a working relationship with as she had just started in December and was overwhelmed with her new duties and in learning her new position within this LTCF. Her availability was limited, and her interest was waning. One way to overcome this challenge was to approach her when she acknowledged she had time to talk and to share what was needed for the project. Her response with this approach was positive and more welcoming. Another solution was to work with the ADON and try and get her to assist, which she did, providing the monthly de-identified unit logs even though she was not timely in getting these to me, and it took several requests over several weeks to get the information. The QA nurse did not conduct the chart audits as the policies and procedures required for January to May 2018; however, the monthly lab reports compared to the monthly unit logs and the documentation on the log did provide the required data regarding whether a culture was ordered, what the results were, and whether the antibiotic was ordered per policy and procedure. I was assigned to contact the lab directly to get the required monthly reports printed out; however, due to my relationship with the facility, the administrator had to establish the generation of the reports for this study and the reports needed to be de-identified for me. The administrator was frustrated that neither the DON or QA nurse had established online accounts with the lab and the administrator had to step in and assist me in getting the monthly lab reports. I learned that sometimes even diligence,

patience, and using all the skills in one's tool box to lead a project may not be enough and key management may need to get involved if the nursing leadership does not respond.

Summary

In summary, conducting this doctoral project has provided me the opportunity to evolve, learn, practice, and become competent in the essential competencies of the DNP program. This has been a roller coaster experience and has been challenging at times. It has provided me with the opportunity to grow and become ready to conduct research in nursing practice after graduation.

References

- Ahern Gould, K. (2017). Johns Hopkins Nursing professional practice model: Strategies to advance nursing excellence. *Dimensions of Critical Care Nursing*, 36(6), 357.
doi:10.1097/DCC.0000000000000273
- American Association for Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice*. Retrieved from
<http://www.aacnnursing.org/Portals/42/Publications/DNPEssentials.pdf>
- Barlem, T., Cosgrove, S., Abbo, L., MacDougall, C., Schuetz, A., Septimus, E., ... Dellit, T. (2016, April 13). Implementing an antibiotic stewardship program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. *Clinical Infectious Disease*, 62, e51-e77.
<http://dx.doi.org/doi:10.1093/cid/ciw118>
- CDC Newsroom. (2013). Untreatable: Report by CDC details today's drug-resistant health threats. Retrieved from <https://www.cdc.gov/media/releases/2013/p0916-untreatable.html>
- Dall, C. (2016). New rule mandates antibiotic stewardship in nursing homes. Retrieved from
<http://www.cidrap.umn.edu/news-perspective/2016/10/new-rule-mandates-antibiotic-stewardship-nursing-homes>
- Daneman, N., Bronskill, S., Grunier, A., Newman, A., Fisher, H., Rochon, P., (2015). *Variability in antibiotic use across nursing homes and the risk of antibiotic-related adverse outcomes for individual residents*. Retrieved from
<http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2337257>
- Guilford, M., Moore, M., Little, P., Hay, A., Fox, R., Prevost, & Ashworth, M. (2016). Safety of

- reduced antibiotic prescribing for self-limiting respiratory tract infections in primary care: Cohort study using electronic health records. Retrieved from <http://www.bmj.com/content/354/bmj.i3410>
- Hyuan, D. (2016). *Why nursing homes and assisted-living facilities need to reduce antibiotic use—and how they can do it*. Retrieved from <http://www.pewtruss.org/en/research-and-analysis/fact-sheets/2016/03/antibiotic-stewardship-in-long-term-care-facilities>)
- Hopkins, John. (2017). Antimicrobial stewardship program. Retrieved from <http://www.hopkinsmedicine.org/amp/>
- Ibrahim, O., Polk, R. (2014). *Antimicrobial use metrics and benchmarking to improve stewardship outcomes*. Retrieved from [http://www.id.theclinics.com/article/S0891-5520\(14\)00010-5/pdf](http://www.id.theclinics.com/article/S0891-5520(14)00010-5/pdf)
- Lee, C., Cho, I., B., Lee, S., (2013). Strategies to minimize antibiotic resistance. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3799537/>
- Lockhart, E., (2017). The 9 dangers of antibiotic misuse. Retrieved from http://www.activebeat.com/your-health/the-9-dangers-of-antibiotic-misuse/?utm_medium=cpc&utm_source=bing&utm_campaign=AB_BNG_US_DESK-SearchMarketing&utm_content=o_c_73461155860115&cus_widget=kwd-73461124629307:loc-190&utm_term=antibiotic%20overuse&cus_teaser=&msclkid=c6109e53647119b16c68c420037545ad
- Mayo Clinic. (2012). Antibiotics: Misuse puts you and others at risk. Retrieved from <http://www.mayoclinic.org/healthy-lifestyle/consumer-health/in-depth/antibiotics/art->

