PREVENTING POLYPHARMACY AMONGST THE ELDERLY IN AN ACUTE CARE SETTING THROUGH THE INTEGRATION OF THE DEPRESCRIBING TOOLS START, STOPP, AND BEERS CRITERIA

Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Samantha Bonita Wilkins-Copeland

Liberty University

Lynchburg, VA

July 2020

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Scholarly Project Chair Approval:

Dr. Kenneth Thompson, Pharm.D. 12/05/2019

ABSTRACT

A significant percentage of medications prescribed in the United States are prescribed to elderly adults, which is due to the increase in chronic illness as Americans age. This increase in the use of medications amongst the elderly population has led to the issue of polypharmacy, which can lead to negative patient outcomes. An evidence-based practice pilot project was performed at a large tertiary care facility in Virginia. The aim of the scholarly project was to integrate three deprescribing tools into the everyday practice of pharmacists at the facility. Three outcomes were achieved: (1) Pharmacists understood how to accurately utilize the deprescribing tools in practice and the elderly populations' average number of medications decreased on the (2) admission and (3) discharge medication reconciliations as a result of integrating the deprescribing tools: START, STOPP, and Beers Criteria. A three-question survey completed by the pharmacy staff pre- and post-education to determine the efficacy of the intervention. The pharmacy staff's knowledge about the deprescribing tools increased related to the START criteria 3.00 to 4.16 (+1.16 mean points), STOPP criteria 3.16 to 4.16 (+1.00 mean points), and the Beers Criteria 4.66 to 4.83 (+0.16 mean points). The average number of medications decreased on admission from 13.62 to 11.88 (-1.74) and on discharge from 15.1 to 14.14 (-0.96). Providing education to pharmacists and healthcare providers on the deprescribing tools will help to decrease the incidence of polypharmacy, ultimately reducing adverse drug reactions and improving patient outcomes.

Keywords: Polypharmacy, elderly, START/STOPP criteria, Beers Criteria, deprescribing

Dedication

This DNP scholarly project is dedicated to my husband John, my mother Jacqueline, my sister Charmaine, and my children Arien, Rachelle, RJ, and James. Without their patience, love, guidance, and support none of this would have been possible.

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SECTION ONE: INTRODUCTION

This scholarly project analyzed current data related to polypharmacy in the elderly population. This is an important topic due to the growing number of older adults in the United States of America (U.S.). Since Americans are living longer, healthier lives, the elderly population has become the fastest-growing population in the U.S. (Healthy People 2020, 2019). The elderly population makes up around 52 million individuals but is expected to double to nearly 95 million by the year 2060, with individuals aged 65 and older making up 23% of the U.S. population (Population Reference Bureau, 2019). With elderly individuals making up such a large part of the U.S population, issues affecting this demographic should be an important consideration for a healthcare system.

Polypharmacy, which can be defined as taking more medications than may be medically necessary or taking five or more medications can cause major problems amongst the elderly population. According to Tegegn et al. (2019), elderly individuals that engage in polypharmacy are more likely to have a much lower quality of life than those who do not. Another major problem with polypharmacy in the elderly population is the increased risks of drug-drug interactions and adverse drug effects (Sherman, Davis, & Daniels, 2017). According to Gómez et al. (2015) polypharmacy places elderly individuals at a markedly higher risk of mortality. Lastly, elderly individuals that take enough medications to be considered polypharmacy are more likely to have increased cognitive impairments, increased risk for urinary incontinence, and decreased medication compliance (Maher, Hanlon, & Hajjar, 2014).

Background

Polypharmacy includes taking more medications than may be medically necessary or taking more than a specified amount of medications. Polypharmacy continues to be a major issue

within the U.S. One study found that 76.3% of the elderly had a problem with polypharmacy at one tertiary care facility (Al-Hashar, Al Sinawi, Al Mahrizi, & Al-Hatrushi, 2016). Another study found that 41.4% of elderly individuals took five-to-eight medications and 37.2% were on nine or more medications (Maher, Hanlon, & Hajjar, 2014). In addition, Barclay, Frassetto, Robb, & Mandel (2018), found that 57% of women aged 65 and older in the U.S. took 5 or more medications daily.

Polypharmacy amongst the elderly population is an important topic that needs to be explored further for a variety of reasons. One reason is that many elderly individuals live in or below the poverty level. In fact, around 25 million elderly individuals in the U.S. live at or below 250% of the federal poverty level (National Council on Aging, 2017). Another reason is that polypharmacy leads to increased adverse effects and drug-drug interactions. More than 175,000 elderly individuals will visit an emergency department in the U.S. for an adverse drug reaction due to commonly prescribed medications (Sherman, Davis, & Daniels, 2017). There is significant value to decreasing polypharmacy in the elderly population, which includes lowering the risk of increased drug-drug interactions and adverse drug effects (Cantlay, Glyn, & Barton, 2016).

Problem Statement

The elderly population in the U.S. comprises a substantial proportion of the individuals with a high incidence of polypharmacy. For this scholarly project, elderly is defined as individuals aged 65 years old and older. The definition of polypharmacy varies, but the most widely accepted definition is an individual taking five or more medications daily (Maher, Hanlon, & Hajjar, 2014). There does however continue to be disagreement about an exact number of medications that will definitively define polypharmacy. Polypharmacy is a problem

for the elderly population for several reasons including being a financial burden, causing increased falls and injuries, causing adverse drug interactions, and resulting in an increase in cognitive impairment (Sherman, Davis, & Daniels, 2017).

Purpose of the Project

The aim of this DNP scholarly project was to integrate various deprescribing tools into the everyday practice of pharmacists that care for elderly patients aged 65 and older. The tools that were integrated as part of this scholarly project were the Screening Tool to Alert to Right Treatment (START), the Screening Tool of Older People's Prescriptions (STOPP), and the Beers Criteria. These tools were integrated to avoid inappropriate medication use in the elderly population, to ensure that elderly individuals are on the appropriate medications at proper doses, and to identify and eliminate potentially inappropriate prescribing practices (O'Mahony et al., 2014). Lastly, this project aimed to decrease potential side effects of polypharmacy through pharmacist education about polypharmacy prevention tools.

Clinical Question

Will educating the pharmacists that make recommendations to the providers who work with the elderly population in acute care settings on the appropriate use of the deprescribing tools START, STOPP, and Beers Criteria decrease the incidence polypharmacy on admission and discharge?

SECTION TWO: LITERATURE REVIEW

The literature suggests that polypharmacy amongst the elderly population continues to be a problem. Elder adults are more likely to suffer from polypharmacy due to their increased number of health issues and chronic diseases (Sherman, Davis, & Daniels, 2017). Elderly individuals that take enough medications to be considered polypharmacy are more likely to have

negative side effects from the practice (Maher, Hanlon, & Hajjar, 2014). One study found that there may be certain predictors of polypharmacy in elderly adults, such as the type and number of diseases the individual suffers from (Wongpakaran et al., 2018). Another study found that 45% of prescriptions are dispensed to patients older than 65 (Cantlay, Glyn, & Barton, 2016). According to Sherman et al. (2017), the silo effect, which is the lack of information sharing between healthcare providers combined with patients utilizing multiple healthcare providers, and pharmacies have led to an increase in polypharmacy.

Barclay, Frassetto, Robb, & Mandel (2018) found that utilizing tools such as the START, STOPP, Beers Criteria, and medication reconciliation helps to reduce polypharmacy and its side effects. One study found that the total number of medications decreased by 11.2% after reviewing the medication record for potentially inappropriate medications and eliminating them (Stuhec, Gorenc, & Zelko, 2019). Another study showed that using the STOPP tool decreased potentially inappropriate medications at discharge by 22% (Urfer, Elzi, Dell-Kuster, & Bassetti, 2016). Additionally, a study concluded that educating providers about the health implications of polypharmacy may help reduce the incidence of medication-related adverse events, which may improve treatment outcomes (Al-Hashar, Al Sinawi, Al Mahrizi, & Al-Hatrushi, 2016). There is an ample amount of evidence in the literature that shows that polypharmacy continues to be a problem among elder adults. Lastly, the literature also shows that using tools such as the START, STOPP, and Beers Criteria can reduce the prevalence of polypharmacy in the elderly population.

Search Strategy

For this DNP scholarly project several search strategies were utilized. First, a general search of the internet was done to gather information on the various polypharmacy prevention

tools. This search was done on Bing.com and Google.com using several keywords. These keywords include polypharmacy prevention, polypharmacy tool, polypharmacy in the elderly, START and STOPP criteria, and Beers Criteria.

Next, a search was done of the Liberty University nursing and medical science databases; specifically, the Medline with Full-Text (EBSCO) database was used. The search terms included: polypharmacy, elderly, aging, elimination, START and STOPP, Screening Tool to Alert Doctors to Right Treatment, Screening Tool of Older Persons, potentially inappropriate prescriptions, and Beers Criteria. A Boolean search mode was used, and the search was narrowed in several ways.

One narrowing parameter that was utilized was the date. Only articles that were published between 2014 and 2019 were searched. This was done to ensure that all information used for the scholarly project is current. Another narrowing parameter that was used included only searching peer reviewed articles to help confirm the validity of the information. Lastly, only full text articles were considered in the search to ensure that the full article contents were available to use. The original search yielded 346 results. Once the above listed criteria were applied there were only 84 articles remaining; the first 15 relevant studies were selected for this literature review. The types of studies that were included in the literature review include descriptive studies, cross-sectional studies, retrospective observational studies, and institutional-based quantitative cross-sectional surveys.

Critical Appraisal

A table of evidence is provided (Appendix A).

Synthesis

The literature review that was performed for this scholarly project has yielded a wealth of information related to polypharmacy in the elderly population. Notably, polypharmacy continues to be a problem in the elderly population because it has been shown to produce a multitude of negative side effects such as an increase in cognitive impairments, adverse drug reactions, drug-drug interactions, urinary incontinence, and poor clinical outcomes (Ailabouni, 2016; Cantlay, 2016). Furthermore, evidence shows that the utilization of tools such as the START, STOPP, and Beers Criteria as a part of clinical decision making has been shown to decrease incidence of polypharmacy in the elderly population (Ailabouni, 2016; Bordovsky, 2017; Verdoorn, 2015).

Conceptual Framework

The conceptual framework for this project is the Iowa Model of Evidence-based Practice. Permission was obtained to use the Iowa Model in the DNP scholarly project (Appendix B). The Iowa Model is a conceptual framework that is a stepwise model to assist the user in implementing current evidence-based practice at the bedside (Buckwalter et al., 2017). This model utilizes a step-by-step method that includes seven key steps. These steps include selecting a topic, forming a team, retrieving evidence, grading evidence, developing an evidence-based practice standard, implementing the evidence-based practice, and evaluation (Buckwalter et al., 2017). Topic selection should be based on triggers, such as financial data or process improvement data (Hall & Roussel, 2016). Once the topic was determined to be a top priority, a team was formed. It was important that all members of the team had a vested interest in the topic. Literature must also be available to support the topic, and this support was determined through a thorough literature review. Related articles were selected utilizing the search criteria, and these articles were synthesized and critiqued to ensure that there was adequate quality evidence to

support the topic. Once it was determined that there was enough evidence to support the topic a pilot study was planned and performed to translate the evidence into practice. This was a multistep process that included selecting the outcomes to be achieved, collecting baseline data, finding and interpreting evidence-based practice guidelines, implementing the evidence-based practice guidelines on the selected pilot units, evaluating the process and outcomes, and modifying practice guidelines (Hall & Roussel, 2016). Once it was determined that the change in practice was effective and appropriate, it was instituted into practice. Lastly, the results were disseminated.

