2023

Primary Care Provider Knowledge and Utilization of the BEERS Criteria for the Prevention and Management of Polypharmacy in the Elderly

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Clinical Research Project

Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Nursing, College of Nursing
and Health Sciences
Mississippi University for Women

COLUMBUS, MISSISSIPPI
July 2023

Graduate Committee Approval

The Graduate Committee of Austin Black, Jessica Pippin and Presley Keel

hereby approves this research project as meeting partial

fulfillment of the requirements for the Degree of

Master of Science in Nursing

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Dedications

I want to start by thanking God for taking me where I am today, because without Him I would not have made it to where I am today. I would also like to thank my loving wife Jessica. She has supported me, loved me, and pushed me to attain this goal I have currently achieved. I would not be where I am without the love of my life by my side. I also want to dedicate where I am today to my soon arriving child Janie. Your mother and I will love you forever. To my parents, thank you for always loving me. You have always supported me through all of endeavors in life. I will never be able to repay you for everything you have done. I would like to also thank my research partners Jessica Pippin and Presley Keel. We did it. It has been a long road, but we have finally found the light at the end of the tunnel. Finally, to Dr. Groves, thank you for your guidance and support on this journey. I could not have done it without you. – Austin Black

I would like to thank God for the opportunity to complete this program and continue to serve others. To my mother, thank you for pushing me, guiding me, and loving me. I would like to thank my father who is not with us on earth, but his words still guide me today. He valued education and would be ecstatic about this accomplishment. I would like to thank my brother and his family for their continued support. Garrett, thank you for your patience and kindness during this journey. To my family and friends, thank you for your understanding during this time and I look forward to the good times ahead. Austin and Presley, it has been a pleasure working with you and getting to know each of you personally. This has been enjoyable because of you. This research would not have been

successful without Dr. Groves. Thank you for your continued guidance and encouragement throughout this program. - Jessica Pippin

First, I give all the praise to God for allowing me to make it this far, his plan is always greater than my own. My husband, Joshua, truly I would not have this opportunity if it were not for your support and optimistic reminders. It is almost over; I promise it will pay off. To my children, Swayze and Jolie, I told you it won't always be like this, thank you for giving me a reason to push forward. To my village; friends, babysitters, and family members, THANK YOU, you will never know what you mean to me and how much your support has helped me. Aunt Lisa, thank you, enough said. Dr Groves, I would not still be in this program writing this if it were not for you. You have pushed me and not allowed me to give up. You have forever impacted my view of education, shown me what an impact good instructors can make on oneself, and will forever hold a special place in my heart. Austin and Jessica, thank you for just accepting my procrastination and trusting me that it will get done. Best of luck to both of you. -Presley Keel

Acknowledgements

Abstract

The establishment of guidelines focusing on the specific challenges and the clinical consequences of polypharmacy in the elderly population is a known research deficit. Throughout three semesters, this study has been conducted to identify primary care providers knowledge and practices regarding polypharmacy in the elderly, specifically in regard to the BEERS criteria. No standard definition exists for polypharmacy and creates a large barrier for universal healthcare. Nola Pender's Health Promotion Model was used to guide the procedures of this study. Implementation of the project included obtaining consent from the Mississippi University for Women Institutional Review Board. Surveys were dispersed to primary care providers in the state of Mississippi. The data was gathered from 65 provider surveys who met the criteria to evaluate their knowledge and utilization of the BEERs criteria in the prevention and management of polypharmacy in the elderly. The researchers utilized a descriptive, quantitative survey design to assess the provider's knowledge and current practices related to polypharmacy. Data from this research project was collected from a convenience sample of Nurse Practitioners, Physicians, and Physician Assistants who practice in a primary care setting. After collecting these surveys, the researchers were able to analyze the general knowledge and practices that the healthcare providers participated in. The design of this study was appropriate given limited time to collect data, participant accessibility, and the possibility of gaining relevant information through a survey method. Providers were found to be familiar with the BEERS criteria but gaps were found in the proficient utilization of the BEERS criteria. Although most providers in MS were knowledgeable of the BEERS criteria, there is a large percentage of providers who are note. A lack of a standard

definition of polypharmacy could contribute to these gaps. With the rising geriatric

population, polypharmacy is expected to overwhelm the current healthcare processes.

There is little documented research regarding polypharmacy, adverse drug reactions, and

how to manage it. Tools have been created to help providers recognize and reduce

polypharmacy as well as potential adverse reactions as a result of polypharmacy. The

negative health outcomes and financial burdens are well documented, but no formal

guidelines have been established. This is a result of lack of knowledge and awareness

with polypharmacy prevention practices. More research is needed to develop a formal

definition to define what constitutes appropriate and inappropriate use of polypharmacy

and standardized practices for management and prevention.

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Chapter I: Dimensions of the Problem (Introduction)

Primary Care Provider Knowledge and Utilization of the BEERS criteria for the Prevention and Management of Polypharmacy in the Elderly

Chapter 1: Dimensions of the Problem

Polypharmacy is an ongoing and understudied global issue that has detrimental effects on the geriatric population. Polypharmacy in advanced ages can cause drug interactions, delirium, and drug toxicity. The Center of Medicare and Medicaid Services defines polypharmacy as taking three to five or more medications over the age of 18 years old. Polypharmacy is most recognized in older adults, because patients with one or more chronic conditions have longer, more extensive medication lists. Older adults with multiple subspecialist physicians and no primary care physician are particularly vulnerable to polypharmacy (Halli-Tierney, Scarbrough, & Carroll, 2019). There is supporting data from pharmaceutical-care principles that states on average, patients taking five medications will average one significant drug problem (Hoel et al., 2020). A study of 5,213 participants in England found the rate of falls was 21% higher in people taking four or more medications compared with those taking fewer. Using a >10-drugs threshold, there was an increase in rate of falls by 50% (Hoel et al., 2021). Medications are useful and even necessary in treating health conditions, but improper use or over-prescribing can lead to negative health effects.

Based on the World Health Organization, elderly patients are defined as being 65 years or older. Currently, one in 11 people worldwide can be defined as elderly with an expected increase to one in six by the year 2050 (Yasky & Zawawi, 2021). As a result of baby boomers, the current elderly population is the largest growing age group.

Polypharmacy is an issue that is projected to overwhelm the current health care processes with the baby boomer generation aging. Adverse drug reactions are associated with polypharmacy and can potentially cause detrimental effects on any population, especially geriatrics. The current guides to identify and help manage polypharmacy are the STOPP/START criteria and the BEERS criteria. There is little documented research in regard to polypharmacy, adverse drug reactions, and how to manage it. The multimorbidity and potential side effects make the management of polypharmacy complex.

Problem Statement

The increasing numbers of the geriatric population increases concern for polypharmacy and its associated complications. Halli-Tierney et al. (2019) established that polypharmacy is an understudied topic, but it continues to be a prevalent issue. Polypharmacy is associated with negative patient outcomes, nonadherence, and the increased cost of healthcare. Wastesson et al. (2018) reported that the primary challenge in pharmacy is the necessity to manage multiple chronic conditions. Guidelines of when and how to stop medications, patient-provider discussions, and educational activities regarding medication usage and effects are strongly encouraged for groups with limited life expectancies.