20045720

Michaelidis, C. I., Fine, M. J., Lin, C. J., Linder, J. A., Nowalk, M. P., Shields, R. K., ... Smith, K. J. (2016). The hidden societal cost of antibiotic resistance per antibiotic prescribed in the United States: An exploratory analysis. *BMC Infectious Diseases*, *16*, 655.

<http://doi.org/10.1186/s12879-016-1990-4>

Mongan, E. (2015). CMS proposal includes mandatory antibiotic stewardship programs.

Retrieved from <http://www.mcknights.com/news/cms-proposal-includes-mandatory-antibiotic-stewardship-programs/article/427218/>

Mushtaq, A., Awali, R. A., Chandramohan, S., Krishna, A., Biedron, C., Jegede, O., & Chopra, T. (2017). Major article: Implementing an antibiotic stewardship program at a long-term acute care hospital in Detroit, Michigan. *AJIC: American Journal of Infection Control*, *45*e157-e160. doi:10.1016/j.ajic.2017.07.028

Offiong, C. (2017). Antibiotics: Our first and last defense. Coordinating antibiotic stewardship activities in the Houston area. Retrieved from

<http://www.tmc.edu/news/2017/02/antibiotics-first-last-defense/>

Nevada Public Health Organization. (2017). Nevada antimicrobial stewardship program.

Retrieved from <http://www.nevadapublichealthfoundation.org/wp-content/uploads/2015/04/Norman-Wright-Abx-stewardship-barriers.pdf>

Newhouse, R. P., Johns Hopkins, U., Sigma Theta Tau, I., & Johns Hopkins, H. (2007). *Johns Hopkins Nursing Evidence-based Practice Model and Guidelines*. Indianapolis: Sigma Theta Tau International.

Rios, E. (2017). Houston antimicrobial stewardship symposium. Retrieved from

- [http://www.houstontx.gov/health/Epidemiology/Houston%20Antimicrobial%20Stewards
hip%20Symposium%20Spring%202015/3-
Houston%20Antimicrobial%20Stewardship%20Symposium%20-%20E%20Rios.pdf](http://www.houstontx.gov/health/Epidemiology/Houston%20Antimicrobial%20Stewards%20hip%20Symposium%20Spring%202015/3-Houston%20Antimicrobial%20Stewardship%20Symposium%20-%20E%20Rios.pdf)
- Schaffer, M. A., Sandau, K., & Diedrick, L. (2013). Evidence-based practice models for organizational change: Overview and practical applications. *Journal of Advanced Nursing*, 69(5), 1197–1209. doi: 10.1111/j.1365-2648.2012.06122.x
- Smith, R., & Coast, J., (2013). The true cost of antimicrobial resistance. Retrieved from <http://www.bmj.com/content/346/bmj.f1493.full>
- Sprenger, M., (2015). How to stop antibiotic resistance? Here's a World Health Organisation prescription. Retrieved from [https://www.theguardian.com/global-
development/2015/nov/20/antibiotic-awareness-week-resistance-world-health-
organisation-prescription](https://www.theguardian.com/global-development/2015/nov/20/antibiotic-awareness-week-resistance-world-health-organisation-prescription)
- Stone, N., (2013). Improving antibiotic use in nursing homes...why and how. Retrieved from [https://www.ndhealth.gov/disease/hai/Docs/Stone_AntibioticUseinNH_NDWebinar_v1%
20LTC%20%5bCompatibility%20Mode%5d.pdf](https://www.ndhealth.gov/disease/hai/Docs/Stone_AntibioticUseinNH_NDWebinar_v1%20LTC%20%5bCompatibility%20Mode%5d.pdf)
- Tiberg, M., Torney, N., & Vander Horst, D., (2017). *The long and the short of it: Development of antimicrobial stewardship programs in long-term care facilities*. Retrieved from [http://www.michiganpharmacists.org/Portals/0/104%20-
%20VandeHorst,%20Tiberg,%20Torney.pdf?ver=2017-02-16-111802-297](http://www.michiganpharmacists.org/Portals/0/104%20-%20VandeHorst,%20Tiberg,%20Torney.pdf?ver=2017-02-16-111802-297)
- Triveldi, K., & Schooneveld, T. (2012). Antimicrobial stewardship in long-term care. Retrieved from <https://www.medscape.com/viewarticle/762755>
- U.S. Centers for Disease Control and Prevention, Antibiotic Resistance Threats in the United