The Iowa Model was applied to this DNP scholarly project. First, the topic was selected: Preventing Polypharmacy Amongst the Elderly in an Acute Care Setting Through the Integration of the START, STOPP, and Beers Criteria. Selecting a topic provided a basis for the DNP scholarly project. The topic selection was based on triggers, with one of the main triggers being a high incidence of elderly individuals being on many medications that can cause negative side effects. Next, a team was formed to assist in the planning and implementation of this scholarly project. A project chair assisted in guiding the graduate student with the DNP scholarly project. In addition, the unit manager on one of the medical units at the host organization and a pharmacist at the host organization assisted with the project as members of the team. Evidence was retrieved through the completion of various scholarly project courses by completing a thorough literature review. Furthermore, evidence was leveled and graded using the Melnyk Pyramid (Appendix A). Once the evidence was leveled and graded and was able to support the DNP scholarly project, it was implemented on the medical units at the host organization, which took approximately five months to complete. The project involved implementing an evidence-based practice standard, which included the use of the deprescribing

tools START, STOPP, and Beers Criteria to decrease polypharmacy on the medical units at the host organization. Lastly, after the completion of the implementation phase, an evaluation of the efficacy of the implementation was completed. During the evaluation phase of the DNP scholarly project the implementation and the outcome of the scholarly project were reviewed (Buckwalter et al., 2017).

Summary

The literature review has shown a great need for this scholarly project. Notably, the elderly population continues to deal with polypharmacy and the negative side effects that come along with it (Maher, Hanlon, & Hajjar, 2014). There are a variety of negative side effects such as, an increased risk of drug-drug interactions (Sherman, Davis, & Daniels, 2017). Pharmacists and healthcare providers are at the forefront of change. The literature points to changes that can be made by pharmacists and healthcare providers using tools such as the deprescribing tools to prevent potentially inappropriate prescriptions from remaining on the medication reconciliations of elderly patients (Barclay, Frassetto, Robb, & Mandel, 2018). Furthermore, once potentially inappropriate prescriptions are minimized, the negative side effects of polypharmacy will be reduced (Maher et al., 2014).

SECTION THREE: METHODOLOGY

Design

In the research realm the purpose of the DNP is to translate research into practice using evidence-based practice. Evidence-based practice is the meticulous use of current best evidence to make the best clinical decisions and improve patient outcomes (Hall & Roussel, 2016). The DNP scholarly project is an evidence-based practice project. To determine if polypharmacy amongst the elderly population would be affected by educating pharmacists on the appropriate

use of the deprescribing tools, an experimental pilot project was performed. The DNP scholarly project design is discussed in detail in the following sections: Measurable Outcomes, Setting, Population, Ethical Considerations, Data Collection, Tools, Intervention, and Data Analysis.

The Measurable Outcomes outline the expected outcomes of this scholarly project. The Setting section describes in detail where the scholarly project took place. The Population section outlines the focus population that was affected by the scholarly project interventions. The Ethical Considerations focus on any potential ethical issues that arose during the scholarly project. The Data Collection section details the method and rationale for all steps of the data collection process. The Tools section describes all the tools that were used as part of the DNP scholarly project. The interventions that were used in this project are outlined in the Intervention section of this proposal. Lastly, the Data Analysis section provides a detailed analysis of the scholarly projects' measurable outcomes.

Measurable Outcomes

1. Pharmacists will understand how to effectively utilize deprescribing tools, which include the START, STOPP, and Beers Criteria.
2. The elderly population's average number of medications will decrease on the admission medication reconciliation as a result of implementing the START, STOPP, and Beers Criteria into practice.
3. The elderly population's average number of medications will decrease on the discharge medication reconciliation as a result of implementing the START, STOPP, and Beers Criteria into practice.

Setting

The scholarly project pilot took place on the three medical-surgical units at the host organization. The host organization is a large 612 bed tertiary care facility. The mission at the host organization is to provide excellent, innovative, and superlative quality care to patients while providing training to healthcare professionals (Host Organization, 2019). The host organization uses the acronym ASPIRE for its values, which stands for accountability, stewardship, professionalism, integrity, respect, and excellence (Host Organization, 2019). The units were chosen based on the available population. The three units that were selected are medical-surgical units, but these units care for patients from many other specialties, such as oncology and cardiac patients. Patients on these medical-surgical units have a variety of admitting diagnoses, and they come from diverse socioeconomic backgrounds. One of the three units specializes as a geriatric and palliative care unit. This unit has a population of adult patients, and a minimum of 60% of those patients are elderly adults aged 65 and older.

The DNP scholarly project aligned directly with the mission and values of the host organization. Part of the DNP scholarly project involved educating pharmacists who make medication recommendations to the healthcare providers that work on the pilot units, which directly aligns with the organization's mission statement. In addition, reducing cases of polypharmacy amongst the elderly population promotes the same values as the organization and the selected units. Furthermore, the organization promotes good stewardship and excellent care delivery, which directly aligns with the DNP scholarly project.

Population

The population for the DNP scholarly project was elderly adults. All genders, ethnicities, and races will be included, but only patients that are classified as inpatient during the scholarly

project timeframe will be considered. At least 100 inpatient admission and discharge medication reconciliations were reviewed. 50 charts were reviewed prior to the scholarly project intervention and 50 after the scholarly project intervention was completed. Patient charts were selected using a purposeful sampling method until the quota was met. Purposeful sampling is ideal for qualitative research (Etikan, 2016). The second part of the sampling population included the pharmacists that received education on deprescribing tools. Convenience sampling was used to select individuals that were educated about the deprescribing tools. Lastly, an appropriate sample size was needed to ensure validity of the scholarly project; thus, 100 charts were used.

Ethical Considerations

There were a variety of ethical considerations when the scholarly project was implemented. One ethical consideration was that no harm should be done to the study participants. When implementing this scholarly project, medication deprescribing was a major part of the process. To ensure that no harm was done to the patients that participated in this scholarly project, all final decisions regarding prescribing and deprescribing practices were made by pharmacists and licensed healthcare providers. Maintaining privacy was another ethical consideration. It was imperative that privacy was maintained not only for the patients that were part of the scholarly project, but for the pharmacists and providers that participated in the scholarly project. No names or other patient identifiers were used in the documentation of the scholarly project data, which helped to prevent any violation of patient privacy. This graduate student and the project chair completed research ethics training prior to the planning and implementation of the DNP scholarly project to ensure protection of human subjects (Appendix C). Approval by Liberty University's Institutional Review Board (IRB) (Appendix D) was obtained prior to implementation of the pilot project. Furthermore, approval by the host organization's IRB (Appendix E) was also obtained

prior to the implementation of the pilot project. Approval of the DNP scholarly project by the two IRB's showed that the scholarly project had a negligible chance of causing harm to the study participants.

Data Collection

A two-step data collection process was used for this scholarly project. First, baseline knowledge was assessed from the pharmacists. This was done by administering a short three question survey before and after the pharmacist education was provided. This data was collected by the graduate student heading this scholarly project. The next step in the data collection process was a chart review, which took place prior to the pharmacist education to evaluate the average number of medications the elderly patients had on their admission and discharge medication reconciliation and again after the education was provided. The chart review was completed by the graduate student. Extraction of data from electronic health records is ideal when the researcher needs to evaluate data that is relevant to clinical outcomes (Moran, Burson, & Conrad, 2014). A chart review was the best way to collect data on the average number of medications on the medication reconciliation, as it provided the researcher with reliable, factual data.

Tools

One of the tools that was used for this project was a survey (appendix G). No permission was needed to use this survey, as it was created by the graduate student. This survey was used to collect data from the pharmacists prior to the education and after the education had occurred. The survey asked a variety of questions that were rated on a 5-point summative scale. Using a summative scale allowed the researcher to obtain a more exact determination of a person's attitude toward a topic (Johnson, 2014). There were several tools used in this scholarly project. These tools

included the START, STOPP, and Beers Criteria. These tools were used because they are geared toward evidence-based medication management in the elderly population.

The START tool is used to determine if elderly adults are on the appropriate medications. This tool takes a wide variety of factors into consideration. Some of these factors include current guidelines and evidence-based practice criteria (O'Mahony et al., 2014).

The STOPP criteria is a tool that is used to determine the need to deprescribe medication for elderly adults. This tool takes one main factor into consideration: adverse drug reactions, as adverse drug reactions are an integral part of poor clinical outcomes amongst the elderly population. The STOPP criteria also takes current guidelines and evidence-based practice criteria into account (O'Mahony et al., 2014).

The Beers Criteria is last tool that was used in this scholarly project. The Beers Criteria is a list of medications that should not be used or should only be used with caution in the elderly population. These criteria are based on current guidelines, evidence-based practice, and weighing the risk-benefit profile (Steinman & Fick, 2019). Ultimately, the provider should use their clinical judgement in conjunction with the deprescribing tools to make the prescribing and deprescribing decisions.

Intervention

This scholarly project started with the project development phase. This phase involved writing a detailed scholarly project proposal that included a step-by-step outline of the complete scholarly project. Then, a letter of support (Appendix F) for the project was secured from the host organization in support of the scholarly project to be completed within their organization. Next, the scholarly project went through a 2-step IRB approval process. First, the IRB at Liberty

University reviewed the scholarly project for approval. Then, the host organization also reviewed the scholarly project for approval. This 2-step process is in place to ensure that the scholarly project is ethically responsible and does not violate any human rights (Liberty University, 2019).

The next step was to elicit participants for the scholarly project. To do this an email invite was sent to perform the educational intervention to the chief of the pharmacy department. The education session was led by this graduate student via a virtual Microsoft Teams meeting. A brief description of the scholarly project was discussed with the pharmacists. Then, a short education session took place to educate the pharmacists on what the deprescribing tools are and on how to use the deprescribing tools, START, STOPP, and the Beers Criteria. The education also included the current updates to the tools. A brief three question survey was given to assess the baseline knowledge of the pharmacists related to the deprescribing tools. An identical three question survey was given to assess the efficacy of the pharmacist education provided by the graduate student.

A chart review was completed on a total of 100 charts to determine the average number of medications elderly patients are on at admission and at discharge. A chart review of 50 charts was completed on admission and discharge medication reconciliations on the pilot units for patients that were admitted and discharged prior to the pharmacist education. Another chart review of 50 charts was completed on admission and discharge medication reconciliations on the pilot units for patients that were admitted and discharged after to the pharmacist education was completed. Biographical data was also collected. This data included, age, gender, insurance status, medication names, medication dosages, comorbidities, length of stay, medical team, and admission diagnosis.