The largest challenge faced by medical communities is that there is no standard definition for polypharmacy. Taghy et al. (2020) considers the vagueness in a polypharmacy definition as a contribution to confusion, making it difficult to assess the extent of the problem, to measure its consequences and to search for solutions. With the

lack of a standard definition, no one provider is held to a specific and consistent standard of care. With the creation of a standard definition, uniformity, as well as consistency, amongst providers may be attainable.

Hanlon et al. (2018) stated that there is little known about the risks of adverse drug reactions in the context of multimorbidity. Hanlon et al. (2018) defined participants at risk of adverse drug reactions as anyone on three or more medications with similar potential adverse drug reactions. Unfortunately, just as with the definition of polypharmacy, there is also a large knowledge deficit created for providers with the lack of education for adverse drug reactions.

Tools have been created to attempt to help providers recognize and reduce the prevalence of polypharmacy. Most common among these tools are the BEERS Criteria and STOPP/START criteria. According to the American Geriatrics Society, the BEERS criteria aim to guide older people and healthcare professionals away from potentially harmful medications while also helping healthcare systems recognize such decisions when assessing care quality. Many healthcare providers are not aware of them, or they do not have enough education on the usefulness of these tools. Hoel et al. (2021) advocate for the method of deprescribing to become standard practice. They also mention that this method would be challenging because of cultural differences. In most regions of the country, people prefer medications to treat medical conditions instead of utilizing lifestyle changes. Multimorbidity is also a factor when discussing polypharmacy. Many of the already established criteria do not consider this when determining the best methods of practice. The deprescribing method that Hoel et al. (2021) recommends does not

include suggestions to use in the event of patients dealing with multiple medical

conditions that need treatment. The BEERS criteria has a guide to medication interactions

and suggestions for preventing harmful interactions; however, this does not address the

pharmaceutical approach to multimorbidity. As with the above-mentioned challenges,

there is mention of multiple tools in literature, but education on these practices, as well as

standard implication, are minimal.

Statement of Purpose

The purpose of this study is to identify primary care providers' knowledge and
utilization of the BEERS criteria in the prevention and management of polypharmacy in
the elderly population.

Significance of Study

Elderly patients are at an increased risk for complications related to

polypharmacy. The longer citizens live, the higher the chances of multimorbidity;

multimorbidity is defined by the World Health Organization as "the co-occurrence of two

or more chronic health conditions in one person" (Hoel, 2021). The majority of patients

who are seen in primary care clinics have two or more chronic health

conditions. Multiple chronic health conditions in the elderly can lead to polypharmacy,

which could potentially put this vulnerable age group at risk for adverse drug reactions.

Due to the prevalence of polypharmacy causing a higher risk of adverse drug reactions,

there is an uptick in falls, hospitalizations, and deaths related directly to polypharmacy

(Hanlon et al., 2018).

The current research will help primary care providers identify knowledge deficits regarding polypharmacy and examine current practices in the prevention and management of polypharmacy. The findings of this study may benefit patients and the healthcare system by raising awareness and prompting healthcare providers to examine their current practices related to polypharmacy. According to the National Institute of Health, in the year 2030 there will be additional challenges related to caring for the "baby boomer" generation born between 1946 and 1964. Implementing a standardized approach to combating polypharmacy in the year 2023 will benefit primary care practice for the future challenges (Knickman & Snell, 2002).

Theoretical Framework

Nola J. Pender's Health Promotion Model (HPM) is the theoretical model used to guide this research study of the geriatric population and polypharmacy. Pender's model iterates that health promotion and prevention should be of main concern for healthcare providers. Pender defines health as a positive state rather than just an absence of disease. The Health Promotion Model will influence the care provider as well as improve patient outcomes.

By using Pender's Health Promotion Model, the goal is to create a positive environment to promote or sustain a healthy lifestyle and prevent future health decline that is already an issue in the elderly population. Screening is a category of health promotion and should be utilized when available to patients to promote and sustain good health. Screening should include medication reconciliation, compliance, efficacy of prescribed meds, any untoward side effects, and address discontinuation or changing

medication regimen with education provided about ongoing needs or changes. By promoting good health and good health habits we can begin to truly heal a patient both physically and emotionally (Petiptrin, 2020).

The current research will be utilizing surveys for primary care providers to better understand how providers are managing the elderly population while balancing polypharmacy. The HPM was chosen to direct the current research due to the empirical precision and generalizability that the theory has to offer. The HPM will also assist with guiding the survey to further understand determinants for their prescribing methods, especially targeted for the elderly population. The HPM can be used to guide the research and understand the limitations that the providers encounter. The limitations are comorbidities and the culture of the population that they serve. The HPM can be used for educational purposes by the providers to show the patients that some medications are unnecessary. The HPM could also be utilized to plan and manage the deprescribing process for patients.

Pender's model focuses on three areas: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Petiptrin, 2020). All elements of Pender's Health Promotion Model can be utilized in the identification and management of polypharmacy. Tailoring patients' medications to their specific diagnosis, financial needs, and educational needs are the foundational parts of Pender's model. Patients must understand the necessity of their medications and the reason for the medications, thus allowing the patients autonomy in their care.

Once patients understand the need for the medication, their behavior-specific cognitions are affected. This occurs when patients begin to cope with their diagnosis or medication regimen and compliance or noncompliance begins. Providers need a concrete understanding about this stage to guide patients. Deprescribing can occur during this stage as the provider assesses the patients' benefit and burden with polypharmacy.

Behavioral and clinical outcomes change when patients adhere to the medication plan. Behavioral changes can also be applied to the provider when changes occur in their practices and management pertaining to polypharmacy. With behavioral changes and improved clinical outcomes, proper prevention and management of polypharmacy can become a standard of care.

Research Questions

1. Are primary care providers knowledgeable of the BEERS criteria for the prevention and management of polypharmacy in elderly patients?
2. Are primary care providers utilizing the BEERS criteria for prevention and management of polypharmacy in elderly patients?

Definition of Terms:

There are multiple terms that must first be defined as they apply to this study. The theoretical and operational definitions are listed below as applicable to this project.

Primary Care Providers:

Theoretical: A person or thing that provides something (Oxford Language n.d.)

Operational: Doctor of Medicine (MD), Doctor of Osteopathic Medicine (DO), Physician's Assistant (PA), and Nurse Practitioners (NP) that provides maintenance medical care to an individual.

Evidence-Based Practice (EBP):

Theoretical: a process used to review, analyze, and translate the latest scientific evidence. The goal is to quickly incorporate the best available research, along with clinical experience and patient preference, into clinical practice, so nurses can make informed patient-care decisions (Kelly, 2021)

Operational: Criteria or documents that has research to support effective and safe clinic practice for the elderly population

Polypharmacy:

Theoretical: the practice of administering many different medicines especially concurrently for the treatment of a single disease (Merriam-Webster.com, n.d.)

Operational: patient being prescribed 5 or more medications over the age of 65

Elderly

Theoretical: rather old especially being past middle age (Merriam-Webster.com, n.d.)

Operational: age 65 and older

BEERS Criteria

Theoretical: tool created by The American Geriatrics Society to catalogue medications that cause side effects in older adults due to physiologic changes of aging

Operational: criteria to identify potentially inappropriate medication use in older adults while providing safe, quality care.