States, 2013, <http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>; Teena Chopra and Ellie J.C. Goldstein, “Clostridium difficile Infection in Long-Term Care Facilities: A Call to Action for Antimicrobial Stewardship,” *Clinical Infectious Diseases* 60, no. S2 (2015): S72–S76, <http://dx.doi.org/10.1093/cid/civ053>.

U.S. Department of Health and Human Services. Centers for Disease Control and Prevention, (2015). The core elements of antibiotic stewardship for nursing homes. Retrieved from <https://www.cdc.gov/longtermcare/pdfs/core-elements-antibiotic-stewardship.pdf>

U.S. Department of Health and Human Services. Centers for Disease Control and Prevention. (2017). *Antibiotic resistance solutions initiative*. Retrieved from <https://www.cdc.gov/drugresistance/solutions-initiative/antibiotic-stewardship.html>

US Department of Health and Human Services. Centers for Disease Control and Prevention. (February 28, 2017). Core elements for of antibiotic stewardship for nursing homes. Retrieved from <https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>

US Department of Health and Human Services. Centers for Disease Control and Prevention. (July 21, 2017). CDC/IHI antibiotic stewardship drivers and change package. Retrieved from <https://www.cdc.gov/getsmart/healthcare/implementation.html>

U.S. Food and Drug Administration. (2017). Combating antibiotic resistance. Retrieved from <https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm092810.htm>

White, K. M., Dudley-Brown, S., & Terharr, M. F. (2016). *Translation of evidence into nursing and health care practice (2nd ed.)*. New York, NY: Springer.

World Health Organization. (2016). Antimicrobial resistance. Retrieved from

<http://www.who.int/mediacentre/factsheets/fs194/en/>

Young, D. (2012). Three steps to engaging stakeholders in your sustainability strategy. Retrieved from http://www.sustainablebrands.com/news_and_views/mar2012/three-steps-engaging-stakeholders-your-sustainability-strategy

Zukowski, C. (2016). Antimicrobial stewardship and patient safety. Retrieved from [http://www.aornjournal.org/article/S0001-2092\(16\)30513-0/fulltext](http://www.aornjournal.org/article/S0001-2092(16)30513-0/fulltext)

Appendix A: Institutional Review Board Approval

Your IRB approval number is 04-04-18-0293257.

Appendix B: Chart Audit Tool

New Antibiotic Starts- Phase One

Effective July 10, 2017

Instructions: Please complete this audit tool **on the patient record** to evaluate the antibiotic stewardship program. This tool is to be done weekly on all patients who received antibiotics by the Unit Manager. The completed tool is forwarded to the QA Nurse for incorporation into the quality assurance program.