Outcome evaluation was completed once the scholarly project interventions were completed and data collection was done. Data analysis of the scholarly project outcomes was completed by utilizing Fisher's test. Fisher's test was utilized due to the small amount of

information that was analyzed. Once the statistical analysis was completed, the project was sent to the editor to be edited prior to the project defense. After the scholarly project was edited by the professional editor the scholarly project chair evaluated the scholarly project for the final approval to move forward to the project defense. Once the scholarly project got final approval by the project chair, a project defense was scheduled and completed. After the scholarly project defense was completed, the project moved forward with preliminary publishing with Liberty University's Scholar's Crossing. Any needed changes were made to the scholarly project as deemed necessary by Scholar's Crossing and the scholarly project was published once final approval was granted. This project was undertaken as a Quality Improvement/Evidence-Based Practice Initiative at the host organization, and as such was not formally supervised by the Liberty University Institutional Review Board.

Timeline

The DNP scholarly project was implemented on January 20, 2020. The scholarly project implementation was completed on June 28, 2020. At this point data analysis began. Data analysis and interpretation was completed on July 6, 2020. The final defense of the scholarly project was completed on July 22, 2020. The scholarly project was submitted to the Scholar's Crossing on July 23, 2020.

Feasibility Analysis

This project is highly feasible, as the host organization is a teaching hospital that embraces research and learning. Several factors that were discussed: necessary resources, personnel, technology, budgeting, and a financial analysis. There were several resources that were necessary to complete the scholarly project. One resource is the paper and printer materials needed to produce the surveys. Another resource was access to the host organization's email to

send requests and notifications to the pharmacy staff that participated in the DNP scholarly project. Access to the host organization's electronic health record was also necessary to review admission and discharge medication reconciliations.

Several personnel members were also needed to complete the scholarly project. First, the project chair acted as an advisor to guide the graduate student through the DNP scholarly project process. At the host organization, the group of pharmacists that participated in the DNP scholarly project were responsible for reviewing the admission, visit, and discharge medication reconciliations and making prescribing and deprescribing recommendations to the healthcare providers that cared for the geriatric patients on the pilot units. There was a limited budget (Appendix H) for this scholarly project. The budget included money to print materials such as surveys. Additionally, the budget included editing and publishing costs that were needed.

Data Analysis

A detailed data analysis was performed for each of the three measurable outcomes. The statistical analysis of each measurable outcome was performed using the statistics software SPSS. The SPSS software allows the researcher to input research data, analyze, and organize the data in several ways (IBM, n.d.). The SPSS software was used to analyze the pre- and post-survey data that was obtained from the pharmacist education intervention. This was done to determine the efficacy of the education the graduate student provided about the deprescribing tools, START, STOPP, and Beers Criteria. The average number of medications was calculated for the pre- and post-education chart reviews on the admission and discharge medication reconciliations. The average number of medications were analyzed to determine if providing education to the pharmacy staff would decrease the average number of medications the elderly

population were prescribed on the admission and discharge medication reconciliations post-education.

SECTION FOUR: RESULTS

A total of 100 charts were reviewed to obtain the average number of medications, pre- and post-education. Medication and demographic data were collected from the charts. 50 patient charts were reviewed prior to the pharmacist education. The mean age of the patients was 76.8 years old. The minimum age was 65 and the maximum age was 98 with a standard deviation of 9.152. All 50 patients were insured. 86% of the patients were Caucasian and 14% of the patients were African American. 38% of the patients were male and 62% were female. The mean length of stay in the hospital was 4.8 days with a standard deviation of 4.204. 50 patient charts were reviewed after the pharmacist education was completed. The mean age of the patients was 75.9 years old. The minimum age was 65 and the maximum age was 95 with a standard deviation of 8.386. 98% of the patients were insured. 80% of the patients were Caucasian, 16% of the patients were African American, and 4% of the patients were Hispanic. 48% of the patients were male and 52% were female. The mean length of stay in the hospital was 8.6 days with a standard deviation of 12.142. See the tables 1-4 below for statistical data related to age, length of stay, gender, and race.

Table 1

Age

Variable	N	Min/Max	Mean	Std. Deviation
Pre-Education Age	50	65/98	76.80	9.152
Post-Education Age	50	65/94	75.92	8.386

Note: N- denotes the number of participants

Table 2

Length of Stay (LOS)

Variable	N	Mean	Min/Max	Range	Std. Deviation
Pre-Education LOS	50	4.80	1/19	18	4.204
Post-Education LOS	50	8.64	1/65	64	12.142

Note: N- denotes the number of participants

Table 3

Gender

Pre-Education Gender (in percentages)

Variable	N	%
Male	19	38%
Female	31	62%

Post-Education Gender (in percentages)

Variable	N	%
Male	24	48%
Female	26	52%

Note: N- denotes the number of participants

Table 4

Race

Pre-Education Race (in percentages)

Variable	N	%
Caucasian	43	86%
Black	7	14%

Post-Education Race (in percentages)

Variable	N	%
Caucasian	40	80%

Black	8	16%
Hispanic	2	4%

Note: N- denotes the number of participants

Descriptive Statistics

All measurable outcomes were achieved during the implementation of the DNP scholarly project. The pharmacists gained a greater understanding of the deprescribing tools, START, STOPP, and Beers Criteria. This was determined by surveying the pharmacy staff with a pre- and post-education questionnaire that used a 5-point summative scale. There was an increase in the mean on question 1 from 3.00 to 4.16 (+1.16), question 2 from 3.16 to 4.16 (+1.00), and question 3 from 4.66 to 4.83 (+0.16). In addition, the average number of medications decreased after the pharmacist education was performed for the admission medication reconciliation that went from an average of 13.62 before the pharmacist education was completed to 11.88 after the pharmacist education was completed, a difference of -1.74. Furthermore, the average number of medications decreased after the pharmacist education was performed for the discharge medication reconciliation that went from an average of 15.10 before the pharmacist education was completed to 14.14 after the pharmacist education was completed, a difference of -0.96.

Measurable Outcome 1

The pharmacists gained a better understanding on how to effectively utilize the deprescribing tools, which include the START, STOPP, and Beers Criteria. The results reflected a normal distribution (Appendix K). This was exemplified using a Kolmogorov-Smirnov test (K-S test) to test the assumption. Furthermore, the education given to the pharmacists increased their base of knowledge, thus allowing them to better manage the medication reconciliations of the elderly population on the pilot units.

Table 5

Survey Question 1

Pre: How familiar are you with utilizing the START Tool?

Descriptive	Statistic
Mean	3.0000
Median	3.0000
Std. Deviation	1.89737
Min/Max	1.00/5.00
Range	4.00

Post: How familiar are you with utilizing the START Tool?

Descriptive	Statistic
Mean	4.1667
Median	4.0000
Std. Deviation	.75277
Min/Max	3.00/5.00
Range	2.00

Table 6

Survey Question 2

Pre: How familiar are you with utilizing the STOPP Tool?

Descriptive	Statistic
Mean	3.1667
Median	3.5000
Std. Deviation	1.83485
Min/Max	1.00/5.00
Range	4.00

Post: How familiar are you with utilizing the STOPP Tool?

Descriptive	Statistic
Mean	4.1667
Median	4.0000
Std. Deviation	.75277
Min/Max	3.00/5.00
Range	2.00

Table 7

Survey Question 3

Pre: How familiar are you with utilizing the Beers Criteria?

Descriptive	Statistic
Mean	4.6667
Median	5.0000
Std. Deviation	.51640
Min/Max	4.00/5.00
Range	1.00

Post: How familiar are you with utilizing the Beers Criteria?

Descriptive	Statistic
Mean	4.8333
Median	5.0000
Std. Deviation	.40825
Min/Max	4.00/5.00
Range	1.00

Measurable Outcome 2

The elderly population's average number of medications decreased on the admission medication reconciliation as a result of implementing the START, STOPP, and Beers Criteria. Utilizing the deprescribing tools had an impact on the average number of medications on the admission medication reconciliation, which had a normal distribution. The distribution was tested using the K-S test with a statistic of .120 and a significance of .067 for the pre-education admission data and a statistic of .131 and a significance of .031 post- education admission data (Table 8). The K-S test is a goodness-of-fit test that compares observed data to the quantiles of normal distribution (Sullivan, 2017).

Measurable Outcome 3

The elderly population's average number of medications will decrease on the discharge medication reconciliation because of implementing the START, STOPP, and Beers Criteria. The results of Measurable Outcome 3 had a normal distribution. Measurable Outcome 3 also utilized the K-S test to determine that results yielded a normal distribution. The distribution was tested using the K-S test with a statistic of .127 and a significance of .043 for the pre-education discharge data and a statistic of .080 and a significance of .200 post- education discharge data (Table 8).

Table 8

K-S Test

Variable	Statistic	df	Sig.
Pre-Education Admission	.120	50	.067
Post-Education Admission	.131	50	.031
Pre-Education Discharge	.127	50	.043
Post-Education Discharge	.080	50	.200*

*This is a lower bound of the true significance

df- degrees of freedom

SECTION FIVE: DISCUSSION

Implication for Practice

Combating polypharmacy has immense clinical significance. Polypharmacy continues to be a problem as the literature has shown. Many elderly adults are on a substantial number of medications for several reasons, most notably, an increased number of chronic diseases (Sherman, Davis, & Daniels, 2017). Polypharmacy causes many adverse reactions in the elderly (Cantlay, Glyn, & Barton, 2016). These adverse reactions are responsible for problems like increased hospitalizations (Tegegn et al., 2019). The literature and the DNP scholarly project results have shown that it is important to continue to educate pharmacists and healthcare providers on current evidence-based practice tools, such as the START, STOPP, and Beer's Criteria. These tools help pharmacists and healthcare providers to make better clinical decisions; thus, decreasing the number of potentially harmful medications elderly individuals are taking (O'Mahony, 2019). The DNP scholarly project has reflected an increase in knowledge of the pharmacy staff related to the deprescribing tools following the education intervention. Furthermore, the results of the project showed a decrease in the average number of medications the elderly population was taking following the pharmacist education. The polypharmacy reduction project has contributed to clinical practice not only by helping to decrease unnecessary medications, but by increasing the knowledge of the pharmacists at the host organization that help to care for elderly patients. The DNP scholarly project has shown the host organization that polypharmacy is indeed a problem and that there is a need to continue to provide education on the deprescribing tools and updates as they become available. Decreasing polypharmacy will

also 0benefit individual organizations by reducing costs, but it will benefit society (Johansson et al., 2016).

The DNP scholarly project findings did show that the pharmacy staff had an increase in knowledge following the education intervention. A possible alternative explanation for this finding is that the small survey response size may have skewed the results. The results will need to be replicated with a larger sample size to add further validity to the results. The DNP scholarly project results showed a decrease in the average number of medications on the admission and discharge medication reconciliations. A possible alternative explanation for these results is that each case is different based on the individual's medical history and provider preferences to prescribing and deprescribing. Additional validity may be granted if the results of the pilot project were replicated.

There are several project limitations that were determined during the implementation of the DNP scholarly project. One limitation is the response size for the pharmacist population. Only six pharmacists responded to the pre- and post-education survey. A larger sample would have added to the validity of the results (Mateo & Foreman, 2014). Another limitation that was identified is that the COVID-19 pandemic was peaking during the months that the project implementation was occurring. This limitation may have affected the available population during the data collection period. The pilot project also had a time limitation. The DNP scholarly project had to be completed during the time the graduate student was in graduate school. A potential bias in this pilot project is that the data for the project was collected by the graduate student on medical units in which the graduate student researcher is employed.