Knowledgeable

Theoretical: the fact or condition of knowing something with familiarity gained through experience or association (Merriam-Webseter.com, n.d.)

Operational: primary care providers understanding of polypharmacy management

Utilizing

Theoretical: to make use of: turn to practical use or account (Merriam-Webster, n.d.)

Operational: primary care providers using the BEERS criteria in their practice

Prevention

Theoretical: the act of preventing or hindering (Merriam-Webster, n.d.)

Operational: preventing polypharmacy in patients aged 65 or older

Assumptions

For this study, the assumptions were as follows:

      1. The participants will answer the questionnaire in an honest manner.

      2. Demographic data collected from the participants were assumed to be

current.

3. Participants in this study have an interest in participating in the research

and do not have any other motives.

4. Data would be gathered in an ethical and legal manner.

5. Data interpretation by researchers would be correctly interpreted.

Limitations

1. Limited time schedules may alter the amount of time needed for data collection
   and analysis.
2. Small sample size may affect generalization of the data collected and may not
   represent larger areas of practice.
3. Providers may not be open and honest with their survey answers.

Summary

Research surrounding polypharmacy is limited, due in part to inconsistent

definitions and practices among primary care providers. There are currently no approved

guidelines for the management and prevention of polypharmacy in the elderly; this is due

to the presence of chronic disease and multiple medications which meet criteria for

management of these chronic diseases in the elderly population.

Chapter II: Review of Literature

The purpose of this study was to evaluate the education of providers and the

procedures utilized for polypharmacy. The study also evaluated the actions once

polypharmacy is recognized. Polypharmacy is an understudied, albeit serious, issue presented in the elderly population. No uniform definition or strategy for prevention is widely recognized by the healthcare community. There is also no standard practice or set of guidelines in place for care of a patient that falls into the polypharmacy category.

Literature reviews are presented in this chapter from multiple authors and sources. The deficit of knowledge and standard definitions of polypharmacy and care are presented for research study. The articles discussed in this literature review substantiate the current research group's assumption that polypharmacy creates a knowledge deficit for providers, as well as contributes to negative effects on the vulnerable geriatric population.

Significance of Polypharmacy

Polypharmacy does not have a standardized definition. Taghy et al. (2020) considers the vagueness in the definition of polypharmacy as the cause for provider confusion. It also makes it difficult to assess the extent of the problem, to measure its consequences and to search for solutions. Studies have been performed to address methods of deprescribing, and multiple methods are mentioned in this literature review that have been put in place to prevent and treat or address polypharmacy. The BEERS criteria and STOPP/START criteria are the specific methods listed. The purpose laid out in the article was to advocate for a systematic approach. In short, there are tools to identify polypharmacy, but the research shows that it is difficult to deescalate the medication regimen once it is initiated.

Khezrian et al. (2020) study collected a large amount of data from multiple resources. The resources conducted their study around their own definition of polypharmacy. The correlation between the studies is the upward trend in the prevalence of polypharmacy. Polypharmacy prevalence has continued to increase throughout multiple nationalities. The increase of polypharmacy is also consistently rising in younger generations as compared to polypharmacy association with older populations.

Wastesson et. al (2018) conducted a meta-analysis of available research regarding polypharmacy definition. The researchers identified growing issues and consequences of polypharmacy due to the lack of universal definitions or guidelines. The growing population of geriatrics aged 65 and older with multi-comorbidities poses a significant challenge regarding primary care and polypharmacy in the years to come. The need was identified for future research to address medication tailoring, polypharmacy, and guidelines to address that specific deficit. The need for refined definitions and aspects of appropriateness will help guide future research at Mississippi University for Women. It was identified that there is a crucial need for standardized tools to define what constitutes appropriate and inappropriate use of polypharmacy.

Wastesson et. Al (2018) identified a number of negative outcomes associated with polypharmacy including falls, frailty, and mortality. Polypharmacy was found to be increasing across all adult populations internationally. There is difficulty in comparing polypharmacy data due to the lack of studies and the lack of definition. It was identified that there is a crucial need for standardized tools to define what constitutes appropriate and inappropriate use of polypharmacy.

The negative health outcomes and financial burdens are well-documented, but no formal definition has been established. This is a result of a lack of knowledge and awareness with polypharmacy prevention practices. A formal definition would warrant a standardized practice and prevention strategies. Pazan et al. (2020) concluded that there was no generally accepted definition for polypharmacy. This fact has also been acknowledged in a recent report from the World Health Organization (WHO) which stated that: "Polypharmacy is the concurrent use of multiple medications. Although there is no standard definition, polypharmacy is often defined as the routine use of five or more medications. These medications can be over the counter or prescription in nature. Pazan et al. (2020) suggest that the common numerical definitions are very heterogenous. The numbers usually indicate the severity. The WHO acknowledges this worldwide issue is due in part to lacking a standardized definition--and therefore a standardized tool--to prevent the issue.

Lack of Knowledge

Multiple research articles in accordance with polypharmacy and adjusting criteria have been reviewed and critiqued. The articles found that lack of knowledge and research for polypharmacy is a substantial limitation. Additionally, there is immediate need for a standard definition of polypharmacy because there is no uniform definition or strategy that is widely recognized by the healthcare community. Wastesson et. al (2018) states there is a crucial need for standardized tools to identify the differences between appropriate and inappropriate polypharmacy practice. Taghy et al. (2020) considers the ambiguity in defining polypharmacy as the primary concern in accurately assessing the

extent of the problem, measuring its consequences and searching for solutions. A nationwide cohort study in Sweden among individuals greater than age 65 has found 44% of the group studied were suffering the effects of polypharmacy. 11.7% of those people were in the extreme polypharmacy category. Data from the United Kingdom shows that 20.8% of individuals with two clinical conditions have been prescribed four to nine medications. 10.1% of them were prescribed more than ten medications. Kurczewska-Michalak et al. (2021) concluded that there is no gold standard for polypharmacy management in older adults.

Potentially Inappropriate Medications

Yasky and Zawawi (2021) conducted a study to describe the characteristics of potentially inappropriate medications also known as (PIM) for the elderly in primary care and hospital settings. There are several risk factors that are associated with PIMS such as increased emergency room visits, death, and physical decline. There are concerns that there are many PIMs being prescribed due to lack of knowledge and failure for providers to promote lifestyle changes for their patients. The study reviewed potentially inappropriate medication classes that are prescribed the most to the geriatric community.

Yasky and Zawawi (2021) utilized convenient sampling techniques from all patients in the study period, and data was retrieved from electronic health record systems. The location of the study was conducted in a large medical center that had various services with multiple specialties. Many of the services included primary care in remote locations. After analyzing the collected data, the researchers found that with the average of 6.5 medications prescribed per elderly patient, there was an average of 3.7 PIMS per

patient. The most prescribed PIM in this study was esomeprazole with 49,100

prescriptions which represented 32.45% of the PIM exposure.

The information presented from this study is relevant to the current research being

conducted. Although the study was conducted in another geographical area, the article

will contribute to providing a large amount of comparable data to the current research. As

mentioned by the researchers' recommendations, the current research should potentially

examine how physicians focus on lifestyle modifications in the elderly community. This

article is parallel to the information that the current research group is trying to attain

(Yasky & Zawawi, 2021).