Week of: _____ (Week of: i.e. Monday- Sunday 6/26/17- 6/30/17) Jan Feb
 March April May June July Aug Sept Oct Nov Dec

Resident Name	Date Antibiotic Ordered	Diagnosis for Antibiotic on the chart	Duration of Antibiotic	Diagnostic procedure (lab, x-ray, culture) on file showing what pathogen?	Results of lab, x-ray, pathogen growing?
Ex. Joseph Silak	07/10/17	UTI	14 days	U/A 7/10/17	Pending – atb started without result
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Appendix C: New Antibiotic Starts- Phase One Monthly Results

Data Collected by: _____
 First Name Last Name Title Date

Monthly Totals: _____

Jan Feb March April May June July Aug Sept Oct Nov Dec

Threshold for Compliance: 80%

# New Antibiotic Orders	#Residents who had Duration documented in the orders # days for antibiotic	# Residents with diagnosis to support antibiotic order	#Residents with tests ordered to establish diagnosis for atb	# results back prior to ordering atb
i.e. 8	7/8	7/8	6/8	5/8
Month Results:				
% compliance				
i.e.	87.5%	87.5%	75%	62.5%
Month %:				

Calculation for % of compliance=

Residents with duration documented divided by total # new antibiotic starts x 100 = %

Residents with diagnosis to support atb order divided by total # new atb order starts x 100 = %

Residents with tests ordered to establish dx divided by total # new atb order starts x 100 = %

Results back prior to ordering atb divided by total # new atb order starts x 100 = %

Appendix D: Inter-facility Infection Control Transfer Form

Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer

Please attach copies of latest culture reports with susceptibilities if available

Sending Healthcare Facility:

Patient/Resident Last Name	First Name	Date of Birth	Medical Record Number
		/ /	

Name/Address of Sending Facility	Sending Unit	Sending Facility phone

Sending Facility Contacts	NAME	PHONE	E-mail
Case Manager/Admin/SW			
Infection Prevention			

Is the patient currently in isolation? NO YES

Type of Isolation (check all that apply) Contact Droplet Airborne Other:

Does patient currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other organism of epidemiological significance?	Colonization or history <i>Check if YES</i>	Active infection on Treatment <i>Check if YES</i>
Methicillin-resistant Staphylococcus aureus (MRSA)		
Vancomycin-resistant Enterococcus (VRE)		
Clostridium difficile		
Acinetobacter, multidrug-resistant*		
E coli, Klebsiella, Proteus etc. w/Extended Spectrum B-Lactamase (ESBL)*		
Carbapenemase resistant Enterobacteriaceae (CRE)*		
Other:		

Does the patient/resident currently have any of the following?

- | | |
|---|--|
| <input type="checkbox"/> Cough or requires suctioning
<input type="checkbox"/> Diarrhea
<input type="checkbox"/> Vomiting
<input type="checkbox"/> Incontinent of urine or stool
<input type="checkbox"/> Open wounds or wounds requiring dressing change
<input type="checkbox"/> Drainage (source) _____ | <input type="checkbox"/> Central line/PICC (Approx. date inserted ___/___/___)
<input type="checkbox"/> Hemodialysis catheter
<input type="checkbox"/> Urinary catheter (Approx. date inserted ___/___/___)
<input type="checkbox"/> Suprapubic catheter
<input type="checkbox"/> Percutaneous gastrostomy tube
<input type="checkbox"/> Tracheostomy |
|---|--|

Is the patient/resident currently on antibiotics? NO YES:

Antibiotic and dose	Treatment for:	Start date	Anticipated stop date

Vaccine	Date administered (If known)	Lot and Brand (If known)	Year administered (If exact date not known)	Does Patient self report receiving vaccine?	
Influenza (seasonal)				<input type="radio"/> yes	<input type="radio"/> no
Pneumococcal				<input type="radio"/> yes	<input type="radio"/> no
Other:				<input type="radio"/> yes	<input type="radio"/> no

Printed Name of Person completing form	Signature	Date	If information communicated prior to transfer: Name and phone of individual at receiving facility