Sustainability

The DNP scholarly project intervention and implementation is a sustainable practice change. The results of the scholarly project have shown that the intervention is effective at helping to reduce polypharmacy amongst the elderly population in an acute care setting. The literature and the DNP scholarly project have shown that there is a need to provide education to pharmacists and healthcare providers (Al-Hashar et al., 2016). With continued, on-going education of pharmacists and healthcare providers, the results can be sustained within the organization. It is feasible to keep the practice change going, as it will not be costly to the healthcare system. The current healthcare environment has shown that a need to reduce costs when possible and reducing polypharmacy can help to reduce those healthcare costs by reducing unnecessary hospitalizations from adverse effects of polypharmacy (Johansson et al., 2016).

Dissemination Plan

Once the DNP scholarly project is completed, the graduate student plans to submit the scholarly project to Liberty University's Scholar's Crossing for future publication. In addition, the graduate student will submit a professional manuscript to the Journal of the American Geriatrics Society (JAGS) for publication. The JAGS is a journal that specializes in research, geriatric education, and clinical practice, public policy related to the geriatric population, in addition to creating the Beers Criteria (American Geriatrics Society, 2020) The manuscript will be written in accordance with the journal's submission requirements. The DNP scholarly project was presented at Liberty University's 2020 Research Week. A poster presentation and an oral presentation were digitally presented and published in Liberty University's Scholar's Crossing. The graduate student plans to submit an abstract to present a poster presentation at the 2021 American Association of Nurse Practitioner's National Conference.

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Appendix A: Evidence Table

Name: Preventing Polypharmacy Amongst the Elderly in an Acute Care Setting Through the Integration of the START, STOPP, and Beers Criteria

Clinical Question: Will educating pharmacists that make recommendations to healthcare providers that work with the elderly population in acute care settings on the appropriate use of the deprescribing tools, START, STOPP, and Beers Criteria decrease the incidence polypharmacy on admission and discharge?

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
Ailabouni, N., Nishtala, P., & Tordoff, J. (2016). Examining potentially inappropriate prescribing in residential care using the STOPP/START criteria. *European Geriatric Medicine*, *7*(1), 40-46. doi:10.1016/j.eurger.2015.11.004	Identify the prevalence of potentially inappropriate prescriptions and potential prescribing omissions in older adults	The population used for this study included individuals aged 65 and older that live in a residential care home	Non-experimental, univariate regression analysis	The results of this study showed that there were 205 potentially inappropriate prescriptions among 102 residents and 66 potential prescribing	Level 4: correlational design	Small sample size and performed in 2 small facilities, an older version of the START/STOPP criteria was used,	Yes, this study uses several credible tools that can be utilized in other setting amongst elderly patients.

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
		in New Zealand.		omissions among 49 residents.		and Data were collected and interpreted systematically by one investigator.	
Bordovsky, S., Il'ina, E., Nikulin, V., Gorbatenkova, S., Bogova, O., & Sychev, D. (2017). Frequency of potentially inappropriate prescribing of the medications in senile patients according to STOPP/START criteria. *Clinical Therapeutics*, *39*(8), e46. doi:10.1016/j.clinthera.2017.05.143	The study aimed to analyze the frequency of potentially inappropriate prescribing of the medications in senile patients according to STOPP/START criteria.	The sample for this study included the case history records of 170 individuals aged 65 and older who were under the treatment of the cardiology department taking an	Literature review	Utilizing the STOPP/START criteria 135 IPs were detected in the patient's case history records, which makes 8.698% of the overall prescriptions	Level 5: systematic review of descriptive & qualitative studies	One limitation of this study includes referring to the patient age group as "senile age" Another limitation of this study is that there was a small sample used and it only focused on	Yes, this study provides a solid focus on how to use the STOPP/START criteria with cardiology medications

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
		average of 8.810 medications				cardiology patients.	
Da Costa, F. A., Periquito, C., Carneiro, M. C., Oliveira, P., Fernandes, A. I., & Cavaco-Silva, P. (2016). Potentially inappropriate medications in a sample of Portuguese nursing home residents: Does the choice of screening tools matter? *International Journal of Clinical Pharmacy*, *38*(5), 1103-1111. doi:10.1007/s11096-016-0337-y	This study aims to detect the prevalence of potentially inappropriate medications and potential prescribing omissions in a sample of Portuguese nursing homes residents	The sample includes 161 individuals aged 65 and older that reside in one of four Portuguese nursing home.	Descriptive cross-sectional study	807 potentially inappropriate medication and 90 potential prescribing omissions were identified through the application of the START, STOPP, and Beers criteria	Level 4: correlational design	Small sample size	Yes, this study utilizes the three major tools used to decrease polypharmacy in the elderly population and provides a comparison of each.
Komagamine, J., Sugawara, K., & Hagane, K. (2018). Characteristics of elderly patients with	The purpose of this study was to evaluate the	A sample of 136 patients aged 65	Retrospective cross-	Of the 136 patients in the study, 82 patients	Level 2: quasi-experime	There were several limitations to this	Yes, this study looks at a different

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
polypharmacy who refuse to participate in an in-hospital deprescribing intervention: a retrospective cross-sectional study. *BMC Geriatrics*, *18*(1), 96. doi:10.1186/s12877-018-0788-1	prevalence of potentially inappropriate medication use in elderly patients accepting and refusing a deprescribing intervention and to investigate factors associated with deprescribing refusal	and older with at least 5 medications upon admission to the orthopedic unit	sectional study	participated in deprescribing and 54 declined the intervention	ntal design	study: Small sample size, one center was used, over-the-counter medication were excluded	side of polypharmacy amongst the elderly, refusing to deprescribe
Article 5 Markovic-Pekovic, V., & Skrbic, R. (2016). Long-term drug use and polypharmacy among the elderly population in the Republic of Srpska, Bosnia and Herzegovina.	To analyze the long-term drug use and the prevalence of polypharmacy	The sample size is 1.4 million individuals, but the study only	Retrospective study	Between 2005-2010 polypharmacy increased amongst the elderly population.	Level 6: descriptive design	No limitations were mentioned in this study	Yes, this study focuses on the magnitude of

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
Vojnosanitetski pregled, 73(5), 435-441. doi:10.2298/vsp150224032m	among the elderly population	focused on the individuals that were at least 65 years old		The increase was greater in women			polypharmacy
Noale, M., Veronese, N., Cavallo Perin, P., Pilotto, A., Tiengo, A., Crepaldi, G., & Maggi, S. (2015). Polypharmacy in elderly patients with type 2 diabetes receiving oral antidiabetic treatment. *Acta Diabetologica, 53*(2), 323-330. doi:10.1007/s00592-015-0790-4	Identify the characteristics associated with polypharmacy in a cohort of elderly diabetic patients being treated with oral hypoglycemic agents	The sample includes 1342 diabetic patients that were enrolled I a diabetic center and participated in a metabolic study, are aged 65 and older, have type 2 diabetes, and are on oral	Cross-sectional survey, longitudinally designed	57.1% of the study participants were found to have polypharmacy; females were found to have more issues with polypharmacy; patient's with polypharmacy had higher rates of malnutrition	Level 6: descriptive design	The sample may be biased due to using patients at a diabetic center who are inherently more complex than those that do not. Insulin patients were excluded.	Yes, this can help to show the magnitude of polypharmacy amongst diabetic patients

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
		antidiabetic medication					
Ozlek, E. (2019). Rationale, design, and methodology of the EPIC (Epidemiology of Polypharmacy and potential drug-drug Interactions in elderly Cardiac outpatients) study. *Turk Kardiyoloji Dernegi Arsivi-Archives of the Turkish Society of Cardiology*, *47*(5), 391–398. doi:10.5543/tkda.2019.27724	Determine the prevalence of polypharmacy, inappropriate drug use, and drug-drug interactions amongst elderly cardiology outpatients	Non-Probability Sample: approximately 5000 patients, aged 65 and older	Non-interventional study	The Charlson comorbidity index will divide patients into 3 groups. Polypharmacy will be defined as 5 or more medication, and drug-drug interactions will be checked in Lexicomp.	Level 6: descriptive design	The study is not complete until 8/30/19; will follow-up with results	Yes, once complete this will provide a large-scale study on the prevalence of polypharmacy and drug-drug interactions
Stuhec, M., Gorenc, K., & Zelko, E. (2019). Evaluation of a collaborative care approach between general	Determine whether a clinical pharmacists medication	91 patients aged 65 and older that are on 10 or more	Retrospective observational medical	Clinical pharmacist recommended 625 interventions	Level 4: correlational design	No control groups. No humanistic or clinical	Yes, this study provides a foundation to analyze

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
practitioners and clinical pharmacists in primary care community settings in elderly patients on polypharmacy in Slovenia: A cohort retrospective study reveals positive evidence for implementation. *BMC Health Services Research*, *19*(1), 118. doi:10.1186/s12913-019-3942-3	review service can improve the quality of drug prescribing in elderly patients treated with polypharmacy in primary care	medications	chart review study	and general practitioner accepted 304. A significant amount of medications was decreased after following the pharmacists' recommendations		outcome measure	type-X drug-drug interactions
Tegegn, H. G., Erku, D. A., Sebsibe, G., Gizaw, B., Seifu, D., Tigabe, M., … Ayele, A. A. (2019). Medication-related quality of life among Ethiopian elderly patients with polypharmacy: A cross-sectional study in an Ethiopia university hospital. *PLOS ONE*, *14*(3), e0214191. doi:	The purpose of this study is to assess the medication-related quality of life among older patients with polypharmacy	Sample of 150 elder patients that visited an internal medicine ward that have a mean age of 70 years old	Institutional-based quantitative cross-sectional survey	Poor quality of life was reported in 75% of the participants. Frequency of hospital visits and medication number showed a statistical	Level 4: correlational design	Cross-cultural validity, reliability, and psychometric property of the Amharic version of MRQoL have not	Yes, this study looks at quality of life related to polypharmacy, which will be an important aspect of the

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
10.1371/journal.pone.0214191				positive association with the likelihood of severe impairment		been done. Polypharmacy exposure time was not analyzed.	scholarly project
Verdoorn, S., Kwint, H.-F., Faber, A., Gussekloo, J., & Bouvy, M. L. (2015). Majority of drug-related problems identified during medication review are not associated with STOPP/START criteria. *European Journal of Clinical Pharmacology*, *71*(10), 1255–1262. https://doi-org.ezproxy.liberty.edu/10.1007/s00228-015-1908-x	Determine to what extent STOPP/START corresponding to drug-related problems	13 Dutch community pharmacies, 457 community-dwelling patients aged 65 and older that use 5 or more medications	Non-experimental, descriptive survey	81% of drug-related problems were not related to the use of START/STOPP criteria.	Level 4: correlational design	A modified START/STOPP criteria was used. Medication omissions could not be measured. Pharmacists were not properly trained in the use of START/STOPP criteria.	No, this study cannot be generalized to polypharmacy in acute or primary care.
Assignment 2							