Deprescribing

There are tools to identify polypharmacy, but the research shows that it is

increasingly difficult to deescalate a medication regimen once it is initiated. Clinical

pharmacists are trained and proficient in identifying potential drug reactions, duplicating

therapies, and proposing a plan to optimize therapy. Another purpose of the study was to

elaborate on the effectiveness of the deprescribing method. Hoel et al. (2021) defines

deprescribing as the purposeful act of stopping or tapering one or more of a patient's

medications. The objective is to target medications from which patients no longer derive

reasonable benefit, prevent consequences of high-risk medication combinations, and

reduce cost and complexity while patients remain on beneficial medications. Their

apparent questions were centered on which method is more effective in various clinical

settings to combat polypharmacy.

Hoel et a. (2021) urge prescribers to find alternatives to prescribing medications that hold higher risks for the aging population. They recommended providers be cautious of cultural factors that influence polypharmacy. In most regions of the country, people desire medications to treat medical conditions instead of using lifestyle changes as a means of a more convenient fix. The authors stated in this study that there is a need for provider surveys for more specific data to allow for larger information for analysis. For future studies it is recommended to distinguish between appropriate and inappropriate polypharmacy.

Summary

Among the current suggested tools recommended for the screening and management of polypharmacy in the elderly are the BEERS criteria and the START/STOPP methods. These, along with deprescribing and de-escalation techniques, are suggested for polypharmacy prevention and management. The lack of an organized definition for polypharmacy poses a unique challenge for primary care providers caring for such populations. The goal of this research study is to assess provider knowledge of the current polypharmacy criteria and their current practices regarding elderly medications.

Chapter III: Methodology

The purpose of this study was to evaluate healthcare provider's knowledge and practices pertaining to polypharmacy. Polypharmacy in the elderly contributes to falls, adverse drug reactions, and delirium. This study was conducted to assess the healthcare

provider's knowledge about polypharmacy and their practices related to polypharmacy. In this section, the population, methods of data collection, and setting will be discussed, and the collection tool (survey) will also be presented.

Design of Study

The researchers utilized a descriptive, quantitative survey design to assess the provider's knowledge and current practices related to polypharmacy. Data from this research project was collected from a convenience sample of nurse practitioners, physicians, and physician assistants who practice in a primary care setting. After collecting these surveys, the researchers were able to analyze the general knowledge and practices that the healthcare providers utilized. The design of this study was appropriate given the time limitations on data collection, participant accessibility, and the possibility of gaining relevant information through a survey method.

Setting for the Research Project

This research project was conducted in multiple primary care clinics across Mississippi. Surveys were distributed to primary care providers via personal delivery, digitally with a QR code, via email, and via social media. The researchers set a goal of 150 surveys to be completed. Qualtrix is the electronic survey platform used to compile collected data for this project.

Population and Sample

The target population of the study is primary care providers servicing patients ages 65 and older in multiple regions of Mississippi. The sample is a convenience sample

of primary care providers in Mississippi. Survey participants must be a NP, MD, DO, or PA practicing in a primary care setting, providing care to patients of the age of 65 years and older.

Methods of Data Collection

The research group obtained approval to conduct the study from the Mississippi University for Women's Institutional Review Board. A survey developed by the study's researchers was submitted to the IRB for approval to administer to participants. Surveys were given manually to primary care providers in multiple regions of Mississippi, caring for the elderly population. A cover letter describing the project and purpose of the surveys was provided with each survey. A script was provided to each of the clinic sites where the surveys maybe administered by office staff. The surveys were also sent via a secure survey platform, Qualtrix, through email and a QR code to known primary care providers in Mississippi and to social media primary care provider groups in Mississippi. The survey includes five demographic questions, five provider knowledge questions related to the BEERS criteria and five questions related to provider utilization of the BEERS criteria in the prevention and management of polypharmacy. A score of three out of five correct questions (60%) on the knowledge questions will be considered knowledgeable of the BEERS criteria. Upon completion, the manual surveys were sealed in an envelope by the participant and placed into a box until data analysis. There was no personal identifying information on the surveys. Surveys will be shredded after data analysis. Digital information will be stored on password-protected computers and will be destroyed at the end of the research project. No incentives were offered for participation.

Methods of Data Analysis

Following data collection, data was analyzed and put into an Excel document by the student researchers. This information was then sent to a statistician for further analysis. The researchers hope to gain a better understanding of the knowledge and practices of primary care providers regarding polypharmacy screening and management in patients over the age of 65.   Findings from the study are recorded in the next chapter.

Subject Protection

Anonymity of data collection was maintained during data collection by a non-traceable Qualtrix technology. Written surveys were destroyed after responses were entered into Qualtrix. No personal patient information was collected on the questionnaire or data collection forms, nor data saved on computer hard drives. Upon compiling data for analysis, data was stored on a single jump drive that was locked in a researcher's filing safe. Upon completion of the research study, the jump drive containing all collected data will be destroyed. The Qualtrix account will be deleted, and the data maintained on the site will be removed according to the website policy.

Summary

The research study aimed to assess primary care provider knowledge and practices in the prevention and management of polypharmacy. A researcher developed survey was used to obtain pertinent information from the appropriate sample, and after IRB approval, the survey was distributed to said sample. All written data was destroyed after digital input into Qualtrix. The Qualtrix account and any digital data will be deleted upon completion of the study.

Chapter IV: Presentation of Findings

Provider knowledge and utilization of the BEERS criteria can be a determining factor for patient outcomes. The BEERS criteria are essential in the prevention and management of polypharmacy and its associated health risks. There is evidence that polypharmacy can be detrimental to the wellbeing of the elderly population. The purpose of this study was to determine if primary care providers in the state of Mississippi were knowledgeable of the BEERS criteria and if they used it when prescribing medications. The researchers used a quantitative descriptive design study with a researcher developed questionnaire that included demographic, knowledge and utilization questions. Data was collected from a convenience sample of primary care providers in Mississippi. The demographic portion of the questionnaire contained questions that determined the participants location of practice, role, and years of experience. Knowledge and utilization questions were developed to determine if participants were indeed knowledgeable about the BEERS criteria and if they utilized these criteria in their care for those patients aged 65 and older. There was also an opportunity for the participant to comment on what methods used to prevent polypharmacy when prescribing medications in the utilization portion of the questionnaire. Survey data were collected from 62 participants. Of the 62 participants, 55 (88.7%) reported actively participating in primary care in the state of Mississippi. Subsequent analyses are limited to only those 55 participants (n=55). A score of 3 out of 5 correct questions (60%) on the knowledge questions were considered knowledgeable of the BEERS criteria. Data was first compiled in Microsoft Excel. Subsequent analyses were performed using IBM SPPS statistical software, version 28.

This chapter will discuss the data collected from the surveys, as well as answer the

research questions in statistical terms with summaries in tables and graphs.

Profile of Study Participants

Student researchers collected 62 surveys electronically at primary care clinics in

Mississippi. Of the 62 surveys, 55 of the participants stated they were primary care

providers in the state of Mississippi. Question one was used to validate that the

participants practiced in primary care clinics in the state of Mississippi. There were 5

questions related to demographics. The majority of participants (89.1%) were nurse

practitioners (NP), 5.5% identified as physician assistants (PA), and 1.8% as doctor of

osteopathic medicine (DO) who have been actively practicing in the state of MS for the

last 6-10 years. Over half of participants stated that 50-75% of their patients are 65 years

and older and take five or more medications a day. Participant demographics are shown

in the following table.

Table 1
Participant Demographic Characteristics   Frequency
(n=55)

Q2. What is your provider role?	
MD	0.0%
DO	1.8%
NP	89.1%
PA	5.5%
Other	3.6%
Total	100%

Q3. How many years have you been been actively practicing with your degree?	
0-2 years	18.2%
3-5 years	23.6%

6-10 years	34.5%
10+ years	23.6%
Total	99.9%

Q4. In your daily practice, what percentage of patients would you consider to be 65 years of age or older?

0%-25%	18.2%
25%-50%	20.0%
50%-75%	50.9%
75%-100%	10.9%
Total	100%

Q5. What percentage of your patients 65 years of age and older would you estimate take five or more medications daily?

0%-25%	9.1%
25%-50%	0.0%
50%-75%	58.2%
75%-100%	32.7%
Total	100%

Knowledge of Participants

There were five knowledge-based questions on the questionnaire (Q6-10). The correct answers for each of these questions are marked with an asterisk (*). A score of 3 out 5 correct answers was considered knowledgeable. Of the 55 participants who participated in the survey, 69.1% agreed that 5-7 medications are considered polypharmacy. All survey participants agreed that betablocker and benzodiazepines are dangerous and that 3 or more CNS active medications should be avoided. The majority of participants (98.2%) agreed that the use of anticholinergic medications in patients aged 65 and older may result in an increased risk of cognitive decline. Most participants (98.2%) also agreed that when prescribing medications to patients aged 65 and older, the

BEERS criteria should be used to identify risks versus benefits. The findings for these

questions are summarized in table 2.

Table 2
Participant Knowledge Questions   *Frequency*
(n=55)

	Frequency
Q6. Define the number of medications that a single patient prescribed that you would consider polypharmacy.	
4 or less medications	10.9%
*5-7 medications	69.1%
8-10 medications	16.4%
10 or more medications	3.6%
Total	100%
Q7. Medication combinations such as betablocker + benzodiazepine could be potentially inappropriate for patients aged 65 and older?	
*TRUE	100%
FALSE	0%
Total	100%
Q8. Providers should avoid a total of three or greater CNS active medications for patients aged 65 or older	
*TRUE	100%
FALSE	0%
Total	100%
Q9. The use of anticholinergic medications in patients aged 65 or older may result in increased risk of cognitive decline	
*TRUE	98.2%
FALSE	1.8%
Total	100%
Q10.When prescribing a medication to	

patients aged 65 and older, the
BEERS criteria should be used to
identify if the risks are greater than
the benefits

*TRUE	98.2%
FALSE	1.8%
Total	100%

Provider Utilization

Included in the survey were 5 questions pertaining to the participants utilization of

the BEERS criteria and their recommendations for polypharmacy management. Over half

of participants (69.1%) consult the BEERs criteria when prescribing or assessing

medications for patients who are 65 years old and older. A large majority (96.4%) of

participants, stated they complete a medication reconciliation at every visit. The majority

(65.5%) participants state that the clinic they practice at does not have alerts in their

electronic health record to notify them if a patient is taking on an increased number of

prescriptions. There is also evidence that a majority of providers (96.4%) assess patient's

understanding of potential side effects with potentially inappropriate medications. The

majority (98.2) of providers also recommend alternative therapies for patients that are

taking potentially inappropriate medications.

Table 3
Participant Utilization Practices   *Frequency*
(n=55)

Q11.The BEERS criteria is consulted
    When prescribing or assessing
     Medications to patients 65 years
     Or older in my current practice.	

TRUE	69.1%

FALSE	30.9%
Total	100%

Q12. Myself or staff completes a medication
reconciliation at every visit

TRUE	96.4%
FALSE	3.6%
Total	100%

Q13. Does your facility's electronic medical
record system has an alert to notify
you of an increased number of
prescriptions for a patient?

YES	34.5%
NO	65.5%
Total	100%

Q14. If you prescribe potentially inappropriate
medications do you assess the patient's
understanding of potential side effects
of these medications?

YES	96.4%
NO	0.0%
OTHER	3.6%
Total	100%

Q15. Do you recommend alternative therapies
when you have patients that take
take potentially inappropriate medications?

YES	98.2%
NO	1.8%
Total	100%

Knowledge by Demographics

The following section will present data utilized to answer the two research

questions posed by the investigators.

1. *Are primary care providers knowledgeable of the BEERS criteria for the prevention and management of polypharmacy in elderly patients?*

The knowledge level of participants was calculated by counting the number of correct answers provided on the knowledge-based survey questions (Q6-Q10). The highest possible score was 5 points. The scores ranged from 4 to 5, with a mean score of 4.65 and a standard deviation of 0.480. Of the 55 participants, 19 scored 4 points and 36 scored 5 points. All participants were deemed knowledgeable regarding BEERS criteria by having a score of 3 or greater on the knowledge questions.

Regarding individual question performance, 69.1% of participants answered correctly for question 6, 100.0% answered correctly on questions 7 and 8, 98.2% answered correctly for questions 9 and 10.

Overall knowledge (score on all knowledge-based questions) was further assessed by demographic variables (Q2-Q5). The mean and standard deviation of overall score is shown for each level of demographic variable in Table 4. The ANOVA results are shown with each demographic heading. There was no statistically significant difference between scores based on any of the demographic variables. This is exhibited in table 4 below.

Table 4
Participant Knowledge by Demographics *Frequency*
(n=55)

	Frequency
Q2. What is your provider role? $[F (3, 51) = 0.964, p = 0.417]$	
MD (n/a)	n/a
DO (n/a)	5.00
NP (.481)	4.65

PA	4.33
(.577)	
Other	5.00
(0.00)	

Q3. How many years have you been
actively practicing with your
degree?
$[F (3, 51) = 1.003, p = 0.399]$

0-2 years	4.70
(.483)	
3-5 years	4.77
(.439)	
6-10 years	4.68
(.478)	
10+ years	4.46
(.519)	

Q4. In your daily practice, what percentage
of patients would you consider to be
65 years old or older?

0%-25%	4.60
(.516)	
25%-50%	4.55
(.522)	
50%-75%	4.68
(.476)	
75%-100%	4.86
(.408)	

Q5. What percentage of your patients
65 years and older would you
estimate take five or more medications
daily.

0%-25%	4.20
(.447)	
25%-50%	5.00
(n/a)	
50%-75%	4.69
(.471)	
75%-100%	4.72
(.461)	

2. Are primary care providers utilizing the BEERS criteria for prevention and

management of polypharmacy in elderly patients?

The results regarding provider utilization of BEERS criteria are mixed, as shown

in Table 3. The majority of survey respondents (69.1%) reported consulting BEERS

criteria when prescribing or assessing patients aged 65 years or older (Q11). Most

respondents (96.4%) reported completing a medication reconciliation at every visit

(Q12). Not many EMR systems of respondents had alerts in place to notify practitioners

of increased number of prescriptions (34.5%) (Q13). Respondents did report assessing

patient understanding of side effects (96.4%) and recommending alternative therapies

(98.2%). This is presented below in table 5.

Table 5

Participant Utilization Practices	*Frequency*
(n=55)	
Q11.The BEERS criteria is consulted When prescribing or assessing Medications to patients 65 years Or older in my current practice.	
TRUE	69.1%
FALSE	30.9%
Total	100%
Q12. Myself or staff completes a medication reconciliation at every visit	
TRUE	96.4%
FALSE	3.6%
Total	100%
Q13. Does your facility's electronic medical Record system have an alert to notify You of an increased number of Prescriptions for a patient?	
YES	34.5%

NO	65.5%
Total	100%

Q14.If you prescribe potentially inappropriate
medications do you assess the patient's
understanding of potential side effects
of these medications?

YES	96.4%
NO	0.0%
OTHER	3.6%
Total	100%

Q15.Do you recommend alternative therapies
when you have patients that take
take potentially inappropriate medications?

YES	98.2%
NO	1.8%
Total	100%

Summary of Data Analysis

In total, 55 participants were included in the analysis. Current researchers

determined that of the primary care providers in Mississippi surveyed, most were

considered knowledgeable about the BEERS criteria and it was being utilized in some

aspect in their practices. It was also determined that most facilities do not have a system

within the electronic health record that prompts providers when patients are prescribed

more than 5 medications. All participants were deemed knowledgeable about BEERS

criteria by having a score of 3 or greater on the knowledge questions. Regarding

individual knowledge question performance, 69.1% of participants answered correctly for

question 6, 100.0% answered correctly on questions 7 and 8, 98.2% answered correctly

for questions 9 and 10.

The majority of survey participants (n=55), 69.1% reported consulting BEERS criteria when prescribing or assessing patients 65 years or older (Q11). Most respondents reported completing a medication reconciliation at every visit (Q12). Participants were offered a text box to provide any other methods that they use to prevent polypharmacy when prescribing medications to patients 65 years of age and older however, there were no recorded comments.

Chapter V: Conclusion, Implications, and Recommendations

Summary of the Investigation

Polypharmacy is a common practice that is applicable to many patients who receive primary care; however, polypharmacy still lacks a standard definition. For the purpose of the current research, the use of 5-7 medications was used for the definition of polypharmacy. When polypharmacy is practiced in the primary care setting, providers should know how to safely and effectively treat their patients. Precautions should be considered for the elderly population. The elderly population is a vulnerable group that has increased comorbidities that often require complex medication regimens.

Limited research has been conducted with a focus on polypharmacy. The literature to review is even more limited when researching studies completed in America. The reviews of literature revealed that there was an incongruency among providers of polypharmacy, with no definite guidelines or definition for a standard of care. Previous studies included recommendations and certain practices that were common in regard to polypharmacy across diverse geographical locations. The BEERS criteria are used to safely and effectively manage and prescribe medications to the elderly population. The quantity of studies was very limited for the current research being conducted.

The current research study was conducted utilizing Nola Pender's Health Promotion Model due to the empirical precision and generalizability that it has to offer. This model promotes individuals' health which was the overall goal in regard to the current research. The Health Promotion Model assisted in identifying determinants of primary care providers' practice and barriers in their practice of polypharmacy prevention and management.

The goal of this research study was to analyze primary care providers' knowledge and utilization of the BEERS criteria in the elderly aged 65 and older. The current researchers surveyed 62 survey participants. There were 55 participants that were included in the analyzed data that were actively practicing in Mississippi. The other seven survey participants who completed the survey did not qualify due to not practicing in Mississippi. The research study tool consisted of a survey that contained questions related to provider demographics, knowledge, and practice of polypharmacy. The current researchers found that all participants were considered knowledgeable regarding the BEERS criteria. The data also suggests that these providers are utilizing the BEERS criteria in some form in their practice. There is data showing that some providers reported utilizing the BEERS criteria in their practice, but their answers to the practice questions were contradictory. These participants did not assess patient understandings of potential side effects. One of the participants does not recommend alternative therapies when their patients are taking potentially inappropriate medications. The majority of the survey participants were nurse practitioners, but there was minimal deviation in answers compared to MD, DO, and PA.

This chapter presents the discussion of the findings, limitations, conclusions, and future implications regarding primary care providers and their knowledge and practices of the BEERS criteria when caring for their elderly patients. Following this is the summary of the research study.

Discussion of the Findings

The demographics of the 55 participants in the study revealed that the majority of the participants were nurse practitioners (89.1%). The 55 participants that were reviewed were all actively practicing primary care providers in the state of Mississippi. The majority of the participants that participated in the questionnaire had been practicing 6-10 years (34.5%). There was minimal deviation between years of practice for providers.

In regard to patient demographics, 50.9% of providers claim that 50%-75% of their patient panel is 65 years of age and older. This data shows that over half of providers are actively practicing policy for their current patients. In comparison to Kurczewska-Michalak et al. (2021) study in Sweden, providers in Mississippi are practicing polypharmacy with approximately 30% more patients than the study based in Sweden.

Survey questions 6-10 tested provider knowledge regarding the BEERS criteria and polypharmacy. Each question had a "correct" answer in regard to the BEERS criteria or other research supporting the correct answer. Question 6 in the survey asked participants to define the number of medications that they would consider polypharmacy. The majority (69.1%) of participants answered that five to seven medications is considered polypharmacy. The 69.1% of participants that answered five to seven medications answered the survey question correctly. Previous research found that this

could vary among agencies. Halli-Tierney et al., stated the Center of Medicare and

Medicaid Services define polypharmacy as taking three to five or more medications.

Kurczewska-Michalak et al. (2021) considered patients taking four to nine medications as

polypharmacy. Taghy et al. (2020) stated the vagueness of polypharmacy can often create

confusion and make it difficult to assess problems. These definitions support evidence

that polypharmacy can lead to mis prescribing or complications among the elderly

population.

All participants answered survey questions 7 and 8 correctly (100% scores)

regarding potentially inappropriate medications and avoiding three or greater CNS active

medications for elderly patients. In comparison to Yasky and Zawawi (2021), the

previous research claimed that there is an average of 3.7 potentially inappropriate

medications prescribed per patient. Current research participants (100%) reported

prescribing less potentially inappropriate medications than Yasky and Zawawi (2021)

study reported. The majority (98.2%) of participants answered survey question 9

correctly by agreeing the use of anticholinergic medications can cause an increased risk

of cognitive decline in the elderly. Previous research was referenced for the correct

answer to question 9 in regard to cognitive decline with the use of anticholinergic

medications in the elderly. A large portion (98.2%) of participants also answered survey

question 10 correctly. The participants agree that the BEERS criteria should be used to

identify if elderly patient risks are worth the benefits. This is contradictory with the

participants answers in the utilization portion of the survey. 98% percent of the

participants report that the BEERS criteria should be consulted, but only 69% of the

participants actually consult with the BEERS criteria when prescribing or assessing any medications to elderly patients.

Questions 11-15 pertained to the survey participants' practices and utilization of the beers criteria. With survey question 11, the majority (69.1%) of participants reported that the BEERS criteria are consulted when prescribing medications to elderly patients. This contradicts the participants' previous answer on the survey regarding the understanding that the BEERS criteria should be used in prescribing for the elderly. One conclusion is that the provider is reporting using the BEERS criteria but not adhering to the practice. The majority of participants (96.4%) report that staff or the provider complete a medication reconciliation at each patient visit. Further research is needed to determine who and how data is conducted for BEERS criteria and how it is being utilized. This may provide answers to the question, "Are the providers utilizing the BEERS criteria each time they complete a medication reconciliation?" This discrepancy requires further data collection to determine cause.

Regarding question 13, the majority (65.5%) of providers reported their facility does not use an electronic medical record to alert or notify an increased number of prescriptions for a patient. Medication reconciliation and provider awareness are the only means of polypharmacy evaluation for most providers in this study. Lack of a system to identify changes and additions to medication can result in medication duplication and increased risk of adverse effects. Survey question 14 asking if participants prescribe potentially inappropriate medication, do they assess patients understanding of potential side effects revealed that that the majority of participants (96.4%) reported to assess patient understanding of side effects, when these medications are prescribed. Without

reminders in place from the electronic medical record, providers are completely dependent on medication reconciliations initiated by staff or provider to assess potential side effects for potentially inappropriate medications.

The majority of participants (98.2%) reported to recommend alternative therapies when having a patient taking potentially inappropriate medications. Hoel et a. (2021) urged prescribers to find alternatives to prescribing high risk medications for aging populations. Hoel et a. (2021) also recommended that providers be cautious of cultural factors that potentially influence polypharmacy. Providers need to understand that most regions of the country want medications for treatment when lifestyle modifications would suffice. Deprescribing is described as the most purposeful act to stop or taper medications. One of the main goals of deprescribing is to prevent consequences of high-risk medication combinations. This should be of utmost priority for providers when managing the elderly patient. Preventing complications to fragile and vulnerable elderly populations is the goal of utilizing the BEERS criteria. The survey offers the opportunity to for the participant to comment on methods that they use to prevent and treat polypharmacy, but no comments were received.

Many of the current research's findings were parallel with the literature reviewed in previous chapters. The most important understanding following the research is the lack of a standard definition of polypharmacy. Many providers claim to practice effective polypharmacy management. They also reported to be using methods such as the BEERS criteria to manage polypharmacy in the elderly. However, the current researchers identified contradictions among provider answers regarding the definition of

polypharmacy. Because of this finding, there can be contradiction in the practices of the providers.

Limitations

The limitations acknowledged in the design of the current research included the reliability of participants' self-reported answers to the questionnaire, limiting participants to the state of Mississippi, and the time frame of one year. The study is formatted for a one-year time frame. If more time were available for the study, data collection could continue with a broader audience. Only primary care providers in the state of Mississippi were included in the study. This excluded providers in the surrounding states. There are many patients and providers that travel across state lines to receive and provide care. Therefore, six surveys were excluded from the results. The survey was also limited to primary care providers. If the study was broadened to include specialty providers as well as gerontologists, the results could be different. The study also relied on the willingness of the participants and the reliability of participants' self-reported answers to the questionnaire.

It has been well-established that there is currently no standard definition of polypharmacy, which accounts for the lack of standardized approaches to preventing the practice in the first place. This is also considered a limitation in the current study. The participants had an opportunity to answer a question pertaining to the number of medications that defines polypharmacy. The majority of participants agreed that five to seven medications fall into the polypharmacy category. However, a large portion of participants chose other answers (69.1%). This could reflect the lack of a standard definition and variable preventative and management strategies for polypharmacy.

Conclusions

The goal of this research study was to determine if primary care providers in the state of Mississippi were knowledgeable about the BEERS criteria and if they utilized these criteria in their practice. According to the results, most participants were knowledgeable about the BEERS criteria. The majority of the participants utilized the BEERS criteria or some sort of tool to prevent polypharmacy. However, contradictions among participant answers occurred. This could be due to lack of standard definition and research in polypharmacy complications.

According to the results, most facilities do not have a flag within their electronic health record to alert providers when more than five medications were prescribed. Thus, requiring providers to rely on medication review only.

Past research suggested that providers are not well educated on how to prevent polypharmacy due to the lack of definition and research. There are multiple methods outlined in the past research. Deprescribing, medication reconciliation, and STOPP/START criteria were mentioned in various research studies. The current study's questionnaire gave the participants an opportunity to share any other methods they use prevent polypharmacy.

Implications

The goal of this study was to assess the knowledge of polypharmacy and the utilization of the BEERS criteria in primary care clinics in Mississippi. This study will enlighten researchers on the challenges of polypharmacy. The study was guided by Nola Pender's Health Promotion Model. This model focuses on identifying factors that could influence or hinder health. This applies to the providers that work to identify

polypharmacy and use the BEERS criteria to prescribe and manage medication regimens. As researchers and nurse practitioners, it is our duty to implement ways to reduce polypharmacy in our communities. Based on the outcomes of this study, the following implications were made:

Recommendations for Future Research

1. Replication of the current research study with a larger number of participants over a longer period in varying and diverse locations, could help to further investigate the use of the BEERS criteria and the use of it in different geographical areas.

2. Future research including the STOPP/START criteria and deprescribing technique that is also used by providers to prevent polypharmacy, could potentially identify the need for a standardized definition. This study used a questionnaire that is focused on the BEERS criteria.

3. Future researchers should focus the quality and effectiveness of electronic medical records that implement polypharmacy notifications, which could prompt providers to review medications for possible polypharmacy issues.

Advanced Nursing Practice

1. Educating providers on how to identify polypharmacy. The lack of a clear definition on how many medications could cause polypharmacy, and proven negative effects when certain medications are combined, could potentially decrease the incidence of polypharmacy and its associated complications.

2. Educating providers on the importance of preventing polypharmacy and utilizing criteria such as the BEERS criteria, could improve the providers knowledge and utilization of criteria designed to reduce these risks.

3. Implementation of a standard tool within electronic health records to alert staff when there are multiple medications prescribed, could reduce polypharmacy practices and complications for the elderly populations by prompting providers to perform a medication review and discuss with the patient regarding risk versus benefit with high-risk medications.

Summary

The current researchers found that most of the primary care providers in the state of Mississippi are knowledgeable about polypharmacy and utilized the BEERS criteria. However, the study is limited to the state of Mississippi and primary care providers. Researchers concluded that most Mississippi primary care providers were competent at identifying, preventing and treating polypharmacy. However, there were gaps in knowledge and variability in utilization, possibly due to a lack of a standard definition and availability of resources to confirm medication reconciliation. Further research is needed to refine the definition of polypharmacy and create standardized guidelines that address management and prevention strategies. It is our hope that the findings of this study will be used to further educate peers and patients on the detrimental effects of polypharmacy and contribute to its prevention and management.

References

Elderly. 2023. Merriam-Webster.com. Retrieved January 10, 2023, from

https://www.merriam-webster.com/dictionary/elderly

Hanlon, P., Nicholl, B. I., Jani, B. D., McQueenie, R., Lee, D., Gallacher, K. I., &; Mair,

F. S. (2018). Examining patterns of multimorbidity, polypharmacy and risk of

adverse drug reactions in chronic obstructive pulmonary disease: a cross-sectional

UK Biobank study open, 8(1), e018404. https://doi.org/10.1136/bmjopen-2017-

018404

Hoel, R., PharmD, RPh., Connolly, R., M.D., Takahashi, P., M.D. (2021). Thematic

Review on Aging: Polypharmacy Management in Older

Patients.doi:10.1016/j.mayocp.2020.06.012

Jonas W. Wastesson, Lucas Mornin, Edwin C.K. Tan &; Kristina Johnell (2018) An

update on the clinical consequences of polypharmacy in older adults: a narrative

review, Expert Opinion on Drug Safety, 17:12, 1185-1196, DOI:

10.1080/14740338.2018.1546841

Khezrian, M., McNeil, C. J., Murray, A. D., & Myint, P. K. (2020). An overview of

prevalence, determinants and health outcomes of polypharmacy. Therapeutic

advances in drug safety, 11, 2042098620933741.

https://doi.org/10.1177/2042098620933741

Knickman, J. R., &; Snell, E. K. (2002). The 2030 problem: caring for aging baby

Kurczewska-Michalak, M., Lewek, P., Jankowska-Polanska, B., Giardini, A., Granata,

    N., Maffoni, M., Costa, E., Midao, L., & Kardas, P. (2021). Polypharmacy

    Management in the Older Adults: A Scoping Review of Available Interventions.

    Frontiers in Pharmacology, 12 (734045), 1-12. DOI: 10.3389/fphar.2021.734045

Okpechi, I.G., Tinwala, M.M., Muneer, S. et al. Prevalence of polypharmacy and

    associated adverse health outcomes in adult patients with chronic kidney disease:

    protocol for a systematic review and meta-analysis. Syst Rev 10, 198 (2021).

    https://doi.org/10.1186/s13643-021-01752-z

Pazan F., Wehling M., 14 November 2020. Polypharmacy in Older Adults: a narrative

    review of definitions, epidemiology and consequences. European Geriatric

    Medicine. doi:10.1007/s41999-021-00479-3

Petiprin, A. (n.d.). Pender's Health Promotion Model. Nursing-Theory.org. Retrieved

    January 10, 2023, from https://nursing-theory.org/theories-and-models/pender-

    health-promotion-model.php

Polypharmacy. 2023. Merriam-Webster.com. Retrieved January 10, 2023, from

    https://www.merriam- webster.com/dictionary/polypharmacy

Taghy, N., Cambon, L., Cohen, J., Dussart, C., (2020). Failure to Reach a Consensus

    in Polypharmacy: An Obstacle to Measuring Risks and Impacts—Results of a

    Literature Review. Dove Press Journal: Therapeutics and Clinical Risk

    Management doi: 10.2147/TCRM.S214187

Word Health Organization (2023). *Polypharmacy.* Retrieved January 10th, 2023,

    from https://www.who.int/

Yasky, A., &; Zawawi, A. (2021). Characterization of potentially inappropriate

    medication prescriptions for the elderly in primary care and hospital settings.

    Journal of Family Medicine &; Primary Care, 10(8), 3111–3115. https://doi-

    org.libprxy.muw.edu/10.4103/jfmpc.jfmpc_271_21

Appendix A

IRB Letter of Exemption

To: Austin Black, Jessica Pippin, Presley Weaver, and Dr. Alena Groves

From: Irene Pintado, IRB Chair *I.P*

Date: 02/2y/2023

Project: Primary Care Provider Knowledge and Utilization of the Beers Criteria for the Prevention and Management of Polypharmacy in the elderly

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The Mississippi University for Women IRB committee has determined that your project, Primary Care Provider Knowledge and Utilization of the Beers Criteria for the Prevention and Management of Polypharmacy in the elderly, is exempt under 45 CFR 46.101 (b)(4). This project does not involve minors and does not collect information on protected health information. The survey research is voluntary, anonymous, and asks questions from professional about professional practices.

If any changes are made to the study, the Committee must be notified. If the project is still running twelve months after the date of this memo, please be advised that we will need an update for our files.

Good luck with your work!

Appendix B

Letter to Survey Participants

Dear Potential Participants,

We are graduate students from Mississippi University for Women in the Master of Science Nursing Program. We are asking for your assistance with our research project regarding Polypharmacy practices by primary care providers in Mississippi. This includes NP's, PA's, MD's, and DO's. It would be of utmost importance if you could provide us with a moment of your time to complete the attached survey. All responses will remain anonymous. It will take approximately 10 minutes or less to complete the survey. There is no correct or incorrect answer. If you do not respond to each question, then your survey will be discarded. If at any time you wish to stop the survey your responses will be discarded. Please contact our principal investigator Presley Weaver (6628320961) or Dr Alena Groves (6622992985) with any questions or concerns. Thank you for your time and participation.

Sincerely,

Presley Weaver, Principal Investigator, Graduate Student

Jessica Pippin, Investigator, Graduate Student

Austin Black, Investigator, Graduate Student

Appendix C

Polypharmacy Survey Script

☐ You must be a NP, MD, DO, or PA practicing in a primary care setting to complete the survey.

☐ This study is being performed by graduate nursing students at Mississippi University for Women.

☐ This survey consists of 15 questions.

☐ The first 5 are demographic questions and the remaining questions are knowledge and personal practice-based questions. All responses will be randomly compiled and not linked to any personal identifying factors

☐ Please answer all the questions as any unanswered questions will deem the survey invalid.

Appendix D

Polypharmacy Survey

This survey is completely voluntary. At any point you can stop this survey and your survey will be discarded immediately. By completing this survey, you are agreeing to allow your answers to be submitted for data collection. Your identity will remain anonymous so please do not write your name or any identifying items on the survey. Please circle one answer or fill in the blank for each question that is most appropriate to your daily practice.

Demographics

1. Are you actively practicing in a Primary Care Setting in the State of Mississippi?
YES   NO

2.   What is your provider role?
MD   DO   NP   PA   Other:_____

3.   How many years have you been actively practicing with your degree?
0-2 years   3-5 years   6-10 years   10+years

4.   In your daily practice, what percentage of patients would you consider to be 65 years old or older?
0%-25%   25%-50%   50%-75%   75%-100%

5.   What percentage of your patients 65 years and older would you estimate take five or more medications daily?
0%-25%   25%-50%   50%-75%   75%-100%

KNOWLEDGE

6. Define the number of medications that a single patient is prescribed that you would consider polypharmacy.
4 or less medications 5-7 medications   8-10 medications   10 or more medications

7. Medication combinations such as betablocker + benzodiazepine could be potentially inappropriate for patients aged 65 and older?
TRUE FALSE

8. Providers should avoid a total of 3 or greater CNS active medications in patients aged 65 or older?
TRUE   FALSE

9. The use of anticholinergic medications in patients aged 65 or older may result in increased risk of cognitive decline.
TRUE   FALSE

10. When prescribing a medication to patients aged 65 and older, the BEERS criteria should be used to identify if the risk are greater than the benefits.
TRUE   FALSE

UTILIZATION

11. The BEERS Criteria is consulted when prescribing or assessing medications to patients 65 years or older in my current practice.
TRUE   FALSE

12. I or my staff completes a medication reconciliation at every visit?
TRUE FALSE

13. Does your facility's electronic medical record system have an alert to notify you of an increased number of prescriptions for a patient?
YES   NO

14. If you prescribe potentially inappropriate medications do you include the patient in decision making?
YES   NO

15. Do you recommend alternative therapies when you have a patient that takes potentially inappropriate medications?
YES   NO