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
Gómez, C., Vega-Quiroga, S., Bermejo-Pareja, F., Medrano, M. J., Louis, E. D., & Benito-León, J. (2015). Polypharmacy in the elderly: A marker of increased risk of mortality in a population-based prospective study. *Gerontology*, *61*(4), 301–309. https://doi-org.ezproxy.liberty.edu/10.1159/000365328	The purpose of this study is to determine in a population-based study whether polypharmacy is associated with increased risk of mortality in elderly persons.	The sample includes 5,052 people aged 65 years and older	Longitudinal population-based prospective study.	Around half of the study participants died prior to the follow-up period, which indicated that polypharmacy amongst the elderly population puts them at increased risk of mortality.	Level 4: correlational study	This study does not consider that community-dwelling elders may take self-prescribed medication and alternative medication that they do not tell the provider about.	Yes, provides foundational information related to the increased risk of mortality associated with polypharmacy amongst the elderly population.
Leiss, W., Méan, M., Limacher, A., Righini, M., Jaeger, K., Beer, H.-J., … Aujesky, D. (2015). Polypharmacy is associated with an increased risk of bleeding in elderly patients with venous thromboembolism. *Journal of General Internal Medicine*, *30*(1), 17–24. https://doi-	The purpose of the study is to examine whether polypharmacy increases the risk of bleeding amongst the	The cohort sample was 830 patients aged 65 years old and older	Prospective cohort study	49.8% of the patients had polypharmacy. The mean follow-up duration was 17.8 months. This study found that	Level 4; correlational design		Yes, this study provides foundational information related to a risk of major

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
org.ezproxy.liberty.edu/10.1007/s11606-014-2993-8	elderly population that receive vitamin K antagonists for acute venous thromboembolism (VTE).	that have a VTE.		patients with polypharmacy had a significantly higher incidence of major bleeding and clinically relevant non-major bleeding in elderly patients receiving vitamin K antagonists for VTE.			bleeding due to polypharmacy in the elderly population
Strabner, C., Frick, E., Stotz-Ingenlath, G., Buhlinger-Göpfarth, N., Szecsenyi, J., Krisam, J., … Joos, S. (2019). Holistic care program for elderly patients to integrate spiritual needs, social activity, and self-care into disease management in primary care: study protocol for a cluster-randomized trial. *Trials, 20*(1), 364.	The purpose of this study is to determine whether combining disease management	360 Patients aged 70 years old or older with at least three	Exploratively, cluster-randomized controlled trial with general practices	It is hypothesized that by incorporating holistic care, the elderly persons	Level 2; randomized controlled trial	There is a lack of generalizability to this study. There is not	No, even once this study is co

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
https://doi-org.ezproxy.liberty.edu/10.1186/s13063-019-3435-z	programs with interventions to address these dimensions is feasible and has any impact on relevant outcomes in elderly patients with polypharmacy	chronic conditions receiving at least three medications participating in at least one disease management program	as the unit of randomization will be conducted and accompanied by a process evaluation	quality of life will improve.		a random selection	
Urfer, M., Elzi, L., Dell-Kuster, S., & Bassetti, S. (2016). Intervention to improve appropriate prescribing and reduce polypharmacy in elderly patients admitted to an internal medicine unit. *Plos One*, *11*(11), e0166359. https://doi-org.ezproxy.liberty.edu/10.1371/journal.pone.0166359	The purpose of this study is to test the efficacy of an easy-to-use checklist aimed at supporting the therapeutic reasoning of	900 patients aged 65 years old and older, half have been hospitalized before the introductio	Single-center, interventional, quasi-experimental before-after study	After the implementation of the checklist, there was a significant reduction in the prescribing of potentially inappropriate	Level 3: quasi-experimental design	Randomization was not possible because of the contamination effect	Yes, the study provides a tool that may be generalized to the scholarly project to decrease the prescribing

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
	physicians to reduce inappropriate prescribing and polypharmacy	n of the checklist and the other half after.		medications amongst the participants			of potentially inappropriate medications
Wongpakaran, N., Wongpakaran, T., Sirirak, T., Jenraumjit, R., Jiraniramai, S., & Lerttrakarnnon, P. (2018). Predictors of polypharmacy among elderly Thais with depressive and anxiety disorders: Findings from the DAS study. *BMC Geriatrics*, *18*(1), 309. https://doi-org.ezproxy.liberty.edu/10.1186/s12877-018-1001-2	The purpose of this study is to investigate potential predictive psychosocial factors related to polypharmacy in elderly Thai people	803 patients participated in this study and 67.6% of the patients were aged 65 years old and older.	Proportional odds logistic regression	The results of the study list how many medications, the type of medications, and the various comorbidities. The study found that individuals with an anxiety disorder were 4 times more likely to have higher	Level 6: descriptive design	One limitation is that the medical aid status of the participant was not recorded.	Yes, this study provides a foundation to organize data to the scholarly project. The study lists various important data about the types of medication the patients are on and the comorbiditi

Article Title, Author, etc.	Study Purpose	Sample	Methods	Study Results	LOE	Study Limitations	Would Use as Evidence to Support a Change?
				polypharmacy and those with dyslipidemia were likely to have lower incidence of polypharmacy.			es that they have

Appendix B: Iowa Model Permission Letter

You have permission, as requested today, to review and/or reproduce *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care.* Click the link below to open.

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

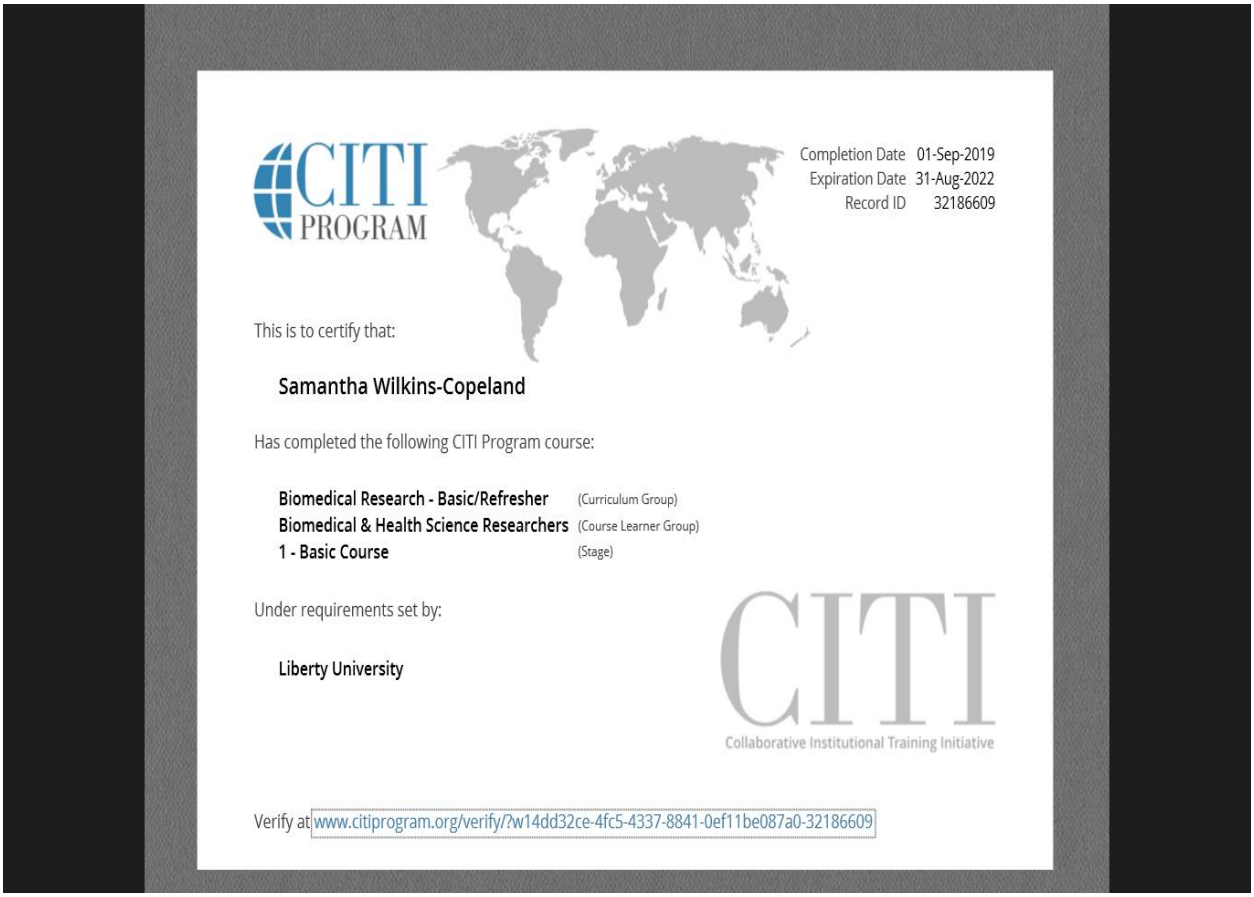
Citation: Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14(3), 175-182. doi:10.1111/wvn.12223*

> In written material, please add the following statement:
> *Used/reprinted with permission from the University of Iowa Hospitals and Clinics, copyright 2015. For permission to use or reproduce, please contact the University of Iowa Hospitals and Clinics at 319-384-9098.*

Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.

**note: This document was an email correspondence*

Appendix C: CITI Certificate



CITI PROGRAM

Completion Date 01-Sep-2019
Expiration Date 31-Aug-2022
Record ID 32186609

This is to certify that:

Samantha Wilkins-Copeland

Has completed the following CITI Program course:

Biomedical Research - Basic/Refresher (Curriculum Group)
Biomedical & Health Science Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Liberty University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w14dd32ce-4fc5-4337-8841-0ef11be087a0-32186609

Appendix D: Liberty University IRB Approval Letter

February 3, 2020
Samantha Wilkins-Copeland
Kenneth Thompson

Re: IRB Application - IRB-FY19-20-39 PREVENTING POLYPHARMACY AMONGST THE ELDERLY IN AN ACUTE CARE SETTING THROUGH THE INTEGRATION OF THE START, STOPP, AND BEERS CRITERIA

Dear Samantha Wilkins-Copeland, Kenneth Thompson:

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study does not classify as human subjects research because:

(2) evidence-based practice projects are considered quality improvement activities, which are not considered “research” according to 45 CFR 46.102(d).

Please note that this decision only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.
If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

**note: This document was an email correspondence*

Appendix E: Host Organization IRB Approval Letter

Mar 18, 2020

The project as described does not meet the criteria for Human Subject Research. No additional IRB submission/review is necessary for you to proceed with this project. Please refer to the attached IRB signed Determination (see PDF) for additional information.

Your project was assigned IRB Tracking Id # This tracking ID has been added to the project documents attached.

This project was determined to be a QI project. The results may only be published as qi and not as human subject research.

Please keep this email and all attached documents with the project files.

Contact the IRB if anything with this project changes OR if you have questions or concerns.

Thanks,

Karen

Karen Coleman (Mimms) Mills, RN

Compliance Coordinator

IRB-HSR Board Member

Institutional Review Board-Health Sciences Research

**note: This document was an email correspondence*

Appendix F: Host Organization Letter of Support

Family Centered Care

UNIVERSITY of VIRGINIA HEALTH SYSTEM

DNP Scholarly Project

LETTER OF SUPPORT

Liberty University, Inc.
1971 University Blvd.
Lynchburg, VA 24593

RE: IRB Letter of Support
Samantha Bonita Wilkins-Copeland

Dear Institutional Review Board Chair and Members:

I am writing this letter of support for one of our colleagues,
It is our intention to support Samantha Bonita Wilkins-Copeland's DNP scholarly project.

Scholarly Project Overview

1. Project Summary:
This scholarly project will analyze current data related to polypharmacy in the elderly population. This scholarly project will aim to integrate various deprescribing tools into the everyday practice of providers that care for elderly patients aged 65 and older. The tools that will be integrated as part of this scholarly project are the Screening Tool to Alert to Right Treatment (START), Screening Tool of Older People's Prescriptions (STOPP), and the Beers Criteria. These tools will be integrated to avoid inappropriate medication use in the elderly population, ensure elderly individuals are on the appropriate medications at proper doses. Lastly, this project will aim to decrease potential side effects of polypharmacy through provider education about the polypharmacy prevention tools.
Data collection will be completed as a two-step process. First, a pre- and post-survey will be completed to collect data from the medical providers prior to implementing the deprescribing tools and after the completion of the chart reviews. The surveys will be identical and include less than ten questions with Likert-based responses from strongly disagree to strongly agree, which will be numbered for statistical analysis later. This will evaluate for the medical providers specific understanding of deprescribing tools and their implementation. The surveys will collect comparison data related to the understanding the level of understanding the medical providers have about the purpose and implementation of the deprescribing tools. The comparison data will compare pre- and post-knowledge and understanding. Next, prescribing comparison data will be collected. A chart review will be completed on a set number of admission and discharge medication reconciliations, which will evaluate the average number of medications that elderly adult takes regularly before and after the implementation of the scholarly project.

Family Centered Care

UNIVERSITY of VIRGINIA HEALTH SYSTEM

2. Objectives:

1. Medical providers will understand how to accurately utilize deprescribing tools, which include the START, STOPP, and Beers Criteria.
2. The elderly populations' average number of medications will decrease on the admission medication reconciliation as a result of implementing the START, STOPP, and Beers Criteria.
3. The elderly populations' average number of medications will decrease on the discharge medication reconciliation as a result of implementing the START, STOPP, and Beers Criteria.

3. Background & Rationale:

This project will use the Iowa Model of Evidence Based Practice for Quality Improvement. The improvement/change the project will address- optimizing the admission and discharge medication reconciliations of elderly adults admitted to a medical unit at the host organization. Polypharmacy amongst the elderly population is an important topic that needs to be explored further for a variety of reasons. These reasons include increased negative effects due to polypharmacy. Some of these effects include, increased drug-drug interactions, medication non-compliance, and increase risk of adverse drug reactions. Many elderly adults visit emergency departments annually due to adverse drug reactions from commonly prescribed medications. There will be a great benefit to the host organization. The benefits include the reduction of negative side effects; such as, increased incontinence, urinary tract infections, drug-drug interactions, poor cognitive outcomes, and falls to name a few. Ultimately, the benefit would be to reduce readmissions due to some of these negative side effects. There is significant value to decreasing polypharmacy in the elderly population. This value would include decreasing the negative effects of polypharmacy, such as increased drug-drug interactions and adverse drug effects. (Also note if the student will receive support to access data, or other resources needed to complete the project.)

Project Overview written by Samantha Wilkins-Copeland.

Family Centered Care

UNIVERSITY of VIRGINIA HEALTH SYSTEM

In support of this Scholarly DNP project
Sincerely,

Cynthia A. Southard DNP
Nurse Manager 3 East Adult General Medicine
BC-Gerontological Nurse

Appendix G: Pre-Education Survey

Directions: Please complete this anonymous survey. Circle ONE answer per question.

1. **What best describes your status within this organization?** (please circle one)

Provider Pharmacist Manager Nurse Other (list)_____

Resident (subspecialty)_____ Intern (subspecialty)_____

Attending (subspecialty)_____

2. **How familiar are you with utilizing the Screening Tool to Alert to Right Treatment (START)?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

3. **How familiar are you with utilizing the Screening Tool of Older People's Prescriptions (STOPP)?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

4. **How familiar are you with utilizing the Beers Criteria?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

Post-Education Survey

Directions: Please complete this anonymous survey. Circle ONE answer per question.

5. **How familiar are you with utilizing the Screening Tool to Alert to Right Treatment (START)?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

6. **How familiar are you with utilizing the Screening Tool of Older People's Prescriptions (STOPP)?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

7. **How familiar are you with utilizing the Beers Criteria?** (please circle one)

Very familiar Somewhat familiar Neutral Not very familiar Not at all familiar

Thank you for completing this survey. Contact me with any questions:

Samantha Wilkins-Copeland MSN-Ed, BS, RN-BC, DNP/FNP Student

Appendix H: DNP Scholarly Project Budget

Item	Cost in dollars
Printing	25
Editing	200
Statistics software	50
Total Cost	**275**

Appendix I: Beer's Criteria Permission Letter

AGS Geriatrics Healthcare Professionals

THE AMERICAN GERIATRICS SOCIETY

January 6, 2020

Samantha Wilkins-Copeland

Dear Samantha Wilkins-Copeland,

Thank you for requesting permission to use the "American Geriatrics Society Updated Beers Criteria®" (2019), for use in the following manner:

Permission to use the above listed materials is limited to educational use. The requested materials are to be used as part of a scholarly research project that will be published in the Liberty University Scholarly Database. The requested materials will be used as educational material only.

Permission is granted for the above provided that:

1. Permission to use the material listed above is limited to use in the above stated manner only. Rights **do not** apply to revised editions. Edits or translations to above listed material is **not allowed**. Electronic use such as in-group presentation (ex: Power Point) is permitted but must include citation. Other electronic/online/website, etc. use is **not allowed**. In the event of publishing study, please contact for further permission.

2. Proper credit is given to the Journal of American Geriatrics Society (JAGS) with the following citation(s):
   - "American Geriatrics Society Updated Beers Criteria®." *www.GeriatricsCareOnline.org*, American Geriatrics Society. January 31, 2019. geriatricscareonline.org/toc/american-geriatrics-society-updated-beers-criteria/CL001

For more information visit the AGS online at www.americangeriatrics.org.

If you have any questions, please feel free to contact me at

Thank you,

Elisha Medina-Gallagher
Manager, Special Projects
American Geriatrics Society

Appendix J: START/STOPP Tool Permission Letter

Dear Ms Wilkins-Copeland,

Please see attached. Scroll to the end of the Word document to find the S/S rules.

STOPP/START criteria are in the public domain and as such may be used for any academic or audit purpose.

Yours, DOM

Prof. Denis O'Mahony, MD, FRCPI, FRCP(UK)

Department of Medicine, University College Cork &

Department of Geriatric & Stroke Medicine,

Cork University Hospital,

Wilton, Cork, Ireland

**note: This document was an email correspondence*

Appendix K: DNP Scholarly Project Statistical Data

Survey Question 1:

Descriptives

			Statistic	Std. Error
Pre: How familiar are you with utilizing the START Tool?	Mean		3.0000	.77460
	95% Confidence Interval for Mean	Lower Bound	1.0088	
		Upper Bound	4.9912	
	5% Trimmed Mean		3.0000	
	Median		3.0000	
	Variance		3.600	
	Std. Deviation		1.89737	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		4.00	
	Skewness		.000	.845
	Kurtosis		-2.685	1.741
Post: How familiar are you with utilizing the START Tool?	Mean		4.1667	.30732
	95% Confidence Interval for Mean	Lower Bound	3.3767	
		Upper Bound	4.9567	
	5% Trimmed Mean		4.1852	
	Median		4.0000	
	Variance		.567	
	Std. Deviation		.75277	
	Minimum		3.00	
	Maximum		5.00	
	Range		2.00	
	Interquartile Range		1.25	
	Skewness		-.313	.845
	Kurtosis		-.104	1.741

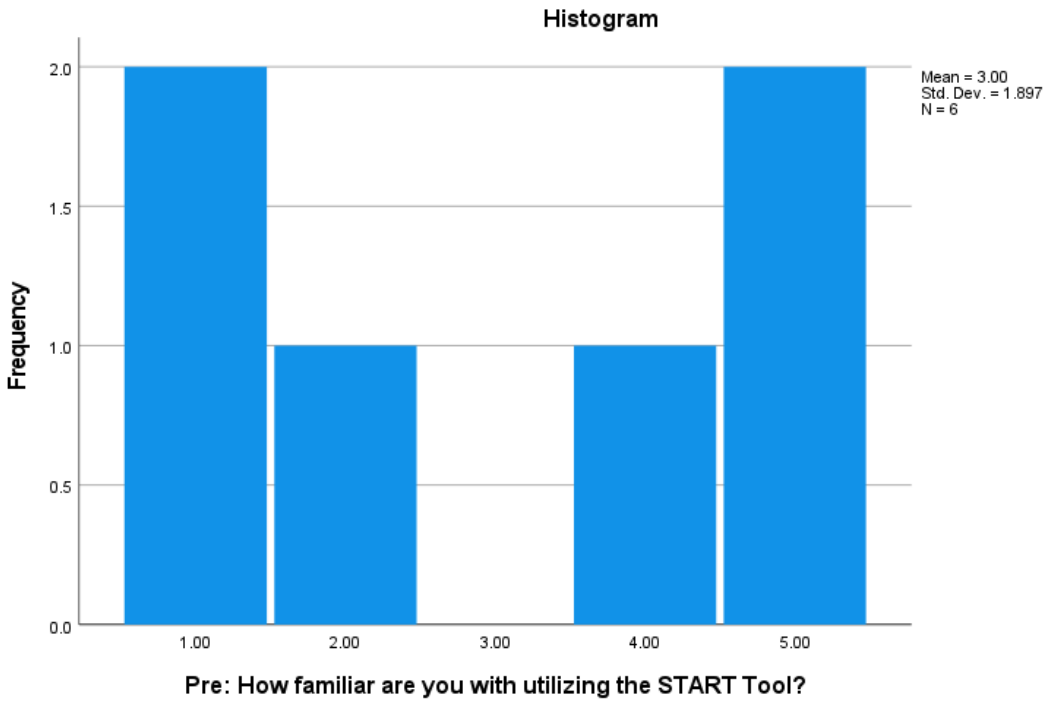
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre: How familiar are you with utilizing the START Tool?	.201	6	.200*	.833	6	.113
Post: How familiar are you with utilizing the START Tool?	.254	6	.200*	.866	6	.212

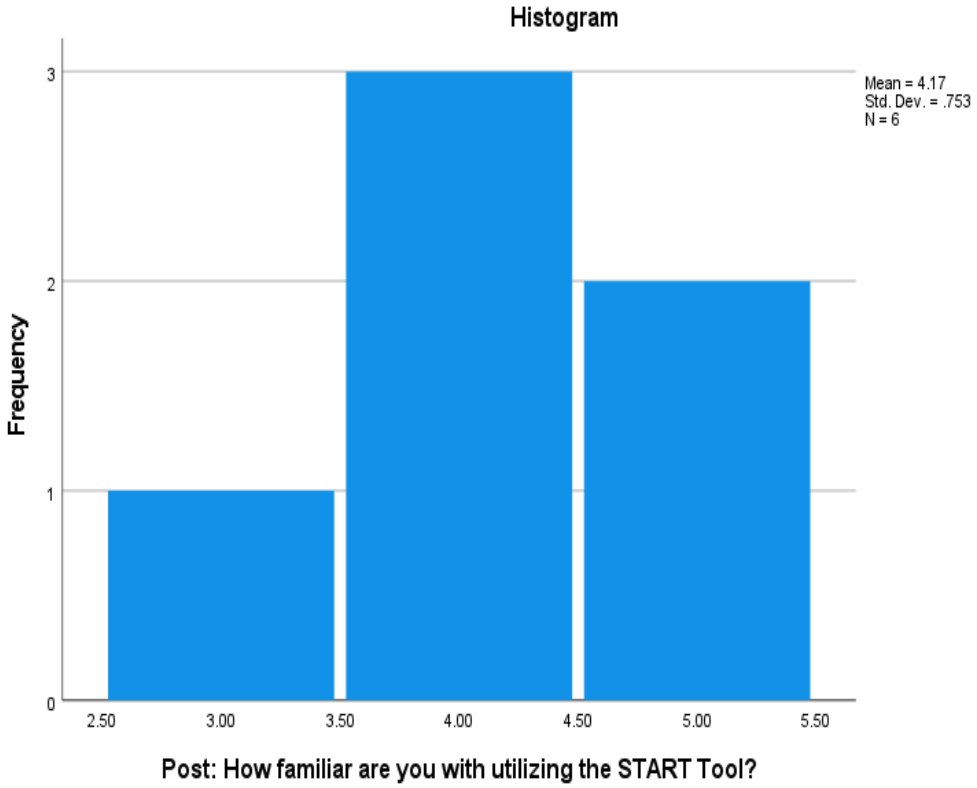
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Survey Question 1 Pre-Education:



Survey Question 1 Post-Education:



Survey Question 2:

Descriptives

			Statistic	Std. Error
Pre: How familiar are you with utilizing the STOPP Tool?	Mean		3.1667	.74907
	95% Confidence Interval for Mean	Lower Bound	1.2411	
		Upper Bound	5.0922	
	5% Trimmed Mean		3.1852	
	Median		3.5000	
	Variance		3.367	
	Std. Deviation		1.83485	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		4.00	
	Skewness		-.362	.845
	Kurtosis		-2.103	1.741
Post: How familiar are you with utilizing the STOPP Tool?	Mean		4.1667	.30732
	95% Confidence Interval for Mean	Lower Bound	3.3767	
		Upper Bound	4.9567	
	5% Trimmed Mean		4.1852	
	Median		4.0000	
	Variance		.567	
	Std. Deviation		.75277	
	Minimum		3.00	
	Maximum		5.00	
	Range		2.00	
	Interquartile Range		1.25	
	Skewness		-.313	.845
	Kurtosis		-.104	1.741

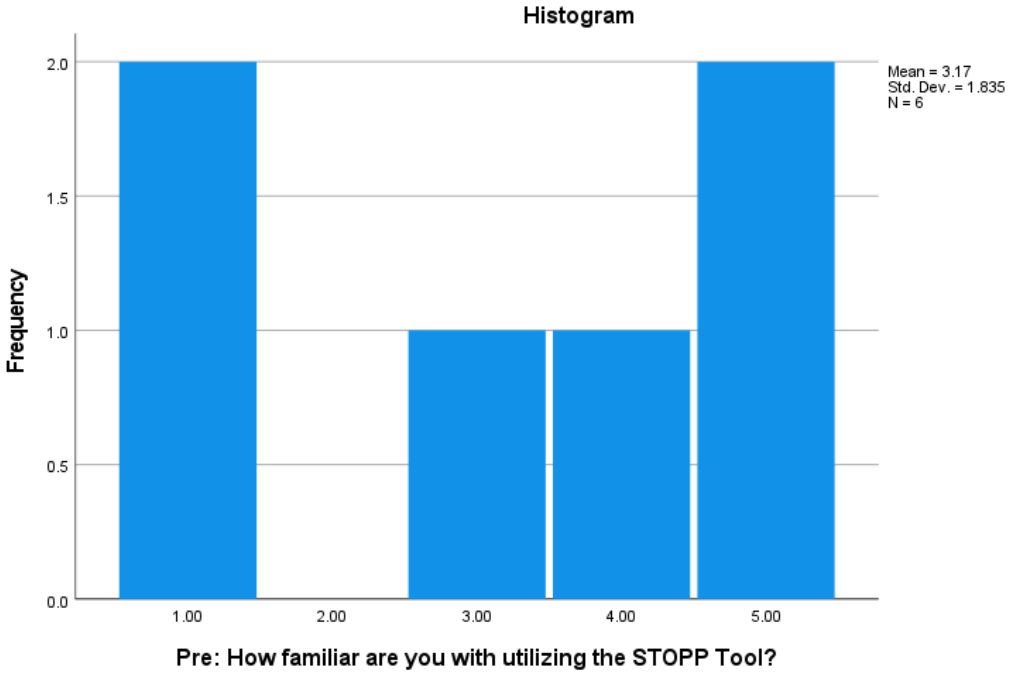
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre: How familiar are you with utilizing the STOPP Tool?	.215	6	.200*	.850	6	.158
Post: How familiar are you with utilizing the STOPP Tool?	.254	6	.200*	.866	6	.212

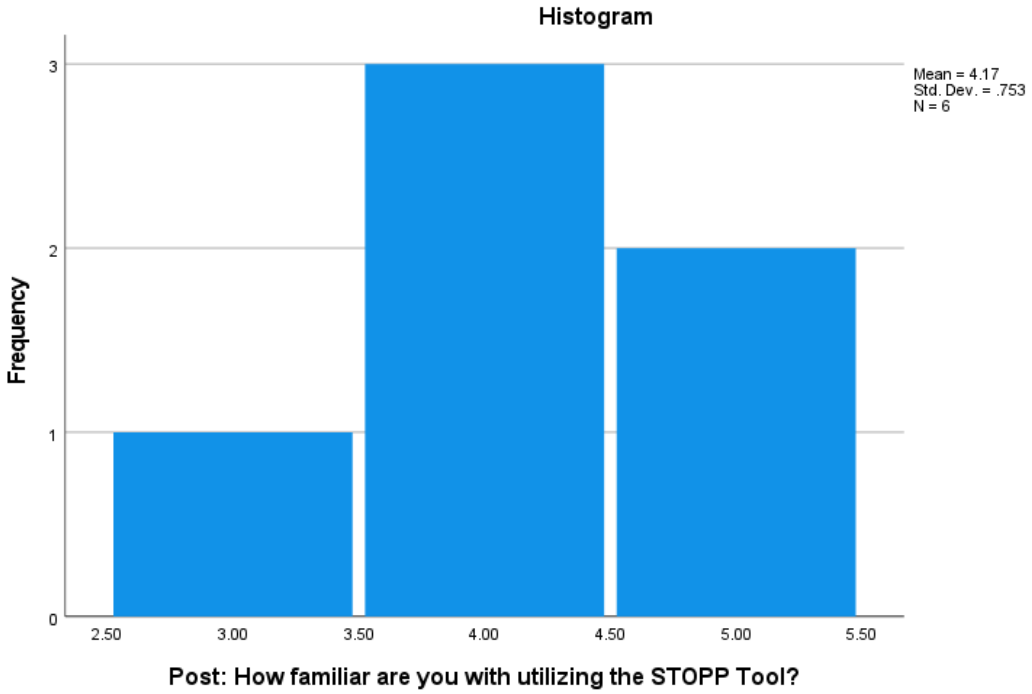
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Survey Question 2 Pre-Education:



Survey Question 2 Post-Education:



Survey Question 3:

Descriptives

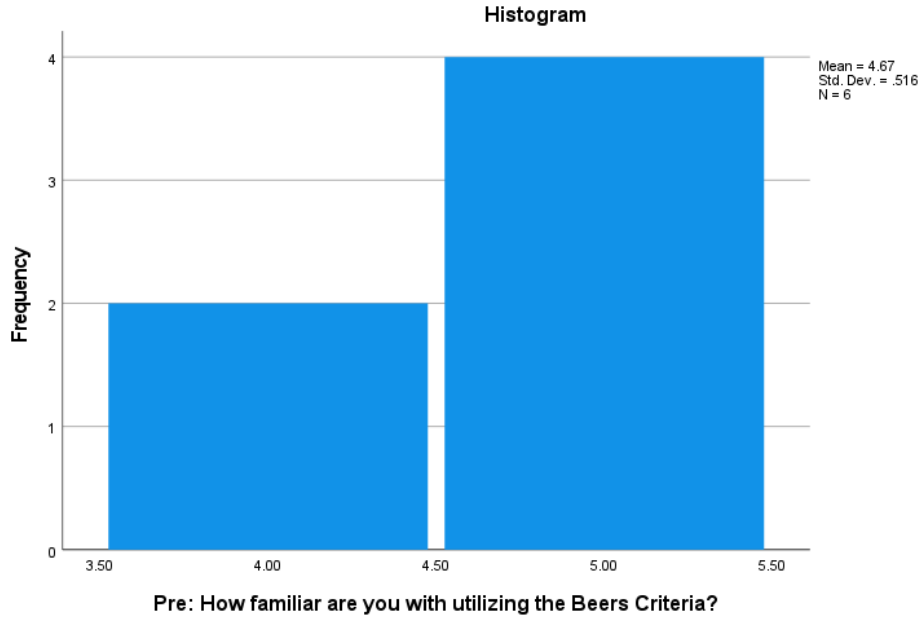
			Statistic	Std. Error
Pre: How familiar are you with utilizing the Beers Criteria?	Mean		4.6667	.21082
	95% Confidence Interval for Mean	Lower Bound	4.1247	
		Upper Bound	5.2086	
	5% Trimmed Mean		4.6852	
	Median		5.0000	
	Variance		.267	
	Std. Deviation		.51640	
	Minimum		4.00	
	Maximum		5.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		-.968	.845
	Kurtosis		-1.875	1.741
Post: How familiar are you with utilizing the Beers Criteria?	Mean		4.8333	.16667
	95% Confidence Interval for Mean	Lower Bound	4.4049	
		Upper Bound	5.2618	
	5% Trimmed Mean		4.8704	
	Median		5.0000	
	Variance		.167	
	Std. Deviation		.40825	
	Minimum		4.00	
	Maximum		5.00	
	Range		1.00	
	Interquartile Range		.25	
	Skewness		-2.449	.845
	Kurtosis		6.000	1.741

Tests of Normality

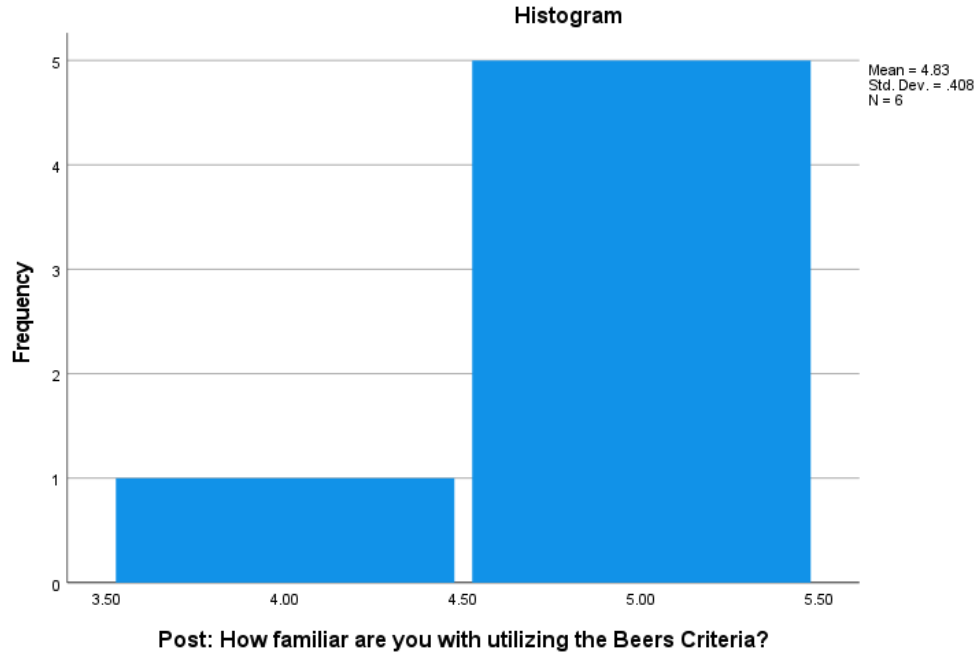
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre: How familiar are you with utilizing the Beers Criteria?	.407	6	.002	.640	6	.001
Post: How familiar are you with utilizing the Beers Criteria?	.492	6	.000	.496	6	.000

a. Lilliefors Significance Correction

Survey Question 3 Pre-Education:



Survey Question 3 Post-Education:



Pre-Education Data:

Descriptives

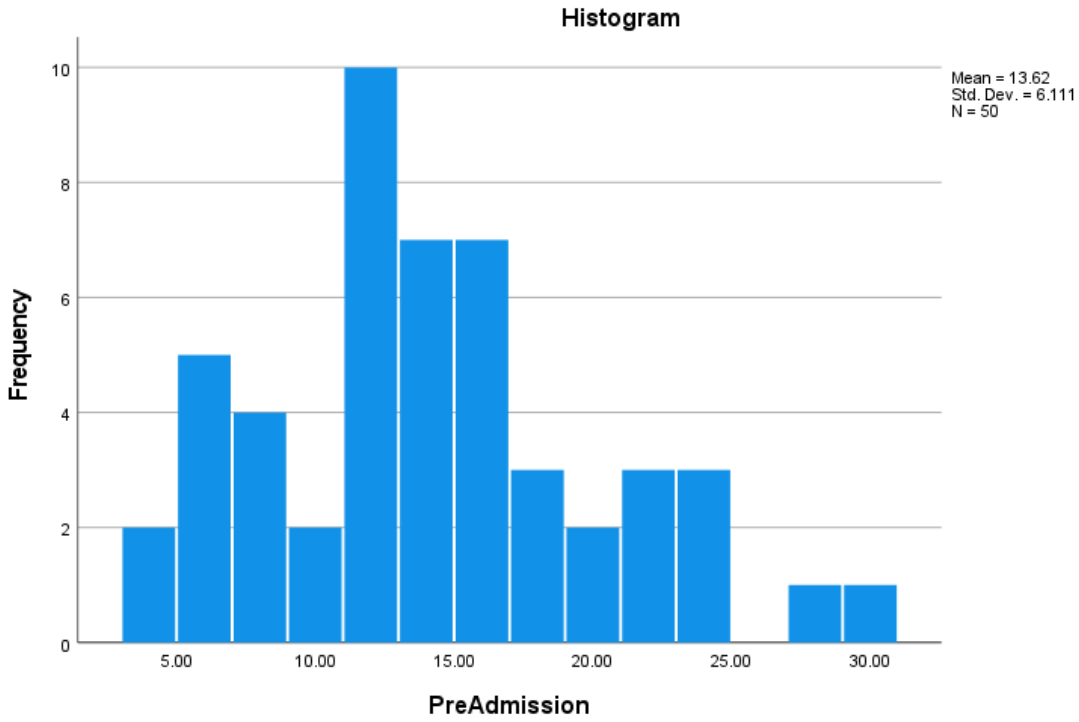
			Statistic	Std. Error
PreAdmission	Mean		13.6200	.86420
	95% Confidence Interval for Mean	Lower Bound	11.8833	
		Upper Bound	15.3567	
	5% Trimmed Mean		13.3667	
	Median		13.0000	
	Variance		37.342	
	Std. Deviation		6.11085	
	Minimum		4.00	
	Maximum		30.00	
	Range		26.00	
	Interquartile Range		7.25	
	Skewness		.506	.337
	Kurtosis		.060	.662
PreDischarge	Mean		15.1000	.81579
	95% Confidence Interval for Mean	Lower Bound	13.4606	
		Upper Bound	16.7394	
	5% Trimmed Mean		14.9111	
	Median		14.0000	
	Variance		33.276	
	Std. Deviation		5.76849	
	Minimum		5.00	
	Maximum		31.00	
	Range		26.00	
	Interquartile Range		8.00	
	Skewness		.620	.337
	Kurtosis		-.036	.662

Tests of Normality

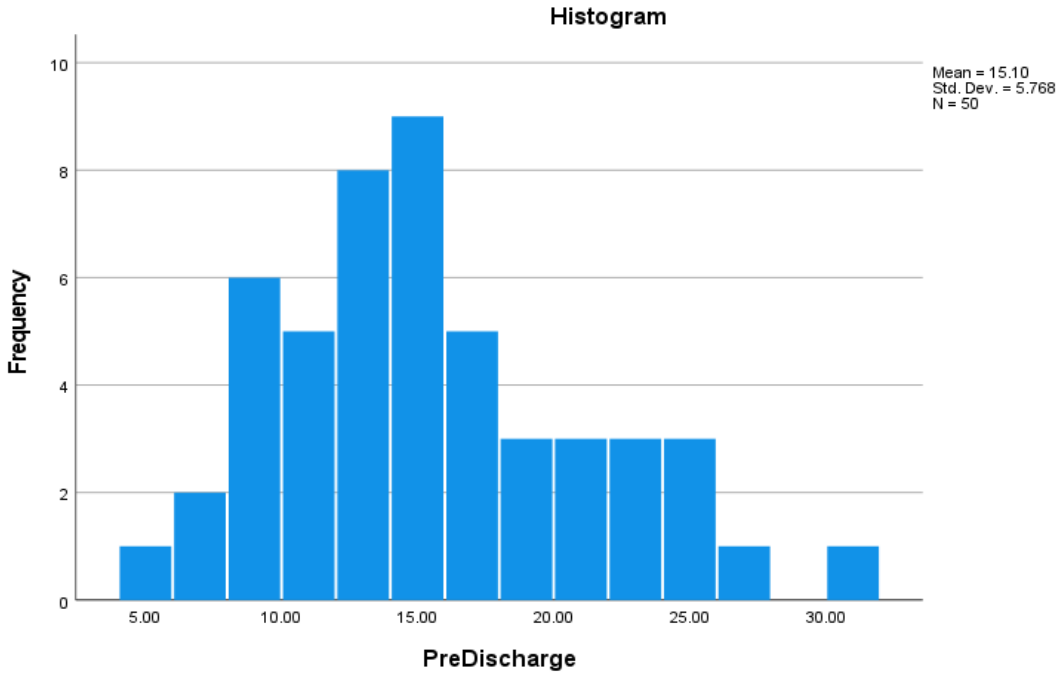
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreAdmission	.120	50	.067	.961	50	.098
PreDischarge	.127	50	.043	.963	50	.114

a. Lilliefors Significance Correction

Pre-Education Admission Data:



Pre-Education Discharge Data:



Post-Education Data:

Descriptives

			Statistic	Std. Error
PostAdmission	Mean		11.8800	.81448
	95% Confidence Interval for Mean	Lower Bound	10.2432	
		Upper Bound	13.5168	
	5% Trimmed Mean		11.6778	
	Median		12.0000	
	Variance		33.169	
	Std. Deviation		5.75925	
	Minimum		1.00	
	Maximum		26.00	
	Range		25.00	
	Interquartile Range		9.00	
	Skewness		.479	.337
	Kurtosis		-.109	.662
PostDischarge	Mean		14.1400	.90981
	95% Confidence Interval for Mean	Lower Bound	12.3117	
		Upper Bound	15.9683	
	5% Trimmed Mean		13.9333	
	Median		14.0000	
	Variance		41.388	
	Std. Deviation		6.43336	
	Minimum		2.00	
	Maximum		35.00	
	Range		33.00	
	Interquartile Range		8.25	
	Skewness		.616	.337
	Kurtosis		1.114	.662

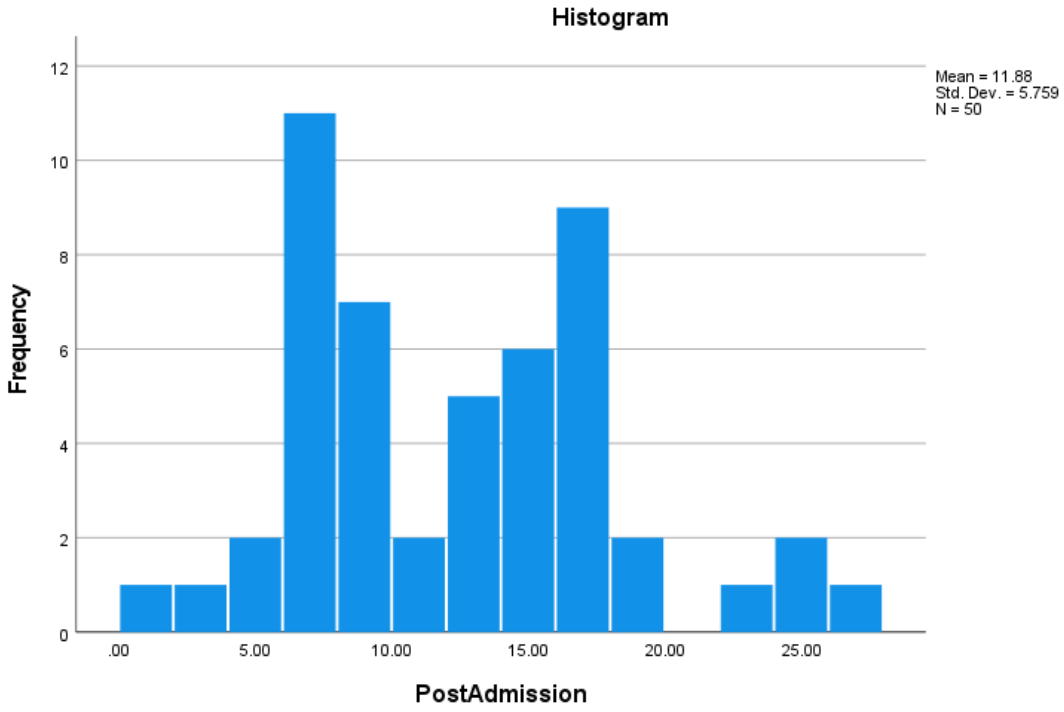
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PostAdmission	.131	50	.031	.957	50	.064
PostDischarge	.080	50	.200*	.971	50	.258

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Post-Education Admission Data:



Post-Education Discharge Data: