

2020

In Beers We Trust: Using Deprescribing Tools to Reduce Inappropriate Polypharmacy in Adults Age \geq 65

Angelica Ferrazzi

Follow this and additional works at: https://scholarworks.umass.edu/nursing_dnp_capstone



Part of the [Family Practice Nursing Commons](#), [Geriatric Nursing Commons](#), [Geriatrics Commons](#), [Interprofessional Education Commons](#), and the [Medical Pharmacology Commons](#)

Ferrazzi, Angelica, "In Beers We Trust: Using Deprescribing Tools to Reduce Inappropriate Polypharmacy in Adults Age \geq 65" (2020). *Doctor of Nursing Practice (DNP) Projects*. 215.
Retrieved from https://scholarworks.umass.edu/nursing_dnp_capstone/215

This Open Access is brought to you for free and open access by the College of Nursing at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Doctor of Nursing Practice (DNP) Projects by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

In Beers We Trust: Using Deprescribing Tools to
Reduce Inappropriate Polypharmacy in Adults Age ≥ 65

Angelica Ferrazzi

University of Massachusetts, Amherst

College of Nursing

DNP Project Chair: Dr. Raeann G. LeBlanc, PhD, DNP, AGPCNP-BC, CHPN

DNP Project Mentor: Kim Groner, MSN, RN, ANP-BC, CCRC, NE-BC

Date of Submission: May 2nd, 2020

Table of Contents

| | |
|---|----|
| Abstract | 4 |
| Background | 5 |
| Problem Statement | 8 |
| Organizational “Gap” Analysis of Project Site..... | 8 |
| Review of the Literature | 9 |
| Search Process | 9 |
| Critical Appraisal of Research | 10 |
| Adverse drug event reduction | 10 |
| Medication reconciliation | 11 |
| Provider education and pharmacist collaboration..... | 13 |
| Deprescribing | 14 |
| Summary | 16 |
| Theoretical Framework..... | 17 |
| Project Description..... | 18 |
| Goals, Objectives & Expected Outcomes..... | 18 |
| Objectives | 18 |
| Expected Outcomes | 18 |
| Project Design | 19 |
| Setting and Participants..... | 20 |
| Barriers..... | 20 |
| Cost-Benefit Analysis | 21 |
| Ethical Considerations/Protection of Human Subjects | 21 |
| Methods..... | 22 |
| Project Implementation..... | 22 |
| Educational Intervention..... | 23 |
| Measurement Instruments..... | 26 |
| Data Collection Procedure | 27 |
| Data Analysis | 28 |
| Exceptions..... | 29 |
| Results..... | 30 |

Sample..... 30

Survey Results 31

 Knowledge 31

 Prescribing practices 34

 Self-efficacy 34

Medication Data Reports 37

Discussion..... 38

 Evaluation of Results 38

 Knowledge 38

 Prescribing Practices 40

 Self-efficacy 41

 Medication Trends 43

 Challenges..... 44

 Strengths and Limitations 46

 Provider Feedback 47

 Clinical Implications..... 48

 Future Recommendations 49

 DNP Essentials..... 50

Conclusion 50

References..... 52

Appendices

 Appendix A: Theoretical Framework 58

 Appendix B: Budget Table 59

 Appendix C: Simplified Project Timeline 60

 Appendix D: Drug-Specific Algorithms..... 61

 Appendix E: Pre-Intervention Survey..... 67

 Appendix F: Post-Intervention Survey 71

Abstract

Background: Adverse drug events (ADEs) are a significant cause of morbidity and mortality in older adults (age ≥ 65). Polypharmacy and potentially inappropriate medications (PIMs) are especially prevalent in this population and are a notable contributing risk factor for ADEs. Research demonstrates that comprehensive medication reconciliation that includes evaluation of both the risks and benefits of medications, in conjunction with deprescribing practices, can reduce PIMs; therefore, reducing ADEs.

Purpose: The aim of this quality improvement project was to empower clinicians to deprescribe current medications that are inappropriate, as well as reduce the rate of newly prescribed PIMs among patients age ≥ 65 in the primary care setting by establishing a multi-modal educational intervention.

Methods: A detailed educational program that incorporated evidence-based resources composed of the American Geriatrics Society (AGS) 2019 Beers Criteria[®], PIMs, and deprescribing was introduced to 88 clinicians in a large academic, urban-based general internal medicine primary care clinic. Data was collected through pre-post intervention surveys to assess provider knowledge, prescribing practices, and self-efficacy in deprescribing. A retrospective medication chart review then assessed actual trends of prescribed PIMs in the clinic.

Results: The 34 clinicians who completed each survey demonstrated an increased knowledge of AGS Beers Criteria[®] medications and reported a greater frequency in medication reconciliation performance. Notably, a paired t-test was performed to measure 13 providers' reported self-efficacy deprescribing; and each participant's response improved post-intervention.

Conclusion: Proper medication safety standards in older adults is a complex issue that requires significant education in order for clinicians to adopt informed prescribing practices, thus ongoing provider education and evaluation are recommended. This multi-modal educational intervention is feasible for implementation in various healthcare settings to expand provider knowledge.

Keywords: deprescribing, polypharmacy, older adult, potentially inappropriate medications, Beers Criteria[®], provider education, nurse-led intervention

In Beers We Trust: Using Deprescribing Tools to
Reduce Inappropriate Polypharmacy in Adults Age ≥ 65

The population of older persons in the United States is rapidly growing as the baby boomers age towards retirement. Older adults, recognized as those age ≥ 65 , sustain a number of physiological age-related changes that require specialized knowledge and care, unique from their younger cohorts. Therefore, prescribers must be educated on age-related considerations that alter pharmacokinetics and pharmacodynamics of medications in order to prevent adverse drug events and manage a safe medication regimen in older persons. Using this knowledge, comprehensive medication reconciliation that utilizes deprescribing practices at primary care visits can reduce inappropriate polypharmacy in older adults, thus improving their quality of care, health safety, and outcomes.

Background

According to the United States Census Bureau (2018), all baby boomers will be older than age 65 by the year 2030 and represent over 20% of the population. The U.S. Department of Human and Health Services has recognized the need for specialized care of older adults and has dedicated an objective of *Healthy People 2020* to “improve the health, function, and quality of life of older adults.” Medication safety is an important aspect of quality care in the health management of older adults. Multi-morbidity of chronic illness has led to an increase in use of prescription drugs; and during the past 30 years, the percentage of older adults who report taking five or more prescription drugs has risen by 28.4% (Dills, Shah, Messinger-Rapport, Bradford, & Syed, 2018). Additionally, medication safety has been recognized as a 2019 National Patient Safety Goal by the Joint Commission with an emphasis on frequent and accurate medication reconciliation.

It is well known that physiologic reserves decrease as we age; and this leads to a greater susceptibility to disease. Higher incidence of disease demands an increased need for pharmacological management. Consequently, older adults are often prescribed multiple medications, which poses a great risk for both drug-drug interactions and adverse drug reactions. Notably, the older adult experiences a decline in both renal and hepatic function, as well as an increase in proportion of body fat relative to skeletal muscle (Rochon, 2019). This leads to longer half-lives of medications and subsequently increased plasma drug concentrations due to decreased drug clearance and larger drug storage reservoirs. Many medications are affected by these alterations in the older adult physiology and therefore are referred to as *potentially inappropriate medications* (PIMs) (Fick et al., 2019).

Guidelines have been created to identify potentially inappropriate medications in older adults, most notably the Beers Criteria[®] published by the American Geriatric Society (AGS). These criteria were originally created in 1991 by Mark H. Beers, MD and his colleagues to decrease the use of harmful medications in nursing home residents (Terrery & Nicoteri, 2016). Mark Beers defined PIMs in the criteria as “medications that pose greater risks than they provide in therapeutic value or those medications for which a safer alternative is available” (Ammerman, Simpkins, Warman, & Downs, 2019, p. 115). Since the creation of the Beers Criteria[®], these guidelines have grown exponentially as a resource for clinicians, educators, researchers, healthcare administrators, and regulators (AGS, 2019). To remain updated on the latest research, an interdisciplinary expert panel updates the criteria on a three-year cycle. The goal of the Beers Criteria[®] is to “improve the care of older adults by reducing their exposure to PIMs that have an unfavorable balance of benefits and harms compared with alternative treatment options” (AGS, 2019, p. 2). There are five categories within the publication: medications that are potentially

inappropriate in most older adults, those that should typically be avoided in older adults with certain conditions, drugs to use with caution, drug-drug interactions, and drug dose adjustment based on kidney function (AGS, 2019). The Beers Criteria[®] is an invaluable resource for prescribing clinicians to ensure the utmost safety of their older adult patients, especially those who take numerous medications.

The use of multiple medications by one individual is generally referred to as *polypharmacy*, and it is often described as the use of five or more medications (Chou, Tong, & Brandt, 2019); however, the exact “number of medications” that polypharmacy refers to varies. Because there is no standardized consensus on a definition, it is necessary for each individual study involving polypharmacy to specifically define the term in relation to their research. However, Molokhia and Majeed (2017) have taken the definition a step further and state that it is a “crude measure” (p. 2) to base the definition of polypharmacy simply on number of medications, for it does not take into account the possible benefits that the patient is receiving from multiple medications. Therefore, polypharmacy can be further defined as either *appropriate* or *problematic* (Molokhia & Majeed, 2017). Appropriate polypharmacy is when medications for multiple conditions are being optimized or prescribed on best available evidence, while problematic (inappropriate) polypharmacy is when the patient is prescribed multiple medications but does not receive the intended benefit (Molokhia & Majeed, 2017).

Inappropriate polypharmacy and PIMs increase the risk for adverse drug events (ADEs). An adverse drug event is defined as a “harm experienced by a patient as a result of exposure to a medication” (Agency for Healthcare Research and Quality [AHRQ], 2019). Adverse drug events are a major public health issue for older adults (Gray et al., 2018) and increase the likelihood of unplanned hospitalization in older adults (Zullo, Gray, Holmes, & Marcum, 2018). According to

the AHRQ (2019), ADEs account for nearly 700,000 emergency department visits and 100,000 hospitalizations each year. In older adults, PIMs are also associated with confusion, falls, and mortality; and inappropriate medication use increases risk of morbidity, mortality, and health care costs (Zullo et al., 2018). Improving the appropriate use of polypharmacy and minimizing potentially inappropriate medications will optimize medication management in the older adult, thus supporting positive patient outcomes, health safety, and improved quality of life.

Problem Statement

Adverse drug events (ADEs) are a major health concern in adults age ≥ 65 . This population experiences age-related physiological changes that increase their risk to sustain ADEs. This risk is exacerbated by the prescription of potentially inappropriate medications (PIMs) and inappropriate polypharmacy. Many healthcare providers have limited knowledge of deprescribing tools that can reduce the prescription of PIMs. Therefore, providers must be more knowledgeable and prudent in their prescribing practices, perform regular medication reconciliation, and utilize deprescribing to prevent adverse drug events in the older adult population.

Organizational “Gap” Analysis of Project Site

Before the onset of this quality improvement project, there was no standard for medication reconciliation and deprescribing in the primary care setting of the internal medicine clinic where this project was being implemented. Providers (nurse practitioners and physicians) perform a simplified medication reconciliation at the beginning of each visit to assess adherence. Providers do not, however, have a method for completing a comprehensive safety assessment for patient medication regimens that consistently evaluates risk and benefit at each visit. Additionally, there is no required formal education on medication safety in the older adult. There

are no geriatricians in this clinic, and all older adults are treated by primary care providers with general medical training. While care of older adults should be a critical part of medical education of both physicians and nurse practitioners, the degree of experience between various providers is unknown. Therefore, this project sought to address this gap and provide education on inappropriate polypharmacy to promote safe prescribing practices in the clinic, as it is a global health problem.

Review of the Literature

Despite overwhelming evidence of the harmful effects of PIMs in the older adult, many clinicians are still prescribing them without first considering safer alternatives. The purpose of this critical appraisal of research was to evaluate these current prescribing practices and cite evidence-based interventions to reduce polypharmacy and preventable ADEs in the older adult.

Search Process

An extensive search of the literature was conducted using CINAHL, PubMed, Google Scholar, and the Cochrane Library. Inclusion criteria were articles published between 2014-2019, primary care setting, older adults (age ≥ 65), English language, peer reviewed, and any author is a nurse. Articles were not limited to just within the United States, and in fact much of the strong literature came from outside the country. Exclusion criteria were articles not written in English, acute care setting, and journals that are not peer reviewed. Search terms included: *medication safety, older adult, adverse drug event, polypharmacy, potentially inappropriate medication, Beers Criteria[®], medication reconciliation, deprescribing, primary care, intervention, meta-analysis, literature review, and randomized controlled trial*. Search criteria were expanded to include authors of all disciplines which resulted in beneficial information from both physicians and pharmacists. Additional resources were found using references of relevant articles.

The literature was analyzed using the Johns Hopkins Nursing Evidence-Based Practice appraisal tool for level of evidence and quality (Newhouse et al., 2005). Each article was assigned an evidence level between I and V and an evidence quality grade of A (high quality), B (good quality), or C (low quality). This critical appraisal of research focuses on levels I and II; however, the intervention of this project is centered around evidence-based guidelines for deprescribing that were rigorously developed by experts from the Bruyère Research Institute in Ottawa, Canada (Level IV). The objective of this review was to explore interventions used to reduce potentially inappropriate medications in older adults with an emphasis on deprescribing tools and/or provider education.

Critical Appraisal of Research

Adverse drug event reduction. One of the highest quality pieces of evidence we have exploring interventions to reduce ADEs is the latest update from the Cochrane Database of Systematic Reviews (Level IA) (Rankin et al., 2018). The review is expansive and includes uni-faceted and multi-faceted interventions targeting polypharmacy in all settings (not only in primary care). These interventions include *educational programs for providers*, *pharmacist-led medication review*, and *computer decision support*. Primary outcomes measured in this systematic review were medication appropriateness, potentially inappropriate medications, potential prescribing omissions, and hospital admissions. Secondary outcomes included medication-related problems, adherence to medication, and quality of life. Each of these measures is specifically defined in the review.

Unfortunately, among 32 studies examined in this systematic review, no consistent intervention had a significant effect on medication-related problems, and the authors refer to the combined evidence as “rather weak” (Rankin et al., 2018, p.29). While this was a high quality

search, the results it yielded were not fruitful in supporting an intervention to improve the use of appropriate polypharmacy in older people. It should be noted that this Cochrane Database systematic review includes studies published through February 2018 and further research has been established since its publication which will be noted in this critical appraisal of research.

A recent meta-analysis published by the Journal of the American Geriatric Society *after* the release of the Cochrane review was more conclusive in its findings on interventions to reduce adverse drug reactions in older adults (Level IA). Authors Gray et al. (2018) reviewed 13 randomized controlled trials involving 6,198 older adults. The study categorized interventions as *pharmacist-led*, *health professional-led*, and *technology-based*; and these interventions consisted of *chart review* and *patient interview/ survey/ questionnaire*. This vigorous review determined that intervention groups were less likely than the control group to experience adverse drug events. Gray et al. (2018) ultimately reported interventions aimed at medication optimization would thus reduce the risk for ADEs in older adults. Although this is a rather generalized statement made by the authors, it supports further research aiming to tailor more precise interventions for the aforementioned goals.

Medication reconciliation. Fundamentally speaking, to decrease adverse drug events one must first reduce the drugs that are the culprits of said events. One method to do this is through comprehensive medication reconciliation with risk/ benefit assessment of each individual medication in the patient's regimen. While this is more challenging in older adults with more medications, it is increasingly important because each medication has the ability to not only interact undesirably in the body, but also in combination with concurrently taken medications.

Although many interventions studied in the literature involve chart/ medication review, thorough medication reconciliation is often a challenge in itself for providers. Wolff, Nowacki, Yeh, and Hickner (2014) performed a randomized controlled trial to test two interventions to improve the medication review process (Level IB). Patients were either provided a printed copy of their current medication list at check-in, or their medication review began with an open-ended question, or neither or both of these interventions. The study concluded that while alone neither intervention improved medication list agreement, this may be beneficial in a multistep protocol aimed at improving medication reconciliation in the primary care setting (Wolff et al., 2014). This trial also emphasized the importance of the patient's role in medication reconciliation as a shared-decision making process.

Two well-executed quality improvement projects (Level IIA) supported medication review as an effective method for improving quality of care in the older adult population (Stuckey, Henriksen, Singh, Dawson, & Waterson, 2018; Vejar, Makic, & Kotthoff-Burrell, 2015). Stuckey et al. (2018) performed a prospective quality improvement project over a three-month period in which patients age ≥ 65 with one or more high risk medication were contacted for medication review. This involved an in-person appointment for 40 minutes with a pharmacy team and 20 minutes with an interprofessional team to discuss recommendations/ interventions. The study resulted in a decrease from 42 to 28 high risk medications in the sample representing a 33% reduction. While the project's sample size was not large, its results support medication reconciliation with both patient shared-decision making and pharmacist collaboration. In contrast from other studies, this intervention did not take place at the average primary care visit, but at a separate visit dedicated to medication management. Based on specificity of a targeted visit, this

has great potential to make a significant difference in reduction of PIMs and inappropriate polypharmacy.

Vejar et al. (2015) performed a pre- and post-group analysis with the aim of reducing ADEs caused by inappropriate drug management. Their four specific outcome goals were: improving medication reconciliation documentation; increasing the number of patients that “brown-bag” medication for clinical visits; reducing use of high-risk over the counter (OTC) medications; and reducing duplicate medication therapy. “Brown-bagging” is a practice where patients physically bring all of their medications from home to clinic so that they can be reviewed in person with their provider. This is helpful for some patients to have a visual aid of what medications they are actually taking. The patient may also be taking OTC supplements that are not listed in their medication lists that providers are unaware of; and these may have dangerous interactions with their prescribed medications. While reviewing medications in person, the provider is given a better understanding of the patient’s health literacy and can make an informed decision while measuring risk and benefit of each medication. Providers can even physically take away the medications they have deprescribed so that patients may not be confused with changes to their regimen. In the study by Vejar et al. (2015), interventions including provider education, patient education, patient questionnaires, written literature/ flyers, and pharmacist collaboration collectively improved the medication management of older adults.

Provider education and pharmacist collaboration. Providers must be educated on the dangers of PIMs and inappropriate polypharmacy in older adults so that they can actively work towards prevention and deprescribing. With knowledge of the Beers Criteria[®], providers can utilize prudent decision making when prescribing medications to this population. As a result, research is needed on interventions that target the education of healthcare providers on PIMs in

order to decrease the incidence of their prescription in older adults. Often, clinical pharmacists can be involved in this education process by sharing their expertise with providers. A randomized controlled trial of 503 patients (Level IA) was performed in Spain where an intervention group underwent medication review by a pharmacist-led group who made suggestions to the prescribing provider (Campins et al., 2017). Ultimately the intervention proved successful at reducing potentially inappropriate medications, although in this particular study it did not reduce emergency visits and hospitalizations of polymedicated older adults (Campins et al., 2017).

Numerous intervention studies found in this literature review involved close collaboration with a clinical pharmacist and/or electronic medical resources which strengthened results. Unfortunately, these resources are often not available in the primary care setting and further research is needed to establish positive outcomes managed solely by providers.

Deprescribing. Deprescribing interventions have shown the most improvement in reduction of potentially inappropriate medications as this is the direct practice of discontinuation. The concept of “deprescribing” was first introduced in 2003 in an Australian hospital pharmacy journal (Reeve, Gnjjidic, Long & Hilmer, 2015). A systematic review (Level IA) by Reeve et al. (2015) explored the emerging definitions of “deprescribing” with the aim of establishing a standardized description to be used in future research. These authors proposed the following definition “Deprescribing is the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes” (Reeve et al., 2015, p. 1254).

Effects of deprescribing. The first comprehensive systematic review of deprescribing interventions was published in the British Journal of Clinical Pharmacology by Page, Clifford,

Potter, Schwartz, and Etherton-Beer (2016). This robust meta-analysis (Level IA) studied the feasibility and effects of deprescribing processes on mortality and health of older adults.

Secondary outcomes evaluated were adverse drug withdrawal events; psychological and physical health outcomes; quality of life; and medication usage (successful deprescribing, number of medications prescribed, potentially inappropriate medication use) (Page et al., 2016). Ultimately their review of deprescribing studies concluded that patient-specific interventions to reduce polypharmacy may improve longevity, and they can be achieved without adverse changes in health outcomes and quality of life.

A systematic review of randomized controlled trials (Level IA) analyzed literature involving patients with chronic medical diseases to evaluate the impact of deprescription on reducing medication burden in the primary care setting (Dills et al., 2018). Consistent with other literature, this systematic review found successful deprescription and reduction of polypharmacy through educational interventions, patient-specific interventions, and pharmacist-physician collaboration (Dills et al., 2018). This study included patients age ≥ 18 rather than just older adults, although it is unclear if this would have affected the conclusions of the study. It is important to note, however, that the review suggests some negative implications for deprescription including expensive intensive interventions by clinicians; lack of expected outcomes (i.e. improved fall rate, cognition, lower hospital admission rate, etc.); or having unexpected adverse outcomes that affect patient quality of life. Further research is needed, although it is likely that the benefits of deprescription will outweigh the risks or lack of positive outcomes.

Deprescribing tools. Since providers face many challenges towards improving inappropriate polypharmacy and deprescribing, it is crucial that they have as many tools as

possible to facilitate changes for safer prescribing practices. The Bruyère Research Institute in Ottawa, Canada has created numerous evidence-based resources to aid providers in deprescribing. A group of experts created deprescribing guidelines using sound methodology through a national modified Delphi consensus process (Level IVA) (Farrell, Pottie, Rojas-Fernandez, Bjerre, Thompson, & Welcoh, 2016). Rigorous systematic reviews of drug classes, effectiveness, and deprescribing trials were performed to identify context for informed recommendations and guideline development. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used to synthesize evidence and create deprescribing practice guidelines and specific algorithms for three drug classes: proton-pump inhibitors (PPIs), benzodiazepine receptor agonists (BZRAs), and antipsychotics (Farrell et al., 2016). Algorithms for antihyperglycemics and cholinesterase inhibitors (ChEIs)/ memantine were also created by this institute; however, they were not utilized in this project.

Further research (Level IIIA) from the Bruyère Research Institute evaluated implementation of their deprescribing guidelines in six practice sites (three in long-term care and three in primary care). Qualitative analysis of a survey administered at sequential points before, during, and after the implementation concluded that these guidelines appeared to increase clinicians' self-efficacy in deprescribing medications based on the drug-specific algorithms (Farrell et al., 2018). When providers possess evidence-based knowledge and guidelines, they are more comfortable deprescribing potentially inappropriate medications when faced with various barriers in practice.

Summary

There is extensive literature discussing the dangers of inappropriate polypharmacy and potentially inappropriate medications in the older adult. While much of the literature studying

interventions is not linked *directly* to patient *outcomes* including adverse drug events; many studies have led to decreased inappropriate polypharmacy and PIMs. Provider education is crucial so they can have the tools to empower patients/ caregivers in a shared-decision making process. Prescribing clinicians can then safely modify the medication regimens of older adults to reduce likelihood of drug interactions to prevent adverse outcomes.

Deprescribing potentially inappropriate medications by performing a comprehensive medication reconciliation is an effective method for reducing preventable adverse drug events. Deprescribing algorithms can be implemented in the primary care setting to guide prescribing practices and improve quality of care for older adults. It is crucial that providers are educated in the dangers of PIMs in older adults and are given deprescribing tools to reduce inappropriate polypharmacy. Specific evidence-based clinical practice guidelines and algorithms can ensure consistent practice for proper deprescribing and medication management of older adults in primary care.

Theoretical Framework

This project followed the Knowledge to Action Model (KTA) (Graham et al., 2006). There are two phases of this model – knowledge creation and action cycle (Appendix A). This model is a straightforward framework for knowledge translation, therefore fits perfectly with the American Association of Colleges of Nursing (AACN) DNP Essentials (AACN, 2006). The 2019 AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults is an important guideline that was created as a resource for prescribing practitioners, and it is the foundation of the knowledge component for this framework. Expansion of this knowledge included extensive evidence surrounding PIMs and clinical tools to aid in deprescribing and safe medication management. The knowledge was dispersed to the providers using a multi-modal

approach of in-person and electronic presentation.

The action cycle of this project evaluated providers' prescribing patterns in relation to PIMs in older adults before and after the intervention. The providers performed the *action* of deprescribing that is addressing the problem of inappropriate polypharmacy by utilizing the *knowledge* of PIMs and ADEs in older adults. It is anticipated that providers will continue to build on this knowledge with their patients in practice which will support their future safe prescribing methods.

Project Description

Goals, Objectives and Expected Outcomes

The goal of this project was to empower prescribing healthcare clinicians to *deprescribe* and reduce the new prescription of potentially inappropriate medications in patients age ≥ 65 in the primary care setting using a multi-modal educational intervention. Objectives were that:

- Primary care providers would receive comprehensive yet succinct education including written literature of potentially inappropriate medications in the older adult, the 2019 AGS Beers Criteria[®], and deprescribing tools/ algorithms
- Primary care providers would perform a comprehensive medication reconciliation to evaluate the risk/ benefit of medications at the start of each visit with patients age ≥ 65
- Primary care providers would utilize the deprescribing process and given tools during their medication reconciliation practice with patients age ≥ 65

Expected Outcomes

Based on the pre-intervention data, upon post-intervention evaluation:

1. An increased number of providers would report that they performed a comprehensive medication reconciliation that evaluates the risk and benefit of each medication prescribed to patients age ≥ 65 at the majority of visits
2. Clinicians that participate in the project would report frequent use of the provided deprescribing tool - either the general deprescribing process and/or drug-specific algorithms
3. Upon evaluating actual medication and prescription data from the clinic during pre-post intervention periods, specified classes of PIMs would result in an increase in discontinuation and/or a decrease in new/ refilled prescription
4. Primary care providers would demonstrate increased knowledge of potentially inappropriate medications in the older adult and the 2019 AGS Beers Criteria[®]
5. Providers would express improved self-efficacy and positive satisfaction towards implementing the deprescribing process into their daily practice

Project Design

This quality improvement project educated providers on potentially inappropriate medications in older adults and deprescribing methods for use during primary care visits. Education was dispersed primarily through email in addition to a “resource binder” located in the clinic. This DNP student was also present in clinic once per week to encourage use of the materials and answer questions. Outcomes were evaluated through both quantitative and qualitative data. Trends in the prescription and discontinuation of potentially inappropriate medications were evaluated using data from the electronic medical record system. Pre- and post-intervention surveys collected both quantitative and qualitative data from providers on their knowledge and self-efficacy in deprescribing practices.

Setting and Participants

This project was implemented in a general internal medicine (GIM) primary care clinic at a large urban-based academic medical center. Patients of all ages and demographics are seen at this clinic, but the project focused specifically on patients age ≥ 65 . Permanent staff of the clinic include 20 attending physicians and three nurse practitioners (NPs). Small groups of medical residents rotate through the clinic every two weeks. This intervention targeted not only these small groups, but the entire cohort of 65 residents that will ultimately practice at the clinic at some point during the academic year. Eighty-eight total providers were offered to participate.

Barriers

Evidence supports a number of barriers to implementing deprescribing processes including awareness, inertia, self-efficacy, and feasibility (Anderson et al., 2014). Many providers are deficient in knowledge of the immense adverse effects of potentially inappropriate medications in the older adult. Therefore, they lack insight into the appropriateness of their own prescribing practices (Anderson et al., 2014). This lack of knowledge may also translate to a lack of self-efficacy in the provider's confidence in their ability to deprescribe medications. Conversely, if providers do maintain awareness of the potential dangers of their practice, they may fear unknown consequences and therefore are resistant to change (inertia). Additionally, performing a comprehensive medication reconciliation on every patient to evaluate the risk/benefit of every medication may seem like a daunting task that providers may not have the time for during short visits. The providers have many responsibilities for disease management in their patients, and altering medication regimens may not be a priority that gets addressed.

More specifically to this project, the Bruyère Research Institute held a symposium in March 2018 to evaluate potential barriers and facilitators in implementing their deprescribing

guidelines/ algorithms into practice (Conklin, Farrell, & Suleman, 2019). This involved an interactive discussion of 107 participants from various disciplines including physicians, nurses, policy makers, public members, and others from around the world. The findings from the symposium are in line with the systematic review performed by Anderson et al. (2014), although they identified a number of additional barriers. These include: patient and caregiver resistance to change (on top of provider resistance); legal/liability concerns; financial structures and business/profit-related motivations; lack of policy/ protocol; and lack of resources/ tools to improve the culture and practice of deprescribing (Conklin et al., 2019).

Cost-Benefit Analysis

Implementing deprescribing has potential for massive cost savings to the organization. It is estimated that preventable ADEs in the Medicare population have led to annual direct costs exceeding \$800 million (Stuckey, Henriksen, Singh, Dawson, & Waterson, 2018). The cost for patients is also significant. It was cited by Vejar, Makic, and Kotthoff-Burrell (2015) that a recent study estimated 8,000-12,000 deaths per year were related to ADEs. This project has minimal cost responsibility from the organization. The DNP student paid for quality printing services and purchased Pocket Beers Criteria[®] cards which are sold from AGS at \$30 per 25 cards. This intervention did not take extra time for providers; therefore, they did not need to be paid additional time. The education was incorporated into their standard care and information could be reviewed at any time. See budget table (Appendix B).

Ethical Considerations/Protection of Human Subjects

The University of Massachusetts, Amherst (UMass) Internal Review Board determination for process of approval was obtained prior to initiating the DNP project. Since this is a quality improvement project, Institutional Review Board (IRB) consent from the clinical facility was not

required. All personal identifying patient and provider information in the medical records was omitted in the data reports aggregated by the Nursing Informatics team before quantitative data was reviewed by the DNP student. Additionally, pre- and post- intervention surveys remained anonymous. Each participant created a unique survey code so that trends between pre- and post-intervention could be assessed. The project provided educational tools and resources to providers in order to benefit patient outcomes using evidence-based research. No ethical risk was posed to patients as they maintained their standard care whether or not the provider chose to participate in the project.

Methods

Project Implementation

All licensed independent practitioners in the GIM clinic were made aware of this quality improvement project in October 2019 through an introductory email from the DNP student. See simplified project timeline (Appendix C). Through collaboration with the medical residency director, this DNP student offered a 15-minute presentation at a weekly resident conference where all of the attending physicians, NPs, and the current resident subgroup partake. A PowerPoint was presented to illustrate the project's purpose and design. This presentation contained evidence-based research and statistics surrounding PIMs and ADEs in older adults, as well as information on the Beers Criteria[®], polypharmacy, and general deprescribing. The concept of "*deprescribing*" was introduced as defined by the Bruyère Research Institute:

What is Deprescribing?

Deprescribing is the planned and supervised process of dose reduction or stopping of medication that might be causing harm, or no longer be of benefit. Deprescribing is part of good prescribing – backing off when doses are too high, or stopping medications that are no longer needed.

The presentation addressed anticipated barriers to deprescribing and provided an open forum for discussion with participants on how to combat these barriers. At the end of the presentation, attendees were shown the link and a QR code to the pre-intervention survey (created from SurveyMonkey <http://www.surveymonkey.com>). Unfortunately, time did not allow for survey completion at this time, but a follow up email was sent to each provider including the survey link and reinforcing information for those who were unable to attend.

Initially it was planned that this in-person presentation would be delivered at various resident conference sessions not only in clinic, but throughout the hospital (which is attached to clinic) multiple times before the intervention began. This would target providers not only in clinic at the time of project initiation, but also those that would be ultimately rotating through at any point during the academic year. An in-person introduction would have ideally encouraged more survey responses from the large cohort of 65 residents. This became exceedingly difficult to coordinate because of the frequent rotations in small groups. The attending physicians that supervise the residents suggested the DNP student remain exclusively in the clinic to streamline the project. This was a more realistic endeavor for the timeline and purposes of this doctoral project. Interactions in clinic proved effective to meet current residents during the data collection period, and these interactions would ultimately be most important for quantitative analysis of prescribing patterns. Regardless of in-person interaction, all 65 residents were encouraged to participate via email and offered the electronic education and surveys.

Educational Intervention

The education modules were designed to highlight deprescribing algorithms and guidelines created by the Bruyère Research Institute in Ottawa, Canada originally found on <https://deprescribing.org/>. By utilizing these evidence-based tools in the educational intervention,

participants received tangible methods to aid in their deprescribing practice, in addition to extensive knowledge regarding PIMs in older adults. However, because these algorithms were developed internationally, they needed to be modified to comply with medication trade names available in the United States. As a result, the DNP student researched the medications listed on each algorithm to assess for inconsistencies. In accordance with the official modification policy from the Bruyère Research Institute, the three algorithms were adapted for U.S. validity.

In December 2019, the educational intervention began. This first educational email discussed the importance of comprehensive medication reconciliation and addressed barriers to deprescribing. Attachments in the email included:

- official AGS Beers Criteria[®] journal article (Fick et al., 2019)
- editorial from the AGS on the “proper use of the Beers Criteria[®]” (AGS, 2019)
- article introducing the deprescribing process (Endsley, 2018)
- article discussing alternative medications to those listed in the Beers Criteria[®] (Hanlon, Semla, & Schmader, 2015)

Additionally, each permanent provider in the clinic personally received an official pocket guide to the 2019 AGS Beers Criteria[®] which was purchased directly from the American Geriatric Society. Hard copies of the guideline were intended to supplement the providers’ learning and to be used as a convenient and accessible reference during practice. These were also distributed to many residents rotating through the clinic throughout the project. Extras were placed in the resource binders and providers were encouraged to obtain a copy of this valuable resource.

Beginning January 2020, providers were sent detailed educational lessons via email weekly for five weeks. The first three lessons focused on drug-specific classes based on the deprescribing algorithms created by the Bruyère Research Institute. These three medication

classes are: proton-pump inhibitors (PPIs), benzodiazepine receptor agonists (BZRAs), and antipsychotics (APs). Each lesson included: a PDF of the US-adapted algorithm (Appendix D) and a clinical practice guideline for the deprescription of the specific medication class:

- proton-pump inhibitors (Farrell et al., 2017)
- benzodiazepine receptor agonists (Pottie et al., 2018)
- antipsychotics (Bjerre et al., 2018)

The body of the emails was intended to engage learners in the weekly topic for a quick review of the lesson at a glance. Additional attachments to the email offered extensive information and resources for further research, should the provider choose to broaden his/her learning. Participants also received high quality color copies of the algorithms as a supplemental resource for daily practice. Furthermore, two resource binders containing all articles from the lessons and extra copies of algorithms were placed in each of the two precepting rooms where residents work during clinic. These binders were also easily accessible to the attending physicians and NPs who also use these rooms.

The fourth lesson was dedicated to medications with anticholinergic properties and those to be used with caution with impaired renal function. These are two specific subsections of the Beers Criteria[®] that require special attention. There are not currently specific deprescribing algorithms for these medications, but other evidence and resources were provided.

A fifth lesson was added at the end of the month to discuss some other important PIMs not previous covered. Antihyperglycemics, medications for cardiovascular disease, statins, aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), and over the counter medications were addressed. Statin discontinuation for primary prevention in older adults is currently a hot topic in primary care medicine. HMG-CoA reductase inhibitors (statins) are technically not listed in the

Beers Criteria[®] because their side effect risk is not limited to older adults, and they are often *appropriately* prescribed in this population. However, they were included in this project because they may be inappropriate for certain patients due to increased risk and lack of benefit. There are several guidelines addressing statins for primary prevention; however, recommendations for stopping and starting the medication are discordant with age and clinical risk (Hawley et al., 2019). Evaluating cardiovascular risk, functional status, and life expectancy may indicate that a statin can be safely discontinued as part of an individualized patient plan.

These email lessons reinforced the process of deprescribing and provided extensive evidence of why these medications are categorized as a PIMs. This was intended to increase providers' knowledge/ awareness on the benefits of deprescribing which can support their decision making for practice change. Originally, the education was going to focus on 25 specific medications from the Beers Criteria[®]; but after further research, it was more effective to discuss the medications in terms of class. This eliminated the possibility of provider bias towards certain medications and yielded more data.

Measurement Instruments

In order to measure the outcomes of this DNP project, both quantitative and qualitative methods were used. Pre- and post-intervention surveys were created by the DNP student to measure subjective data (Appendices E & F). The surveys assessed provider knowledge of the Beers Criteria[®] and polypharmacy, as well as their current prescribing practices in medication reconciliation and deprescribing. The self-efficacy portion of the survey was modeled after a survey created by the Bruyère Research Institute (Farell et al., 2018) where *self-efficacy* was defined as “one’s belief in their capability to carry out specific tasks... in this case, belief in your capability to carry out tasks related to deprescribing [under the following circumstances].” This

original self-efficacy survey was created using the Delphi process with a panel of experts on the deprescribing guideline research team. Permission was given by Dr. Barbara Farrell of the Bruyère Research Institute to use a portion of the survey for the purposes of this DNP project, and thus will contribute to future validity and reliability testing of this tool.

A post-survey was administered the week following completion of the educational intervention. This assessed the same information as the pre-survey, in addition to providers' perception of the project and satisfaction with the interventions. Furthermore, objective data of prescription trends were measured through reports run from the electronic medical health record (EMR) system by the institution's Nursing Informatics team.

Data Collection Procedure

Obtaining survey participation from providers was initially difficult, but it was enhanced through personal interactions in the clinic. The DNP student offered candy and a handout with the link/ QR code to the survey as a reminder. The QR code was intended as a user-friendly way for participants to complete the survey on their phone or on-the-go. Anecdotally, this method was well-received by the resident physicians. The same process was used for the post-survey.

The Nursing Informatics team at the facility used an internal system to synthesize the medication data. A report was run with the following inclusion criteria:

- date range: 30 days before project initiation
- patient age ≥ 65
- location: general internal medicine clinic
- order action type: discontinue, cancel, void, modify, order, renew, resume, refill
- action personnel position: (all were included - physician, resident physician, NP)
- medication name

- medication dose

The action “modify” was included in the criteria because the practice of decreasing or tapering doses falls under the definition of deprescribing as referenced earlier. Unfortunately, the electronic system used to gather data did not allow access to medication doses; therefore, we could not confirm that the modification of a medication was in fact a decrease rather than an increase. As a result, the “modify” and “medication dose” actions were eliminated. The report ultimately yielded data from the actions “discontinue,” “void,” and “order”. This same report was run for a date range of 30 days after completion of the intervention.

Data Analysis

Descriptive and inferential statistics were used to evaluate the trends in data before and after the intervention. Excel reports were obtained from SurveyMonkey (<http://www.surveymonkey.com>) for all individual responses from both surveys. Responses were then coded appropriately to input into SPSS Version 26 (IBM Corporation, 2019) for analysis to produce frequency tables. These were then translated to bar charts through Excel for data visualization of outcomes. The figures are presented to accommodate visual and accessibility needs. Colors vary in brightness/ contrast and are outlined in black to allow easier interpretation for color-blind or visually impaired individuals. The self-efficacy portion of the survey was analyzed in SPSS Version 26 (IBM Corporation, 2019) through a paired *t*-test between individual providers that completed both the pre- and post-intervention survey.

Additionally, the EMR medication reports gathered to determine prescriber trends were manually coded in Excel and evaluated by this DNP student. The code consisted of nine categories: proton-pump inhibitor, benzodiazepine receptor agonist, antipsychotic, anticholinergic, NSAID, statin, sulfonylurea, opioid, and other PIM. The medications were then

divided into sheets of either “ordered” or “discontinued” then sorted by class for visualization of frequencies.

Exceptions

Of the 88 providers in this large academic urban-based general internal medicine primary care clinic that were offered the educational intervention to improve medication safety and deprescribing, 41 providers participated in the pre-intervention survey (response rate = 46.6%). Seven of these responses were removed from the sample as they were incomplete. The survey should take at least six minutes to complete, and these individuals completed it in less than two minutes per the SurveyMonkey (<http://www.surveymonkey.com>) report; therefore, this was the exclusion criteria. The same process was used for the post-intervention survey which resulted in 35 responses (response rate = 39.8%). Only one response was incomplete and removed, coincidentally leaving 34 valid responses for each the pre- and post-surveys. These were not necessarily the same individuals who decided to participate in both surveys, but through a unique code they provided, 13 responses were matched between the pre- and post-intervention surveys to evaluate trends in their individual deprescribing self-efficacy before and after the educational intervention.

After analyzing the results from the knowledge section of the survey, *famotidine*, *nifedipine*, *hydromorphone*, and *morphine* were excluded due to the potential for confusion and inconsistency relevant to the educational intervention. Although H₂ agonists have been removed AGS Beers Criteria[®] from the list of medications to avoid in patients with dementia or cognitive impairment; they are still included under the specific list to avoid in patients with delirium as a potential for disease exacerbation (AGS Beers Criteria[®] Table 3). The American Geriatrics Society (2019) made this change from the 2015 criteria because there was concern that this

would overly restrict options for management of reflux and other issues in this patient population, and it may intersect with the recommendation to avoid use of PPIs in older adults without valid indications (AGS, 2019). Learners less familiar with the Beers Criteria® would not be expected to recall this level of detail.

Nifedipine was removed from the analysis because this medication is listed on the AGS Beers Criteria® Table 2 in its *immediate release* form due to high risk for hypotension; but it is safe for older adults in its *extended release* form. This was not explicitly covered in the education provided through this project and was not clearly indicated on this survey. Furthermore, narcotics are not listed in the general “avoid” list (AGS 2019 Beers Criteria® Table 2), but they are listed in various sections to avoid in older adults with a history of falls/ fractures and to be avoided with concurrent use of three or more CNS-active medications. Additionally, newer evidence is showing increasingly harmful adverse effects in older adults when opioids are used in combination with gabapentinoids and benzodiazepines (AGS, 2019). Otherwise, the risks of narcotic medications are equal in persons of all ages, and pain management needs to be carefully addressed outside of these guidelines.

Results

Sample

The 34 providers who completed the pre-intervention survey included 19 resident physicians, 12 attending physicians, and three nurse practitioners with a mean of 6.5 years of experience ($SD = 7.60$). The 34 providers of the post-intervention survey included 20 resident physicians, 11 attending physicians, and three nurse practitioners with a mean of 6.47 years of experience ($SD = 7.14$). The 13 matched participants who completed both pre- and post-surveys included 7 resident physicians, 4 attending physicians, and two nurse practitioners with a mean

of 4.76 years of experience ($SD = 4.06$). Some participants chose not to designate a unique code on either survey, and there may have been other unknown paired results not included in this sample.

Survey Results

The survey was divided into three domains to evaluate provider's *knowledge* of the Beers Criteria®, their current subjective *prescribing practices* of PIMs, and their *self-efficacy* in deprescribing (See Appendices E & F). All 34 responses were statistically analyzed for frequencies in the first two categories; and the third section matched the 13 responses of providers who completed both surveys for individual behavior patterns pre-post intervention.

Knowledge

To assess provider knowledge, the survey asked providers to identify from a list of 18 medications which are classified on the AGS Beers Criteria® as general PIMs to avoid in older adults. Competency proved greater in identifying medications that are in fact *appropriate* for older adults, but knowledge varied between different classes of PIMs both pre- and post-intervention. See Figures 1 and 2 for variation of participants' correct responses before and after receiving the educational lessons.

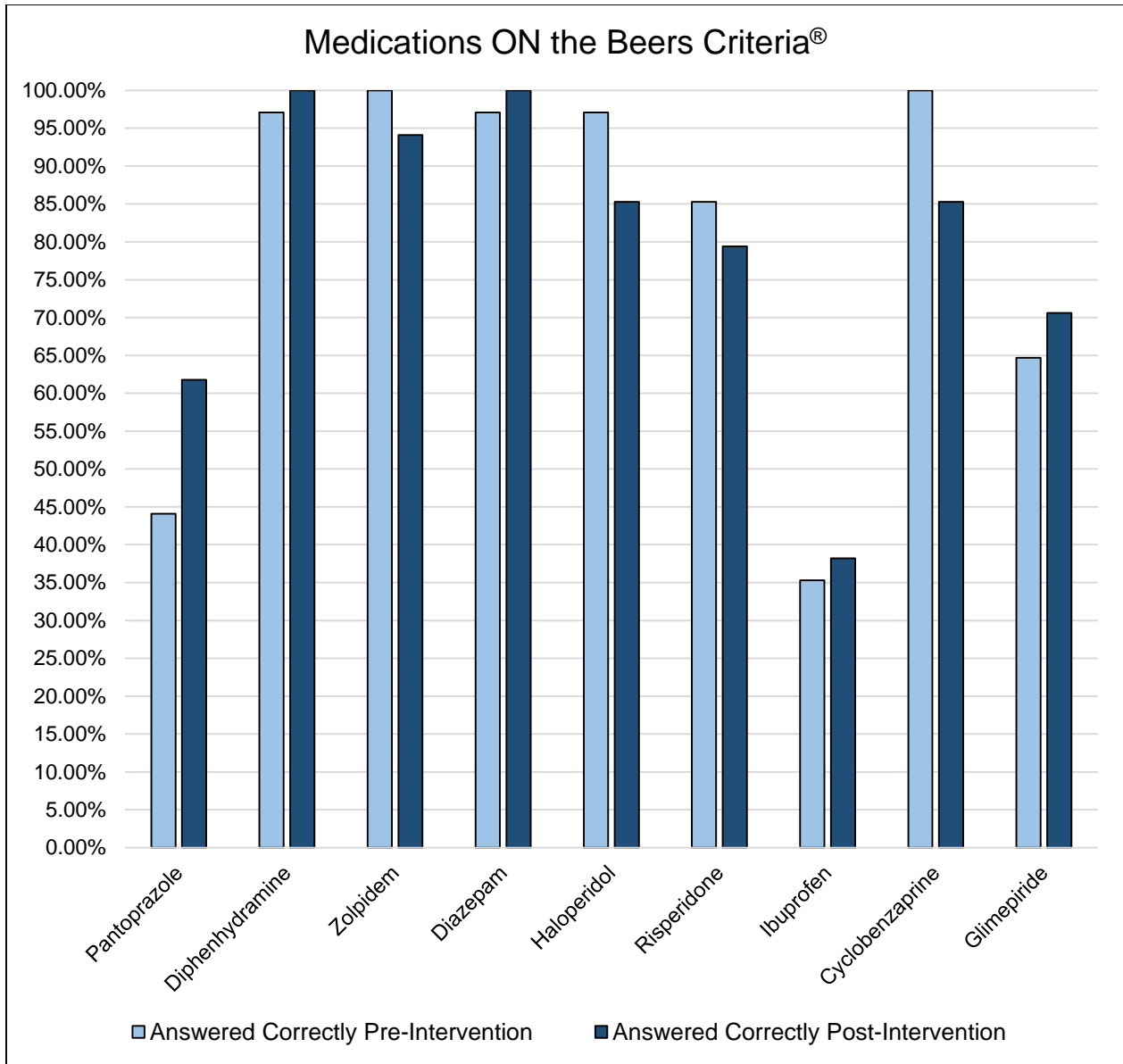


Figure 1: Participant knowledge of PIMs listed on the AGS 2019 Beers Criteria®

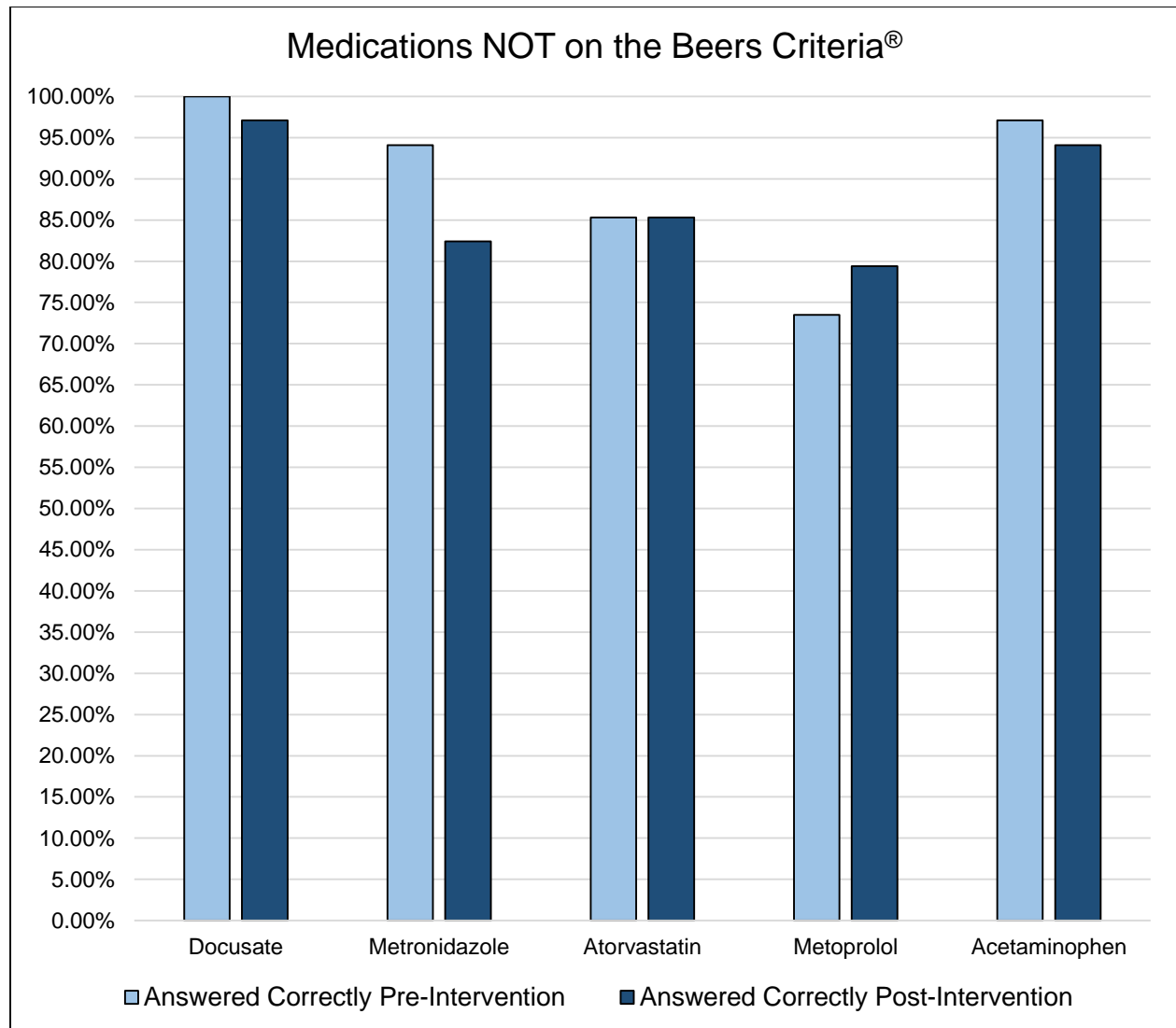


Figure 2: Participant knowledge of medications *not* listed on the AGS 2019 Beers Criteria®

Providers were also asked about the goals of the AGS Beers Criteria® to reduce adverse drug events/ drug related problems and improve medication selection/ medication use in older adults relative to which population and setting they pertain. In the pre-intervention group, 23 providers (67.6%) correctly answered this question, and 11 providers (32.4%) answered incorrectly. In the post-intervention responses, 24 providers (70.6%) answered correctly and 10 (29.4%) incorrectly.

Prescribing Practices

To assess prescribing behaviors before and after the intervention, providers were asked three questions using a Likert Scale. The survey demonstrated an increase in frequency of medication reconciliation performance and increased use of the AGS Beers Criteria® after the intervention. However, overall frequency of reported intentional deprescribing decreased. Responses are reflected in Figure 3.

Responses are reflected in Figure 3.

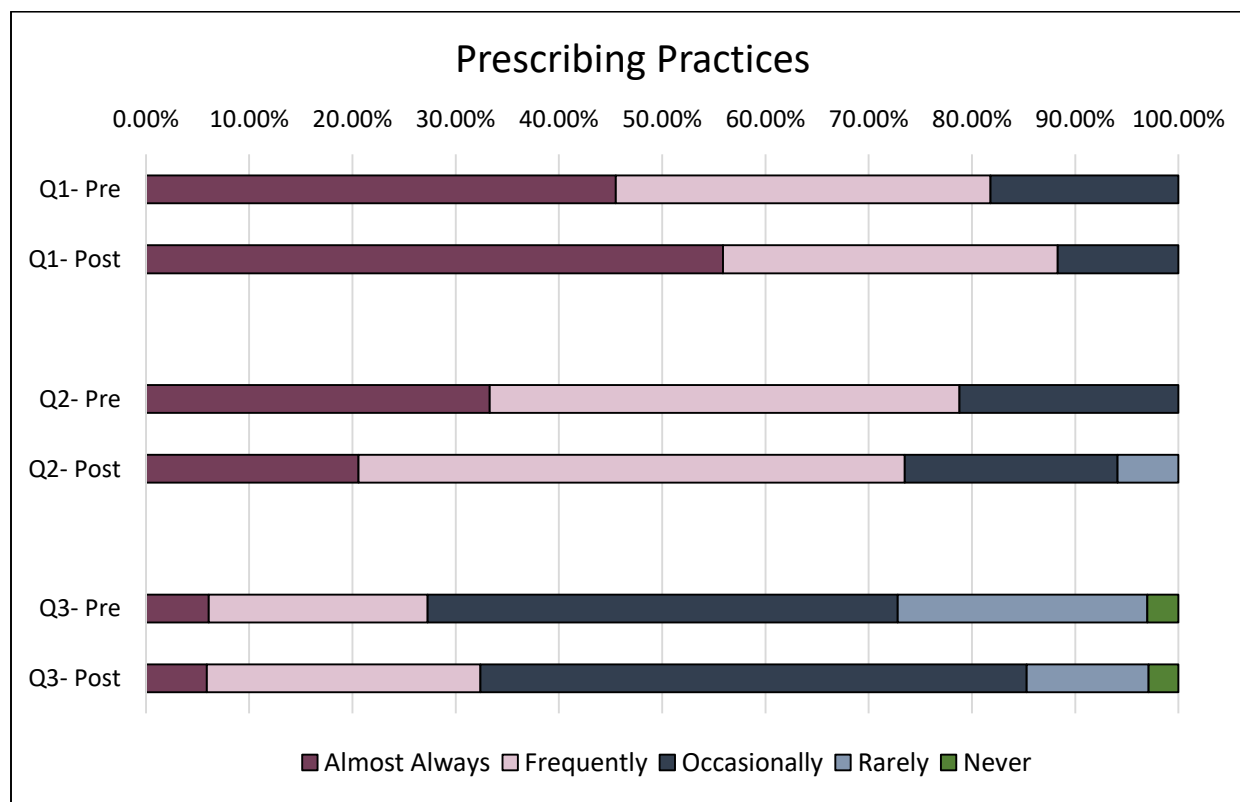


Figure 3: Prescribing practices before and after intervention reported using the following questions: Q1 Do you perform a comprehensive medication reconciliation at the start of each patient visit by evaluating the risk and benefit of each individual medication the patient is taking? Q2 Do you consider intentionally deprescribing medications in older adults to reduce polypharmacy? Q3 Do you utilize the Beers Criteria® as a resource in your practice?

Self – efficacy

On the electronic version of the survey, this section was displayed in a “sliding bar” format with a unipolar scale of 0 to 100 (0 = cannot do at all, 50 = moderately certain can do, 100 = highly certain can do). Providers used this scale to self-report their confidence

deprescribing PIMs under 24 certain circumstances. Relative to the intervention, Tables 1 and 2 display the means of these matched responses along with their variance, effect size (d), and significance (p). In **each** one of the 24 circumstances, participants reported an increase in self-efficacy pre-post intervention. As a result, overall self-efficacy was improved as demonstrated by the mean total scores from the 24 items (Pre: $M = 56.11$, Post: $M = 66.01$).

Table 1

Deprescribing Self-Efficacy Score Results (N=13)

| <i>For a patient 65 years of age or older who is taking a PIM, I am able to:</i> | Pre (Mean, SD) | Post (Mean, SD) | Effect Size (d) |
|--|----------------|-----------------|---------------------|
| 1. Weigh the benefits vs. harms of continuing the PIM | (70.08, 19.01) | (77.54, 14.49) | .7* |
| 2. Weigh the benefits vs. harms of deprescribing the PIM | (66.00, 17.45) | (78.00, 14.91) | .8* |
| 3. Determine whether a non-pharmacological intervention would facilitate deprescribing the PIM | (61.77, 22.96) | (72.38, 14.87) | .7* |
| 4. Consider the patient's preferences, care goals, and life expectancy in decided whether to continue or deprescribe the PIM | (76.00, 21.42) | (83.31, 10.36) | .3 |
| 5. Determine the best dosing approach to deprescribing the PIM | (55.77, 26.13) | (68.92, 20.26) | .6* |
| 6. Develop a monitoring plan to determine the outcome of deprescribing the PIM | (55.08, 27.29) | (72.31, 17.54) | 1.0** |
| 7. Negotiate a deprescribing plan for the PIM with the patient/ caregivers | (65.23, 21.19) | (72.92, 16.86) | .5 |
| 8. Monitor and follow-up to determine the outcome of deprescribing the PIM | (65.31, 24.19) | (76.08, 16.21) | .4† |
| 9. Determine if PIM tapering should stop or if the PIM should be restarted | (61.23, 25.04) | (73.46, 19.28) | .6* |
| Overall Self-Efficacy Mean | Pre: 64.05 | Post: 74.99 | |

† $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2

Deprescribing Self-Efficacy Score Results (N=13)

| <i>For a patient 65 years of age or older, I am able to deprescribe a medication:</i> | Pre (Mean, SD) | Post (Mean, SD) | Effect Size (<i>d</i>) |
|--|----------------|-----------------|--------------------------|
| 1. When I am concerned about adverse drug withdrawal events | (65.69, 23.12) | (74.92, 22.45) | .4 |
| 2. When I am concerned about exacerbations of the underlying condition the drug is being used to treat | (62.23, 22.36) | (70.69, 19.55) | .2 |
| 3. When disease-specific clinical guidelines recommend the use of a medication | (53.38, 23.96) | (63.62, 21.03) | .4 |
| 4. When the medication is coupled to performance indicators | (53.23, 24.17) | (62.08, 18.12) | .4 |
| 5. When I receive little support from colleagues for stopping or reducing medications | (47.92, 22.04) | (60.08, 17.11) | .9** |
| 6. When I have too much work to do | (49.08, 28.04) | (60.00, 19.72) | .3 |
| 7. When I am concerned about damage to my provider-patient relationship | (52.92, 22.56) | (61.78, 17.83) | .4 |
| 8. When the patient is resistant to change | (46.08, 18.09) | (66.23, 11.20) | 1.0** |
| 9. When the patient's family/ caregivers are resistant to change | (47.69, 17.75) | (64.69, 12.84) | .8** |
| 10. When there is no literature describing the effects of medication tapering or discontinuation | (48.31, 21.48) | (48.85, 16.96) | 0 |
| 11. When there is no guidance on how to taper or stop a medication | (47.08, 22.70) | (52.54, 16.72) | .3 |
| 12. When I am not the original prescriber of the medication | (51.38, 21.07) | (58.46, 24.98) | .5† |
| 13. When the medication was prescribed by a specialist | (40.23, 22.54) | (49.38, 19.05) | .4 |
| 14. When I am unsure why the medication was started originally | (46.54, 19.46) | (57.08, 16.96) | .6† |
| 15. When the medication is being used to treat an adverse effect of another medication | (58.31, 25.14) | (59.00, 24.67) | .0 |
| Overall Self-Efficacy Mean | Pre: 51.34 | Post: 60.63 | |

† $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

After these numerical self-efficacy responses regarding certain circumstances, providers were then asked about their overall comfort deprescribing or adjusting dosages of PIMs, including those that they did not initially prescribe to the patient. These scores show the largest increase in those that are *somewhat confident* after the intervention, and a decrease in *extremely confident* and *very confident* as demonstrated in Figure 4.

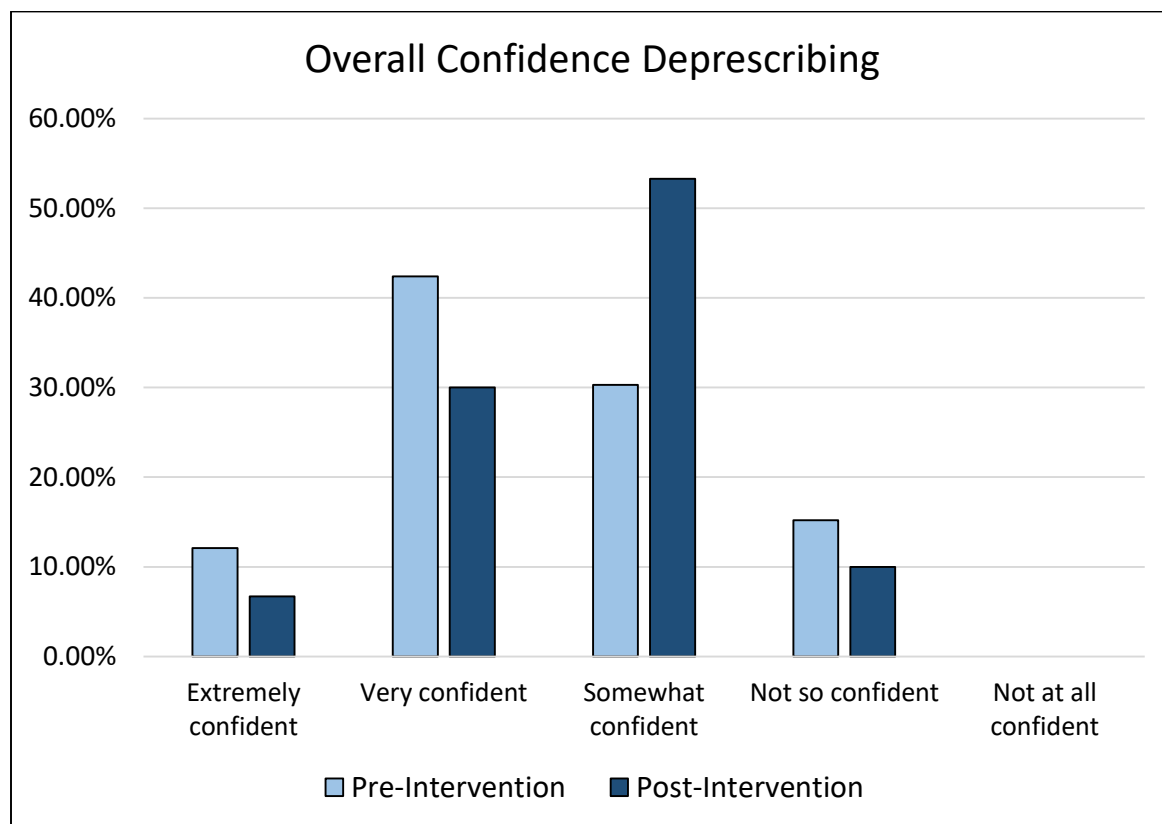


Figure 4: Overall confidence deprescribing PIMs before and after receiving the educational intervention.

Medication Data Reports

The report samples of 30 days pre- and post- intervention were limited to this timeframe for the purposes of this scholarly project; therefore, the data was not substantial enough to deduce statistically significant trends in prescribing patterns. Electronic medical record (EMR) reports were individually analyzed and interpreted by this DNP student to assess for prescribing

trends. The categories of PIMs identified most frequently on both the pre- and post-intervention medication reports (for either prescription or discontinuation) were PPIs, BZRAs, statins, and CNS depressants. Objective data from these reports were inconclusive in determining true prescribing trends and/or if they had been influenced by the intervention.

Discussion

Completion of this study demonstrated the true complexity of medication safety in older adults. Education on PIMs and deprescribing is an ongoing process as there is continually new evidence attributing to new knowledge. Furthermore, since there is much more to deprescribing than a clinical practice guideline or algorithm, it is a skill that requires a higher level of critical thinking and clinical aptitude.

Evaluation of Results

There are a range of conclusions that can be inferred from the three domains of the survey and trends in prescribing patterns.

Knowledge

It is important to acknowledge the characteristics of the general internal medicine residency program where the study was conducted. As an academic practice, many of the attending physicians are also professors, and the residents undergo a rigorous education program simultaneously with their practice in clinic. The nurse practitioners have a high standard of practice as well, and one is a certified Adult/ Gerontological Primary Care Nurse Practitioner (AGPCNP). As a result, this sample of individuals may have a stronger baseline knowledge than providers in some other practices. However, it should be noted that none of the practicing physicians are certified geriatricians in this outpatient clinic.

Of the nine medications that should have been identified as Beers Criteria® medications, the most significant improvement in knowledge was the identification of pantoprazole, a proton-pump inhibitor, as a Beers Criteria® medication (expected outcome #4). Before the intervention, 15 providers (44.1%) identified *pantoprazole* as a PIM on the Beers Criteria®, and after the intervention, 21 providers (61.8%) identified this correctly. Chronic use of proton-pump inhibitors (PPIs) is currently a particularly hot topic in primary care, and detailed education of potential side effects, medication related problems, and the latest evidence were included in the first education lesson of the series.

Providers also demonstrated a reliable understanding that medications with anticholinergic properties and benzodiazepines are PIMs in older adults. The post-intervention correct response rates for *diphenhydramine* and *diazepam* were each 100%, although the baseline pre-intervention rates for both medications were 97.1%. Interestingly, although knowledge improved from before the intervention, *ibuprofen* was the least understood PIM on this list (correct response rate pre-35.3%, post-38.2%). Nonsteroidal anti-inflammatory drugs (NSAIDs) are listed on the AGS Beers Criteria® as potentially inappropriate due to their increased risk of gastrointestinal bleeding and/or peptic ulcer disease in high-risk groups (Beers Table 2). NSAIDs are also listed in Beers Table 3 as potentially inappropriate to those with chronic kidney disease stage 4 or higher (creatinine clearance <30ml/min). Furthermore, these medications are listed on Beers Table 5 as potentially inappropriate drug-drug interactions that should be avoided in older adults on warfarin or corticosteroids (oral or parenteral). Ibuprofen and other NSAIDs are common over-the-counter medications, and it is important to include these in detailed medication reconciliation at each patient visit. While there are in fact some appropriate indications for short-

term use of NSAIDs, it is critical that these medications are identified as potentially inappropriate in older adults, especially for chronic use.

The five medications measured in the sample that are not listed on the AGS Beers Criteria® (*docusate, metronidazole, atorvastatin, metoprolol, acetaminophen*) are widely prescribed drugs, and this may explain why there was limited change in knowledge through this intervention. Overall, providers demonstrated a firm comprehension of PIMs that would support safe medication management in older adult patients.

Prescribing Practices

The educational intervention encouraged providers to perform a comprehensive medication reconciliation at the beginning of each patient's visit to evaluate for inappropriate polypharmacy and opportunities for deprescribing. This is a difficult task for any provider due to limited time during patient visits, especially among populations with multi-morbidity and increased age. After the intervention, 88.3% of providers reported they perform medication reconciliation either "*frequently*" or "*almost always*" (expected outcome #1). This project brought to light the importance of medication reconciliation as the first step of deprescribing. Additionally, after distribution of materials, 85.3% of participants reported use of the AGS Beers Criteria® at least "*occasionally*" during practice, which was an improvement from 72.8% pre-intervention (expected outcome #2). Anecdotally, throughout the intervention, multiple providers verbally expressed their satisfaction in the utility of the AGS Beers Criteria® pocket guide in their day-to-day practice. Increased awareness and accessibility to evidence-based guidelines facilitated greater use of the material.

Conversely, the objective results of providers' survey responses reflected a slight decrease in frequency of their intentional deprescribing practices pre-post intervention.

Participants may have been overwhelmed with the amount of detail presented on the deprescribing process, thus lowering their intent to carry-out the practice. However, the frequency chart presented was derived from the entire sample ($N=34$) rather than solely the sample of matched pairs from whom we evaluated self-efficacy ($n =13$). As a result, the individuals that only completed one of the surveys may have had different baseline behaviors. Furthermore, despite the intervention, approximately 75% of providers reported considering intentional deprescribing either *almost always* or *frequently*. For a newer concept, this statistic is impressive, for it shows deprescribing is on the forefront of providers' minds; and it confirms the need for further education to facilitate implementation.

Self-efficacy

According to Farrell et al. (2018, p. 19), self-efficacy is defined as “the belief that one is capable of organizing and completing actions to achieve specific challenges,” and it can also be understood as a provider's level of confidence or comfort in deprescribing. The results of the self-efficacy section of the survey proved to be most interesting due to the statistical significance and effect size of the paired *t*-test between individual provider practices pre-post intervention. While the sample size of the paired results was smaller ($N = 13$), it should be emphasized that **every** single survey item demonstrated an increase in self-efficacy after the intervention, thus fulfilling the fifth expected outcome of the study. Effect sizes were interpreted using Cohen's *d* (Cohen, 1988).

The most notable report from the analysis was the increase in providers' perceived ability to deprescribe PIMs even “*when the patient/family/caregiver is resistant to change.*” With newly acquired knowledge from the intervention, providers felt empowered to educate their patients to engage in the most appropriate shared-decision making processes. This also demonstrates that

these providers are well respected by their patients, and they feel confident that they can collaborate to make change even when there is uncertainty. The practitioners in this clinic have a high regard for relationship-based care which is vital to deprescribing.

Additionally, the intervention had a notable statistically significant effect on providers' perceived ability to "*develop a monitoring plan to determine the outcome of deprescribing a PIM.*" Providers were given tools/algorithms that were found useful for carrying out the process of deprescribing PIMs in their older adult patients. Deprescribing is a complex practice and requires thoughtful planning in order to execute successfully. Having evidence-based resources to guide this process is a key factor in not only initiating, but also maintaining safer medication regimens in older adults.

Furthermore, providers expressed an increased self-efficacy deprescribing "*when receiving little support from colleagues for stopping or reducing medication.*" This is an interesting result because colleagues are seen to be incredibly supportive in this clinic. Perhaps the implementation of the project itself manifested as a source of support; therefore, providers felt more comfortable after project completion.

Clinicians reported the highest levels of confidence regarding "*patient preferences, goals and life expectancy*" in both groups; however, the effect size is low suggesting this change may not have resulted from the intervention. This is not surprising, as the academic institution's primary philosophy of care is that of the "whole person;" and it is expected as a standard for every practitioner. Deprescribing encompasses all of these domains in patient care, and assessing patient goals is a fundamental step in the process. Again, every single provider's perception of their self-efficacy in deprescribing improved pre-post intervention, a truly remarkable result.

Current Literature. Results from this survey were comparable to those from its model implemented by the original authors of the algorithms in their own self-efficacy survey (Farrell et al., 2018). While these researchers' analysis was more complex over a larger time-series and in different care settings; the intervention of this DNP project was more intricate, including not only algorithms, but multi-modal evidence. Implementation of guidelines from Farrell et al. (2018) included onsite PowerPoint presentations of key guideline components along with the decision-support algorithms, as well as an opportunity to discuss implementation strategies. As mentioned, the in-person presentation component of the DNP project was limited; however, education included detailed topic summaries with supporting evidence, in addition to the algorithms and clinical practice guidelines. Response rates to this DNP project survey pre-post (46.6%, 39.8%) were higher than the original pilot in Canada over a four-part time-series (27.2%, 20.2%, 17.6%, 30.0%). The results of this DNP project are consistent with those from Farrell et al. (2018) who also saw an increase in self-efficacy for creating and implementing a deprescribing plan after administering evidence-based guidelines.

Medication Trends

Analysis of the medication reports proved very challenging for a number of reasons. As mentioned, the timeline was limited for this project; therefore, the quantity of collected objective data was modest. The pre- and post-intervention data sets included only 21 actual clinic days (out of the 30 calendar days), and it was not possible to control for any patient-specific variables aside from age. Deprescribing is an incredibly individualized process that requires numerous unique considerations, and *not all* older adults meet the criteria. Pertinent information to determine the actual appropriateness of medications was not available including past medical history, kidney function, potential for drug-drug interactions, and life expectancy to name a few.

Since there are exceptions to the AGS Beers Criteria[®] and other medications considered potentially inappropriate, it is unfair to deem them all as unsafe without assessing other factors. Additionally, it would be unreasonable to expect a legitimate trend in prescription and deprescription based on the data acquired in this project; thus expected outcome #3 was unable to be determined.

Challenges

As mentioned in the literature review, there were numerous anticipated barriers to this project, and many were observed. These included provider buy-in, resistance to practice change, and time constraint. Feasibility appeared to be the greatest challenge – both for project participation and for the practice of deprescribing. Resident physicians at this academic institution are engaged in a rigorous program that does not allow much time for participation in other activities. Therefore, it was especially difficult to engage participants in completing the surveys, particularly those with whom the DNP student could not interact in person. It was also challenging to coordinate scheduled presentations with the residency program leaders, as the residents were divided into several small groups throughout the hospital and greater health system. As a result, the project was modified to focus only on the providers present in clinic during the intervention period. While 88 providers still received the education, a smaller sample was used for data collection.

Time constraint to complete the survey was a challenge. The survey was estimated to take around six minutes; however, many providers noted the survey was “too long,” which is not ideal for the demanding role of a clinician. Shortening the survey was considered, but the self-efficacy portion was ultimately kept since it is in the process of becoming a validated tool (Farrell et al., 2018). Because of the length of the survey, many participants could have easily

misread questions and answered hastily, thus not truly representing their own prescribing behaviors and confidence deprescribing. Furthermore, it was of greater difficulty obtaining post-intervention responses since the group was potentially desensitized to the emails. Preconceived notion of survey length may have also led to avoidance. As a result, 13 responses were matched out of the 34; nevertheless, this sample was still considerably valuable.

There was also difficulty obtaining EMR data. It was initially thought that reports could be easily drawn from the system to view medication changes in patients age 65 and older within the clinic. The Nursing Informatics team had difficulty accessing this information, and there lacked a simple method to filter the exact data needed with multiple patient-specific variables for this project's purposes. Consequently, a large data set was manually evaluated by the DNP student, but medication trends were not able to be statistically analyzed.

Additionally, the DNP student experienced a challenge in modifying the drug-specific algorithms from the Bruyère Research Institute. This required considerable attention to detail, and the initial modifications submitted were found not to be comprehensive as a U.S. adaptation. Therefore, a resubmission was required to obtain the correct citation for approved use of the algorithms. Working with an outside source was an uncontrollable factor in the project, although the educational intervention was still executed in a timely manner.

One interesting and unanticipated barrier was the new role of the DNP student in a primarily physician-run clinic. While there are three nurse practitioners actively working and well-respected within the clinic, it is not typical for a nurse practitioner *student* to be involved in medical education with the residents and other medical students. Therefore, this project introduced the unique role of a DNP student in the clinic. This novelty was surprising since the academic center is well-renowned for the latest innovations in medicine and nursing; however,

the physicians themselves had not encountered this role in their own practice. For the DNP student it was initially difficult to single-handedly introduce the role into practice, but implementing this project was an incredible first step in utilizing the DNP for clinical evidence-based translation. More physical time in clinic interacting with the physicians allowed for greater understanding and increased respect of the DNP role.

Strengths and Limitations

There were several strengths of this DNP project. It was intricately planned to leave a significant impact on its participants. The topic of medication safety in older adults is an extremely important discussion, and there was a high need for attention in this clinic that lacks licensed geriatricians. It was beneficial to implement in an academic learning center because providers were privy to research and quality improvement projects. Furthermore, large effect sizes were extracted from the paired *t*-test results, signifying the intervention substantially influenced post-intervention self-efficacy data.

There were also limitations to this project. Since this educational intervention was not required learning, providers were likely not able to review all of the content concurrently with their already heavy load of responsibilities. Furthermore, the sample size of paired *t*-test results was relatively small ($N = 13$). Due to the scope of this quality improvement project as a DNP scholarly endeavor, there was limited time for implementation and analysis of results. With more time, these limitations could be addressed, and medication records could be reviewed over a larger time-series. This could better determine if the prescription and deprescription of PIMs in older adults treated in this clinic were significantly impacted by the intervention. It would also allow for more in-person presentations to encourage participation in surveys and teach key points from the education. This would also guarantee that more providers receive hard-copies of the

algorithms and pocket guide of AGS Beers Criteria[®], which were both anecdotally deemed useful by other participants.

Provider Feedback

During the pre-intervention period, many providers reported a need for tangible guidelines and strategies for deprescribing. They inquired how to better incorporate the AGS Beers Criteria[®] into practice and learn more specifics in degrees of contraindications for PIMs. Practitioners also emphasized a need for guidance on how to taper medications along with efficacious alternatives. Each of these points were introduced throughout the educational lessons to tailor their learning needs.

After the intervention, participants endorsed positive feedback on the project. Providers especially found the module on BZRAs helpful, namely processes for tapering these medications. This topic requires strong patient-provider collaboration; therefore, the patient must have a solid understanding of the process. Multiple patient education resources were also provided in the modules which facilitated patient buy-in of deprescribing. Additionally, participants demonstrated understanding of the importance of medication reconciliation. When asked the most important lesson gained from the educational intervention, one provider stated “medication reconciliation is a must for every visit.” This indicates the project was successful in emphasizing this crucial first step in deprescribing.

Providers also delivered constructive feedback regarding the project. One attending physician commented on his survey, “I did not have time to review the materials because clinic and admin time are unfortunately packed.” Time constraints were a definite anticipated barrier for the project, but this is a factor that will take repetitive reinforcement to address. Fortunately, the intervention was set up through organized emails and the resource binder so that education

can be easily accessed when needed at any time. However, one participant did note “there were a lot of emails and it was difficult to follow along with each and every one.” This again attests to the complexity of the topic and need for further reinforcement of the education. Providers did, however, find the material very useful. Two attending physicians expressed interest in using the patient education materials as standard handouts to use in practice and inquired of using links from www.deprescribing.com as “quick-text” for patient visit summaries. Furthermore, multiple participants suggested the use of more in-person presentation, thus affirming the importance of this component for the future.

Clinical Implications

Clinics that care for older adults must employ a geriatrician or provider with additional training in gerontology. There is a clear need for this specialized education, even in centers known for providing exceptional standards of care. The age-related considerations for the geriatric population are immense, and it appears that many providers do not always prioritize this in their practice. Older adults are a unique and vulnerable population that require individualized care. They should be considered a specialized patient population similar to that of pediatric patients, although this is often overlooked in practice. Consequently, specialized classes in gerontology should be included in early training of healthcare providers (i.e. medical school, undergraduate nursing school), and then again during medical residency and nurse practitioner training. Unfortunately, this foundational education is not consistent with every prescribing practitioner, yet it is imperative for medication safety in advanced practice. Subsequently, the educational intervention would be advantageous if implemented as a continuing education opportunity for healthcare providers.

Moreover, medication reconciliation must become a standard component of patient assessment. Similar to identifying “name and date of birth,” providers should identify which medications each patient is taking and utilize this information to formulate plans of care and future treatment recommendations. The potential for drug-drug interactions and drug-disease exacerbations is critical for the provider to account for in prescribing and deprescribing PIMs. The clinical implications of medication safety in older adults are profound and worthy of careful consideration.

Future Recommendations

The intervention itself can be utilized as a training program or continuing education opportunity. This was a reliable pilot that can be exponentially developed for further research. It is unreasonable to cover every important topic under the realm of pharmacology, but provider education can be divided into a myriad of sectors. Using a pre-intervention survey geared towards identifying provider needs and interests may lead to more successful outcomes. Education can be divided by medication class or by deprescribing domain (provider knowledge, provider behavior, patient education, deprescribing tools, etc.). More research on education of PIMs will lead to improved clinical translation and will emphasize its necessity in practice.

Furthermore, studying patient-specific information may yield more definitive results in evaluating prescribing trends. By controlling for variables that affect medication appropriateness in different individuals, there will be more certainty on the utility of deprescribing resources. Time-series trends may show subtle but crucial trends in medication reconciliation. Moreover, completing a larger study that attains IRB approval to follow specific patients and prescribers will achieve higher specificity of results. The project can be easily scaled up to replicate in all healthcare settings including acute and subacute care.

DNP Essentials

This scholarly DNP project, *In Beers We Trust*, exemplified each of the *American Association of Colleges of Nursing DNP Essentials* (AACN, 2006) from its earliest stages of problem identification through its implementation and evaluation. The first *AACN DNP Essential: Scientific Underpinnings for Practice* is the crux of quality improvement.

Inappropriate polypharmacy in older adults is a widely-known problem, and the extensive literature review immediately identified deprescribing as a promising intervention. Furthermore, the project relates directly back to the theoretical framework Knowledge-to-Action (KTA) (Graham et al., 2006). As described, a plethora of knowledge was provided throughout the intervention to deeply educate participating providers. Their validated self-efficacy in deprescribing depicted their action after the intervention. The straightforward direction of the KTA model aligned the project in a systematic process for education to practice.

In Beers We Trust also illuminated *AACN DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health* by emphasizing the need for population-based care of older adult patients. Ultimately, the project's fulfillment of *AACN DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes* proved to be most valuable. In this general internal medicine clinic, the intervention promoted an opportunity for the evolving role of DNP to collaborate with an interdisciplinary team. This scholarly DNP project introduced the integration of *Advanced Nursing Practice* (*AACN DNP Essential VIII*) with the clinical practice doctorate.

Conclusion

The educational program designed for this intervention is extensive, yet feasible for improving outcomes. The information is invaluable to expanding provider knowledge that will

augment their practice with evidence-based tools. Comprehensive online modules covered essential topics in medication safety, and due to the viability of their virtual platform, prove to be an excellent source of knowledge for healthcare providers in all settings. It should be required learning for all prescribing practitioners who care for older adults, and demonstration of competency is pivotal for guiding practice. The aims of this project were met and successfully influenced providers' behaviors. Clinicians who received the education demonstrated a greater confidence deprescribing, as well as an increased knowledge in PIMs. These behavioral modifications will ultimately lead to changes in practice that could immensely benefit health outcomes of older adult patients.

In Beers We Trust is a complex project that illustrated the gravity and intricate nature of medication safety in older adults. It is imperative that medications are consistently evaluated for clinical benefit and risk of harm. When these measures are overlooked, patients are at a substantially greater risk of adverse drug events and mortality. As a result, there is a crucial need for prescribing practitioners to demonstrate proper judgement and intellectual acuity throughout the deprescribing process and management of PIMs in older adults. By educating providers and promoting greater accessibility to resources such as the Beers Criteria[®] and deprescribing tools, medical professionals gain the ability to make better-informed clinical decisions which lead to safer medication practices. Board-certified geriatric pharmacist Simonson (2019) wrote a column in the journal *Geriatric Nursing* titled, "Deprescribing is not rocket science, but it is challenging." *In Beers We Trust* is a tremendous testament to this notion, and accordingly, demonstrated the critical necessity of provider education.

References

- Agency for Healthcare Research and Quality (AHRQ) Patient Safety Network. (January, 2019). Medication errors and adverse drug events. Retrieved from <https://psnet.ahrq.gov/primers/primer/23/Medication-Errors-and-Adverse-Drug-Events>
- American Association of Colleges of Nursing (AACN). (2006). The essentials of doctoral education for advanced nursing practice [PDF file]. Washington, DC. Retrieved from <https://www.aacnnursing.org/Portals/42/Publications/DNPEssentials.pdf>
- Ammerman, C. A., Simpkins, B. A., Warman, N., & Downs, T. N. (2019). Potentially inappropriate medications in older adults: Deprescribing with a clinical pharmacist. *Journal of the American Geriatrics Society*, 67(1), 115–118. <https://doi.org/10.1111/jgs.15623>
- Anderson, K., Stowasser, D., Freeman, C., & Scott, I. (2014). Prescriber barriers and enablers to minimizing potentially inappropriate medications in adults: A systematic review and thematic synthesis. *British Medical Journal Open* 4(12), 1-18. <https://dx.doi.org/10.1136/bmjopen-2014-006544>
- Bjerre, L. M., Farrell, B., Hogel, M., Graham, L., Lemay, G., McCarthy, L., ... Wiens, A. (2018). Deprescribing antipsychotics for behavioural and psychological symptoms of dementia and insomnia: Evidence-based clinical practice guideline. *Canadian Family Physician*, 64(1), 17–27. Retrieved from <https://www.cfp.ca/content/63/5/354>
- Bruyère Research Institute (2018). Deprescribing guidelines and algorithms. Retrieved from <https://deprescribing.org/resources/deprescribing-guidelines-algorithms/>
- Campins, L., Serra-Prat, M., Gózaló, I., López, D., Palomera, E., Agustí, C., & Cabré, M. (2017). Randomized controlled trial of an intervention to improve drug appropriateness in

community-dwelling polymedicated elderly people. *Family Practice*, 34(1), 36–42.

<https://doi.org/10.1093/fampra/cmw073>

Chou, J., Tong, M., & Brandt, N. J. (2019). Combating polypharmacy through deprescribing potentially inappropriate medications. *Journal of Gerontological Nursing*, 45(1), 9–15.

<https://doi-org./10.3928/00989134-20190102-01>

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Conklin J., Farrell, B., & Suleman, S. (2019). Implementing deprescribing guidelines into frontline practice: Barriers and facilitators. *Research in Social and Administrative Pharmacy*, 15(6), 796-800. <https://doi.org/10.1016/j.sapharm.2018.08.012>

Dills, H., Shah, K., Messinger-Rapport, B., Bradford, K., & Syed, Q. (2018). Deprescribing medications for chronic diseases management in primary care settings: A systematic review of randomized controlled trials. *Journal of the American Medical Directors Association*, 19(11), 923-35. <https://doi:10.1016/j.jamda.2018.06.021>

Endsley, S. (2018). Deprescribing unnecessary medications: A four-part process. *Family Practice Management*, 25(3), 28–32. Retrieved from <https://www.aafp.org/fpm/2018/0500/p28.html>

Farrell, B., Pottie, K., Rojas-Fernandez, C. H., Bjerre, L.M, Thompson, W., & Welch, V. (2016). Methodology for developing deprescribing guidelines: Using evidence and GRADE to guide recommendations for deprescribing. *PLoS One*, 11(8), 1-12. <https://doi.10.1371/journal.pone.0161248>

Farrell, B., Pottie, K., Thompson, W., Boghossian, T., Pizzola, L., Rashid, F. J., Rojas-Fernandez, C., ...Moayyedi, P. (2017). Deprescribing proton pump inhibitors: Evidence-

based clinical practice guideline. *Canadian Family Physician*, 63(5), 354–364. Retrieved from <https://www.cfp.ca/content/63/5/354>

- Farrell, B., Richardson, L., Raman-Wilms, L., de Launay, D., Alsabbagh, M. W., & Conklin, J. (2018). Self-efficacy for deprescribing: A survey for health care professionals using evidence-based deprescribing guidelines. *Research in Social and Administrative Pharmacy*, 14(1), 18–25. <https://dx.doi.org/10.1016/j.sapharm.2017.01.003>
- Fick, D. M., Semla, T. P., Steinman, M., Beizer, J., Brandt, N., Dombrowski, R., ... Sandhu, S. [2019 American Geriatrics Society Beers Criteria® Update Expert Panel] (2019). American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *Journal of the American Geriatrics Society*, 67(4), 674–694. <https://doi-org./10.1111/jgs.15767>
- Graham, I. D., Logan J., Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *Journal of Continuing Education in the Health Professions*, 26(1), 13–24. <https://doi.org/10.1002/chp.47>
- Gray, S. L., Hart, L. A., Perera, S., Semla, T. P., Schmader, K. E., & Hanlon, J. T. (2018). Meta-analysis of interventions to reduce adverse drug reactions in older adults. *Journal of the American Geriatrics Society*, 66(2), 282–288. <https://doi.org/10.1111/jgs.15195>
- Hanlon, J. T., Semla, T.P., & Schmader, K.E. (2015). Alternative medications for medications in the use of high-risk medications in the elderly and potentially harmful drug–disease interactions in the elderly quality measures. *Journal of the American Geriatric Society*, 63(12), e8-e18. <https://doi.org/10.1111/jgs.13807>

- Hawley, C. E., Roefaro, J., Forman, D. E., & Orkaby, A. R. (2019). Statins for primary prevention in those aged 70 years and older: A critical review of recent cholesterol guidelines. *Drugs & Aging, 36*(8), 687–699. <https://doi-org/10.1007/s40266-019-00673w>
- Molokhia, M., & Majeed, A. (2017). Current and future perspectives on the management of polypharmacy. *BMC Family Practice, 18*(70), 1–9. <https://doi.org/10.1186/s12875-017-0642-0>
- Newhouse, R., Dearholt S., Poe, S., Pugh L.C., White, K. (2005). The Johns Hopkins nursing evidence-based practice rating scale. Baltimore, MD, The Johns Hopkins Hospital; Johns Hopkins University School of Nursing.
- Page, A. T., Clifford, R. M., Potter, K., Schwartz, D., & Etherton-Ber, C. D. (2016). The feasibility and effect of deprescribing in older adults on mortality and health: A systematic review and meta-analysis. *British Journal of Clinical Pharmacology, 82*(3), 583-623. <https://doi.org/10.1111/bcp.12975>
- Pottie, K., Thompson, W., Davies, S., Grenier, J., Sadowski, C. A., Welch, V., ... Farrell, B. (2018). Deprescribing benzodiazepine receptor agonists: Evidence-based clinical practice guideline. *Canadian Family Physician, 64*(5), 339–351. Retrieved from <https://www.cfp.ca/content/64/5/339?platform=hootsuite>
- Rankin, A., Cadogan, C. A., Patterson, S. M., Kerse, N., Cardwell, C. R., Bradley, M. C., Ryan, C., Hughes, C. (2018). Interventions to improve the appropriate use of polypharmacy for older people. *Cochrane Database of Systematic Reviews 2018, 9*, 1-211. <https://doi.org/10.1002/14651858.CD008165.pub4>

- Reeve, E., Gnjidic, D., Long, J., & Hilmer, S. (2015). A systematic review of the merging definition of “deprescribing” with network analysis: Implications for future research and practice. *The British Pharmacological Society* 80(6), 1254-68. doi:10.1111/bcp.12732
- Rochon, P.A. (2019). Drug prescribing for older adults. In J. Givens (Ed.), *UpToDate*. Retrieved from <https://www.uptodate.com>
- Simonson, W. (2019). Deprescribing is not rocket science, but it is challenging. *Geriatric Nursing*, 40(4), 431–432. <https://doi-org/10.1016/j.gerinurse.2019.07.005>
- Stuckey, N., Henriksen, B., Singh, H., Dawson, A., & Waterson, Z. (2018). Interventions to reduce high-risk medication use in the geriatric population. *Topics in Geriatric Rehabilitation*, 34(3), 178–181. <https://doi-org/10.1097/TGR.0000000000000191>
- The Joint Commission. (2019). Ambulatory Care National Patient Safety Goals [PDF file]. Retrieved from: https://www.jointcommission.org/assets/1/6/2019_AHC_NPSGs_final.pdf
- Terrery Jr., C. L., & Nicoteri, J. L. (2016). The 2015 American Geriatric Society Beers Criteria®: Implications for nurse practitioners. *Journal for Nurse Practitioners*, 12(3), 192–200. <https://doi-org/10.1016/j.nurpra.2015.11.027>
- United States Census Bureau. (2018). Older people projected to outnumber children for first time in US history. Retrieved from <https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html>
- U. S. Department of Health and Human Services/ Office of Disease Prevention and Health Promotion. (2019). Healthy people topics & objectives: Older adults. Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/older-adults>
- Vejar, M. V., Makic, M. F., & Kotthoff, B. E. (2015). Medication management for elderly patients in an academic primary care setting: A quality improvement project. *Journal of*

the American Association of Nurse Practitioners, 27(2), 72–78. <https://doi-org/10.1002/2327-6924.12121>

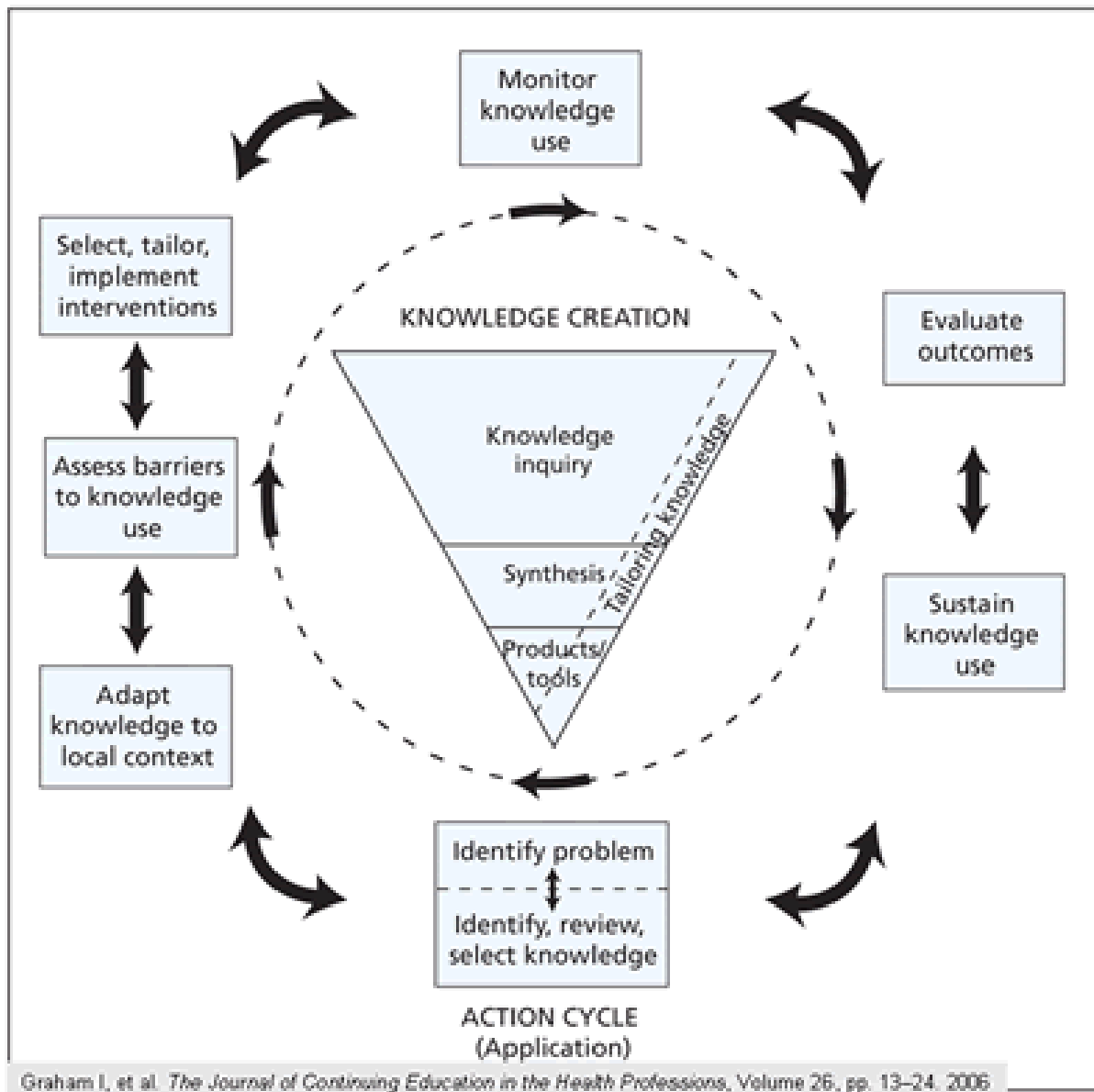
Wolff, C.M., Nowacki, A.S., Yeh, J., & Hickner, J.M. (2014). A randomized controlled trial of two interventions to improve medication reconciliation. *Journal of the American Board of Family Medicine*, 27(3), 347–355. <https://doi-org/10.3122/jabfm.2014.03.130240>

Zullo, A. R., Gray, S. L., Holmes, H. M., & Marcum, Z. A. (2018). Screening for medication appropriateness in older adults. *Clinics in Geriatric Medicine*, 34(1), 39–54. <https://doi-org/10.1016/j.cger.2017.09.003> vcb.mm

Appendix A

Theoretical Framework:

Knowledge-to-Action (KTA) Model

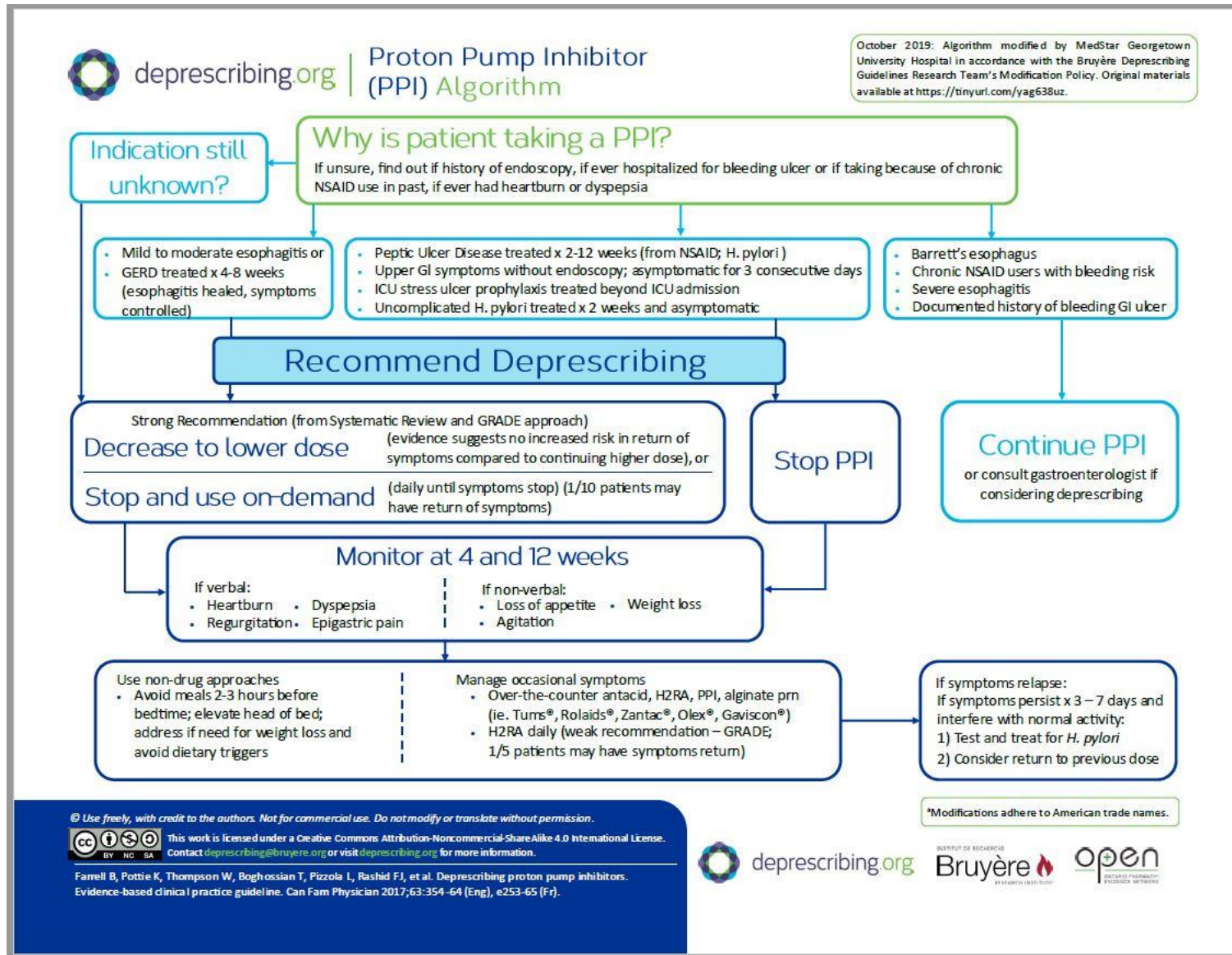


Appendix B

Budget Table

| Description | Cost | Total | Responsible Party |
|---|---|---------------------------------|--|
| AGS Beers Criteria® Pocket Cards (purchased in sets of 25) | 25 cards = \$30 Shipping Cost = \$14.00 | 100 cards = \$134 | Covered under “Love of Learning” grant from The Honor Society of Phi Kappa Phi (25 cards: AGS member price \$30; regular price \$38.99) |
| Quality color printing from Staples of Bruyère drug specific deprescribing algorithms (3 sheets per provider) | \$1.08 per double-sided sheet = \$97.20 for 90 sheets | 90 providers x 3 sheets = \$291 | Covered under “Love of Learning” grant from The Honor Society of Phi Kappa Phi |
| Time spent creating educational materials (drafting educational emails with deprescribing tools and Beers Criteria® information; creating presentations to supplement learning) | RN pay \$33.86/ hour | 50 hours = \$1693 | Paid by DNP student |
| Total: | | \$2,118 | |

Appendix D: Drug-Specific Algorithms





deprescribing.org | Proton Pump Inhibitor (PPI)
Deprescribing Notes

October 2019: Algorithm modified by MedStar Georgetown University Hospital in accordance with the Bruyère Deprescribing Guidelines Research Team's Modification Policy. Original materials available at <https://tinyurl.com/yag638uz>.

PPI Availability

| PPI | Standard dose (healing) (once daily)* | Low dose (maintenance) (once daily) |
|--------------------------------------|---------------------------------------|-------------------------------------|
| Omeprazole (Losec®) - Capsule | 20 mg ^a | 10 mg ^a |
| Esomeprazole (Nexium®) - Tablet | 20 ^a or 40 ^a mg | 20 mg |
| Lansoprazole (Prevacid®) - Capsule | 30 mg ^a | 15 mg ^a |
| Dexlansoprazole (Dexilant®) - Tablet | 30 ^c or 60 ^d mg | 30 mg |
| Pantoprazole (Protonix®) - Tablet | 40 mg | 20 mg |
| Rabeprazole (Aciphex®) - Tablet | 20 mg | 10 mg |

Legend

- a Non-erosive reflux disease
 - b Reflux esophagitis
 - c Symptomatic non-erosive gastroesophageal reflux disease
 - d Healing of erosive esophagitis
 - + Can be sprinkled on food
- * Standard dose PPI taken BID only indicated in treatment of peptic ulcer caused by *H. pylori*; PPI should generally be stopped once eradication therapy is complete unless risk factors warrant continuing PPI (see guideline for details)

Key

- GERD = gastroesophageal reflux disease
- NSAID = nonsteroidal anti-inflammatory drugs
- H2RA = H2 receptor antagonist
- SR = systematic review
- GRADE = Grading of Recommendations Assessment, Development and Evaluation

Engaging patients and caregivers

Patients and/or caregivers may be more likely to engage if they understand the rationale for deprescribing (risks of continued PPI use; long-term therapy may not be necessary), and the deprescribing process

PPI side effects

- When an ongoing indication is unclear, the risk of side effects may outweigh the chance of benefit
- PPIs are associated with higher risk of fractures, *C. difficile* infections and diarrhea, community-acquired pneumonia, vitamin B12 deficiency and hypomagnesemia
- Common side effects include headache, nausea, diarrhea and rash

Tapering doses

- No evidence that one tapering approach is better than another
- Lowering the PPI dose (for example, from twice daily to once daily, or halving the dose, or taking every second day) OR stopping the PPI and using it on-demand are equally recommended strong options
- Choose what is most convenient and acceptable to the patient

On-demand definition

Daily intake of a PPI for a period sufficient to achieve resolution of the individual's reflux-related symptoms; following symptom resolution, the medication is discontinued until the individual's symptoms recur, at which point, medication is again taken daily until the symptoms resolve

*Modifications adhere to American trade names.

© Use freely, with credit to the authors. Not for commercial use. Do not modify or translate without permission.



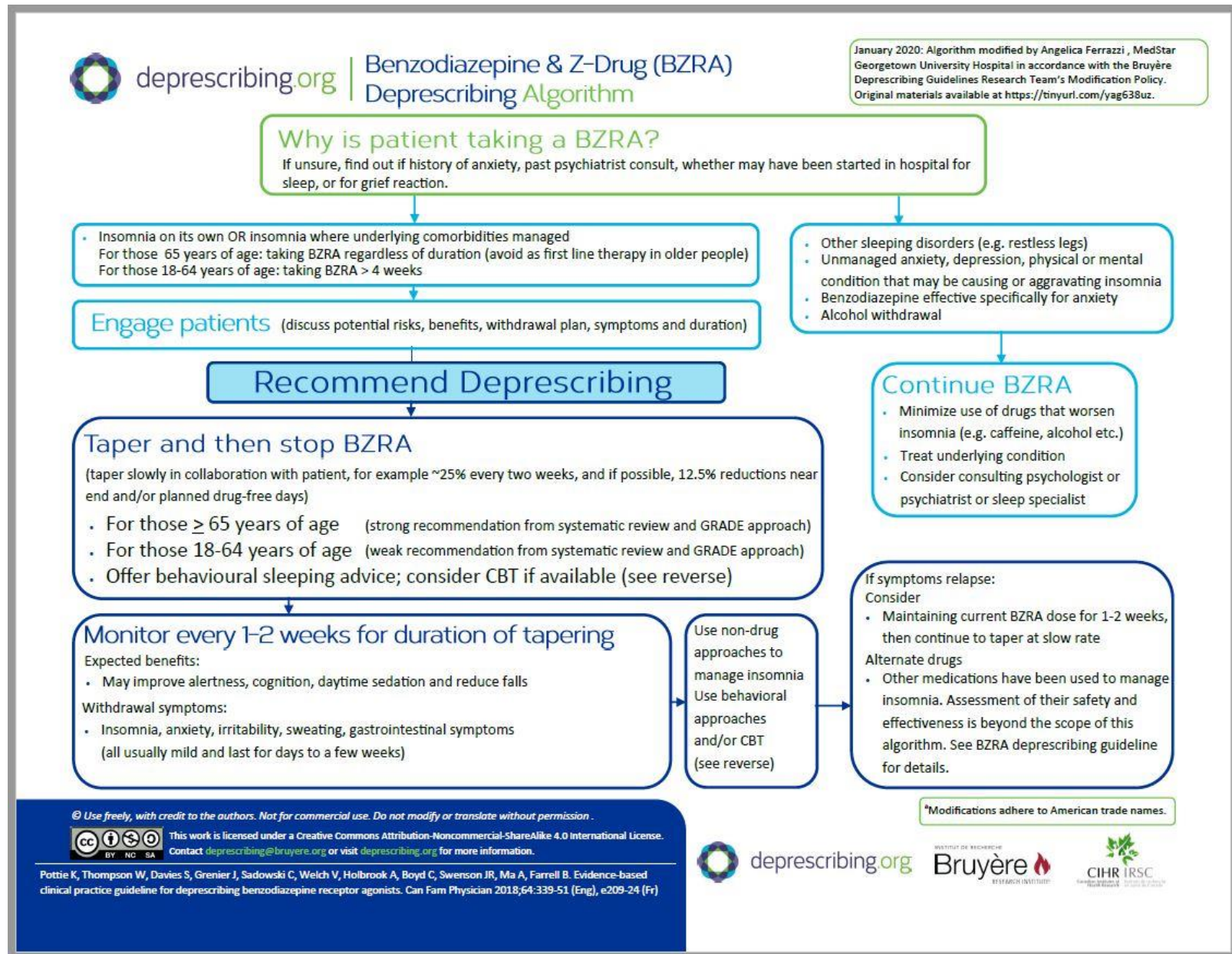
This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Contact deprescribing@bruyere.org or visit deprescribing.org for more information.

Farrell B, Pottie K, Thompson W, Boghossian T, Pizzola L, Rashid FJ, et al. Deprescribing proton pump inhibitors. Evidence-based clinical practice guideline. *Can Fam Physician* 2017;63:354-64 (Eng), e253-65 (Fr).



deprescribing.org







**Benzodiazepine & Z-Drug (BZRA)
Deprescribing Algorithm**

January 2020: Algorithm modified by Angelica Ferrazzi, MedStar Georgetown University Hospital in accordance with the Bruyère Deprescribing Guidelines Research Team's Modification Policy. Original materials available at <https://tinyurl.com/yag638uz>.

BZRA Availability

| BZRA | Strength |
|---|-------------------------------|
| Alprazolam (Xanax®) ^T | 0.25 mg, 0.5 mg, 1 mg, 2 mg |
| Chlordiazepoxide (*Librium®) ^C | 5 mg, 10 mg, 25 mg |
| Clonazepam (*Klonopin®) ^T | 0.5 mg, 1 mg, 2 mg |
| Clorazepate (Tranxene®) ^T | 3.75 mg, 7.5 mg, 15 mg |
| Diazepam (Valium®) ^T | 2 mg, 5 mg, 10 mg |
| Eszopiclone (Lunesta®) ^T | 1 mg, 2 mg, 3mg |
| Flurazepam ^C | 15 mg, 30 mg |
| Lorazepam (Ativan®) ^T | 0.5 mg, 1 mg, 2 mg |
| Oxazepam ^C | 10 mg, 15 mg, 30 mg |
| Temazepam (Restoril®) ^C | 7.5 mg, 15 mg, 22.5 mg, 30 mg |
| Triazolam (Halcion®) ^T | 0.125 mg, 0.25 mg |
| Zaleplon (Sonata®) ^C | 5 mg, 10 mg |
| Zolpidem (*Ambien®) ^{T,S} | 5 mg, 10 mg |

T = tablet, C = capsule, S = sublingual tablet

BZRA Side Effects

- BZRAs have been associated with:
 - physical dependence, falls, memory disorder, dementia, functional impairment, daytime sedation and motor vehicle accidents
- Risks increase in older persons

Engaging patients and caregivers

- Patients should understand:
- The rationale for deprescribing (associated risks of continued BZRA use, reduced long-term efficacy)
 - Withdrawal symptoms (insomnia, anxiety) may occur but are usually mild, transient and short-term (days to a few weeks)
 - They are part of the tapering plan, and can control tapering rate and duration

Tapering doses

- No published evidence exists to suggest switching to long-acting BZRAs reduces incidence of withdrawal symptoms or is more effective than tapering shorter-acting BZRAs
- If dosage forms do not allow 25% reduction, consider 50% reduction initially using drug-free days during latter part of tapering, or switch to lorazepam or oxazepam for final taper steps

Behavioural Management

- Primary care:
- Go to bed only when sleepy
 - Do not use bed or bedroom for anything but sleep (or intimacy)
 - If not asleep within about 20-30 min at the beginning of the night or after an awakening, exit the bedroom
 - If not asleep within 20-30 min on returning to bed, repeat #3
 - Use alarm to awaken at the same time every morning
 - Do not nap
 - Avoid caffeine after noon
 - Avoid exercise, nicotine, alcohol, and big meals within 2 hrs of bedtime

- Institutional care:
- Pull up curtains during the day to obtain bright light exposure
 - Keep alarm noises to a minimum
 - Increase daytime activity & discourage daytime sleeping
 - Reduce number of naps (no more than 30 mins and no naps after 2 pm)
 - Offer warm decaf drink, warm milk at night
 - Restrict food, caffeine, smoking before bedtime
 - Have the resident toilet before going to bed
 - Encourage regular bedtime and rising times
 - Avoid waking at night to provide direct care
 - Offer backrub, gentle massage

Using CBT

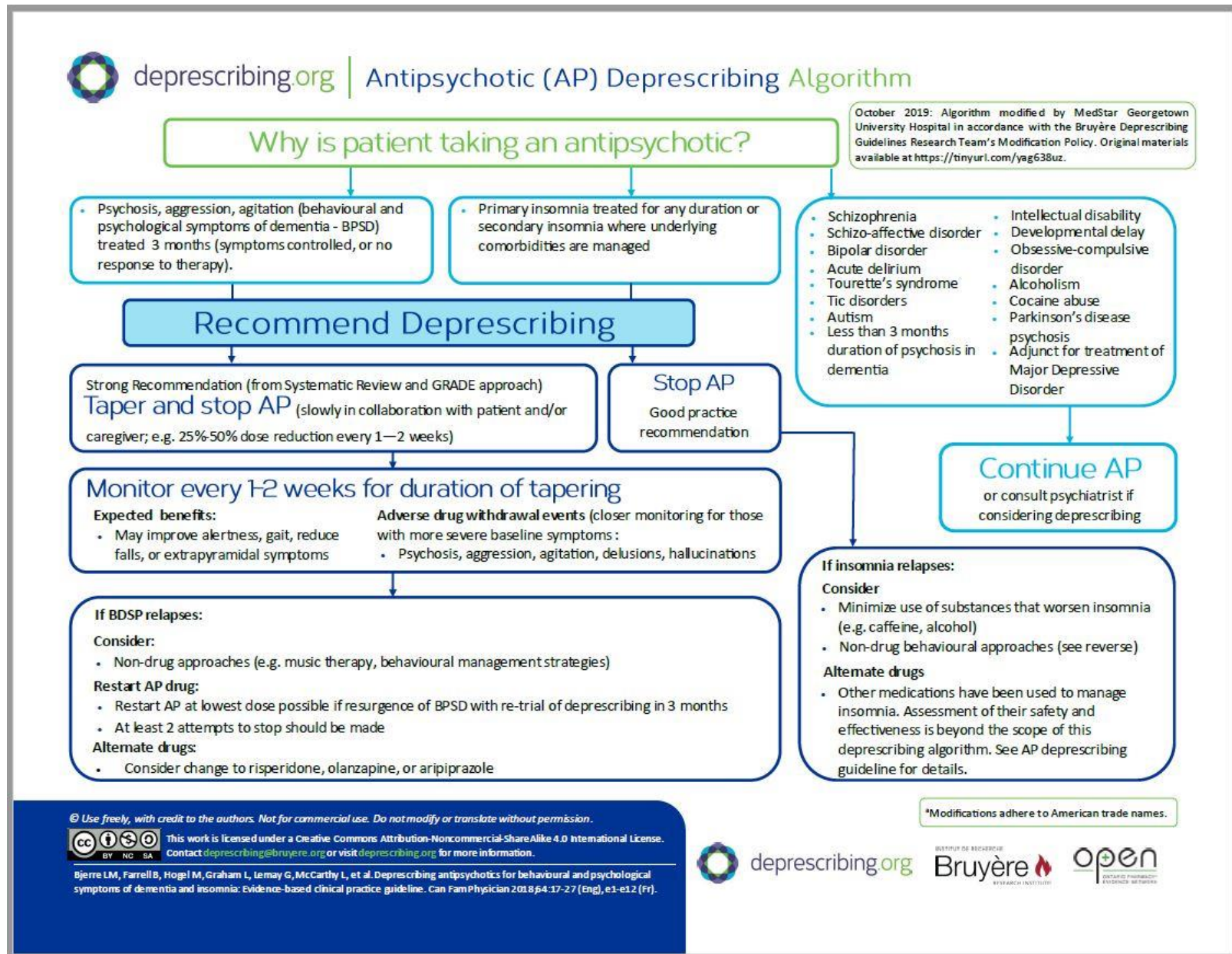
- What is cognitive behavioural therapy (CBT)?
- CBT includes 5-6 educational sessions about sleep/insomnia, stimulus control, sleep restriction, sleep hygiene, relaxation training and support
- Does it work?
- CBT has been shown in trials to improve sleep outcomes with sustained long-term benefits
- Who can provide it?
- Clinical psychologists usually deliver CBT, however, others can be trained or can provide aspects of CBT education; self-help programs are available
- How can providers and patients find out about it?
- Some resources can be found here: <http://sleepwellns.ca/>

*Modifications adhere to American trade names.

© Use freely, with credit to the authors. Not for commercial use. Do not modify or translate without permission.
 This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. contact deprescribing@bruyere.org or visit deprescribing.org for more information.

Pottie K, Thompson W, Davies S, Grenier J, Sadowski C, Welch V, Holbrook A, Boyd C, Swenson JR, Ma A, Farrell B. Evidence-based clinical practice guideline for deprescribing benzodiazepine receptor agonists. Can Fam Physician 2018;64:339-51 (Eng), e209-24 (Fr)







deprescribing.org | Antipsychotic (AP)
Deprescribing Notes

October 2019: Algorithm modified by MedStar Georgetown University Hospital in accordance with the Bruyère Deprescribing Guidelines Research Team's Modification Policy. Original materials available at <https://tinyurl.com/yag638uz>.

Commonly Prescribed Antipsychotics

| Antipsychotic | Form | Strength |
|--------------------------|-------------------------------|--|
| Chlorpromazine | T IM, IV | 25, 50, 100 mg 125 mg/mL |
| Haloperidol (Haldol®) | T L IR, IM, IV LA IM | 0.5, 1, 2, 5, 10, 20 mg 2 mg/mL 5 mg/mL 50, 100 mg/mL |
| Loxapine (*Adasuve®) | T L IM | 2.5, 5, 10, 25, 50 mg 25 mg/L 25, 50 mg/mL |
| Aripiprazole (Abilify®) | T IM | 2, 5, 10, 15, 20, 30 mg 300, 400 mg |
| Clozapine (Clozaril®) | T | 25, 100 mg |
| Olanzapine (Zyprexa®) | T D IM | 2.5, 5, 7.5, 10, 15, 20 mg 5, 10, 15, 20 mg 10mg per vial |
| Paliperidone (Invega®) | ER T PR IM | 3, 6, 9 mg 50mg/0.5mL, 75mg/0.75mL, 100mg/1mL, 150mg/1.5mL |
| Quetiapine (Seroquel®) | IRT ER T | 25, 100, 200, 300 mg 50, 150, 200, 300, 400 mg |
| Risperidone (Risperdal®) | T S D PR IM | 0.25, 0.5, 1, 2, 3, 4 mg 1 mg/mL 0.5, 1, 2, 3, 4 mg 12.5, 25, 37.5, 50 mg |

IM = intramuscular, IV = intravenous, L = liquid, S = suppository, SL = sublingual,
T = tablet, D = disintegrating tablet, ER = extended release, IR = immediate release,
LA = long-acting, PR = prolonged release

Antipsychotic side effects

- Aps associated with increased risk of:
 - Metabolic disturbances, weight gain, dry mouth, dizziness
 - Somnolence, drowsiness, injury or falls, hip fractures, EPS, abnormal gait, urinary tract infections, cardiovascular adverse events, death
 - Risk factors: higher dose, older age, Parkinsons', Lewy Body Dementia

Engaging patients and caregivers

Patients and caregivers should understand:

- The rationale for deprescribing (risk of side effects of continued AP use)
- Withdrawal symptoms, including BPSD symptom relapse, may occur
- They are part of the tapering plan, and can control tapering rate and duration

Tapering doses

- No evidence that one tapering approach is better than another
- Consider:
 - Reduce to 75%, 50%, 25% of original dose on a weekly or bi-weekly basis and then stop; or
 - Consider slower tapering and frequent monitoring in those with severe baseline BPSD
- Tapering may not be needed if low dose for insomnia only

Sleep Management

Primary care:

1. Go to bed only when sleepy
2. Do not use your bed or bedroom for anything but sleep (or intimacy)
3. If you do not fall asleep within about 20-30 min at the beginning of the night or after an awakening, exit the bedroom
4. If you do not fall asleep within 20-30 min on returning to bed, repeat #3
5. Use your alarm to awaken at the same time every morning
6. Do not nap
7. Avoid caffeine after noon
8. Avoid exercise, nicotine, alcohol, and big meals within 2 hrs of bedtime

Institutional care:

1. Pull up curtains during the day to obtain bright light exposure
2. Keep alarm noises to a minimum
3. Increase daytime activity and discourage daytime sleeping
4. Reduce number of naps (no more than 30 mins and no naps after 2pm)
5. Offer warm decaf drink, warm milk at night
6. Restrict food, caffeine, smoking before bedtime
7. Have the resident toilet before going to bed
8. Encourage regular bedtime and rising times
9. Avoid waking at night to provide direct care
10. Offer backrub, gentle massage

BPSD management

- Consider interventions such as: relaxation, social contact, sensory (music or aroma-therapy), structured activities and behavioural therapy
- Address physical and other disease factors: e.g. pain, infection, constipation, depression
- Consider environment: e.g. light, noise
- Review medications that might be worsening symptoms

*Modifications adhere to American trade names.

© Use freely, with credit to the authors. Not for commercial use. Do not modify or translate without permission.



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Contact deprescribing@bruyere.org or visit deprescribing.org for more information.

Bjerre LM, Farrell B, Hoge M, Graham I, Lemay G, McCarthy L, et al. Deprescribing antipsychotics for behavioural and psychological symptoms of dementia and insomnia: Evidence-based clinical practice guideline. Can Fam Physician 2018;64:17-27 (Eng), e1-e12 (Fr).



deprescribing.org



Appendix E
Pre-intervention Survey

Demographics

- Generate **unique survey ID** to ensure confidentiality. The same instructions will be used in a future post-intervention survey.
 - What is the first letter of the city you were born in? ____
 - What day of the month were you born? ____
 - What is the second letter of your first name? ____
 Combine your responses to create your ID (eg. W02N) and enter: _____
- **What is your current role in the GIM clinic?**
 ____ attending physician ____ resident physician ____ NP ____ PA ____ other (please specify)
- **How many years have you had prescriptive authority?** (Round up to nearest one year): _____

Knowledge

- **Of the choices below, which medications are on the 2019 Updated American Geriatric Society (AGS) Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults? (Select all that apply)****

Note** There are many medications on the Beers Criteria® in subcategories for special considerations such as exacerbation of certain comorbidities. This question is asking to select only medications that are on the general list of medications that are sufficiently unique/ particularly problematic for older adults compared to their younger cohorts.

- | | | |
|--|--|--|
| - Famotidine <input type="checkbox"/> | - Morphine <input type="checkbox"/> | - Metoprolol <input type="checkbox"/> |
| - Pantoprazole <input type="checkbox"/> | - Diazepam <input type="checkbox"/> | - Risperidone <input type="checkbox"/> |
| - Diphenhydramine <input type="checkbox"/> | - Haloperidol <input type="checkbox"/> | - Ibuprofen <input type="checkbox"/> |
| - Hydromorphone <input type="checkbox"/> | - Metronidazole <input type="checkbox"/> | - Acetaminophen <input type="checkbox"/> |
| - Docusate <input type="checkbox"/> | - Atorvastatin <input type="checkbox"/> | - Cyclobenzaprine <input type="checkbox"/> |
| - Zolpidem <input type="checkbox"/> | - Nifedipine <input type="checkbox"/> | - Glimepiride <input type="checkbox"/> |
- **There is controversy in the evidence defining the term "polypharmacy." In your own experience, polypharmacy refers to concurrent use of at least how many medications?**

- **Which of the following is true regarding the AGS Beers Criteria®?**
 - a.) The purpose is to identify potentially inappropriate medications that should be avoided in *all* adults
 - b.) The goal is to reduce adverse drug events/ drug related problems and improve medication selection/ medication use in older adults
 - c.) It is designed for use *only* in primary care settings, but it is also used as an educational, quality, and research tool
 - d.) All of the above
 - e.) None of the above

Current Prescribing Practices

When caring for the older adult patient population (age ≥ 65):

- **Do you perform a comprehensive medication reconciliation at the start of each patient visit by evaluating the risk and benefit of each individual medication the patient is taking?**

almost always frequently occasionally rarely never
 - **Do you consider intentionally deprescribing medications in older adults to reduce polypharmacy?**

almost always frequently occasionally rarely never
 - **Do you utilize the Beers Criteria® as a resource in your practice?**

almost always frequently occasionally rarely never
 - **Are you interested in receiving evidence-based tools, knowledge, and algorithms that can help you to deprescribe potentially inappropriate medications?**

extremely interested very interested somewhat interested
 not so interested not at all interested
 - **What is/are the most common potentially inappropriate medication(s) that you see on active medication lists of older adults in your practice?**
-

Self-efficacy*

This section of the survey is designed to help us gain a better understanding of how clinicians rate their self-efficacy in deprescribing an older adult (age ≥ 65) patients' medication(s). Self-efficacy refers to one's belief in their capability to carry out specific tasks. In this case, we are interested in your belief in your capability to carry out the tasks related to deprescribing (tapering or stopping) a medication an older adult patient is currently taking. using the scale below. Please rate how certain you are right now that you can carry out these tasks using the scale below:

0 10 20 30 40 50 60 70 80 90 100

Cannot do at all

Moderately certain can do

Highly certain can do

Deprescribing potentially inappropriate medications (PIMs):

Potentially inappropriate medications are defined by the American Geriatric Society as “medications that pose greater risks than they provide in therapeutic value or those medications for which a safer alternative is available.”

For a patient 65 years of age or older who is taking a potentially inappropriate medication, I am able to:

Item **Certainty (0-100)**

- Weigh the benefits vs. harms of *continuing* the PIM _____
- Weigh the benefits vs. harms of *deprescribing* the PIM _____
- Determine whether a non-pharmacological intervention would facilitate deprescribing the PIM _____
- Consider the patient’s preferences, care goals, and life expectancy in deciding whether to continue or describe the PIM _____
- Determine the best dosing approach to deprescribing the PIM _____
- Develop a monitoring plan to determine the outcome of deprescribing the PIM _____
- Negotiate a deprescribing plan for the PIM with the patient/caregivers _____
- Monitor and follow-up to determine the outcome of deprescribing the PIM _____
- Determine if PIM tapering should stop or if the PIM should be restarted _____

Deprescribing under potentially impeding circumstances:

A number of situations are described below which can make it difficult to deprescribe medications in older adults.

For a patient 65 years of age or older, I am able to deprescribe a medication:

Item **Certainty (0-100)**

- When I am concerned about adverse drug withdrawal events _____
- When I am concerned about exacerbations of the underlying condition the drug is being used to treat _____
- When disease-specific clinical guidelines recommend the use of a medication _____
- When the medication is coupled to performance indicators _____
- When I receive little support from colleagues for stopping or reducing medications _____
- When I have too much work to do _____
- When I am concerned about damage to my provider-patient relationship _____
- When the patient is resistant to change _____
- When the patient’s family/caregivers are resistant to change _____
- When there is no literature describing the effects of medication tapering or discontinuation _____
- When there is no guidance on how to taper or stop a medication _____
- When I am not the original prescriber of the medication _____
- When the medication was prescribed by a specialist _____
- When I am unsure why the medication was started originally _____
- When the medication is being used to treat an adverse effect of another medication _____

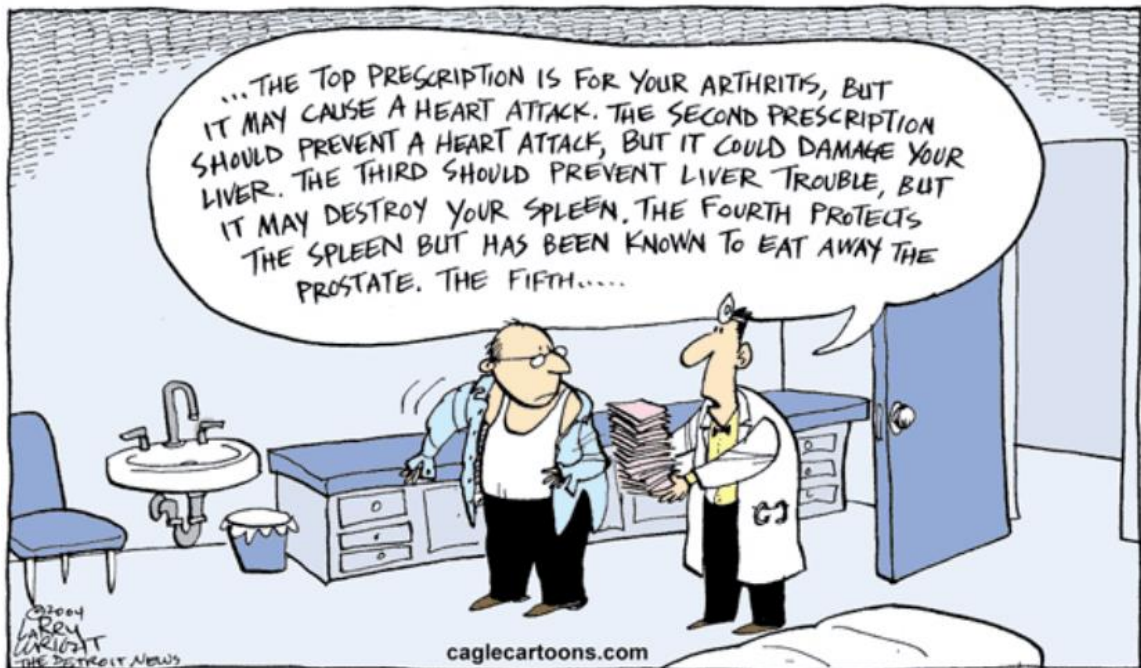
- Overall, how comfortable are you deprescribing or adjusting dosages of medications, including those that you did not initially prescribe to the patient?

extremely confident very confident somewhat confident
 not so confident not at all confident

*These self-efficacy portions of the survey were adapted with permission directly from Dr. Barbara Farrell of the Bruyère Research Institute. Completion of this Deprescribing Project will aid in validating the psychometric properties of the instrument. The published article with results from the original pilot can be found at <http://dx.doi.org/10.1016/j.sapharm.2017.01.003>

Bonus Question!

Is there specific knowledge or information you are hoping to gain from participating in this project?



Appendix F

Post-intervention Survey

Demographics

- Generate **unique survey ID** to ensure confidentiality. The same instructions will be used in a future post-intervention survey.
 - What is the first letter of the city you were born in? ____
 - What day of the month were you born? ____
 - What is the second letter of your first name? ____
 Combine your responses to create your ID (eg. W02N) and enter: _____

- **What is your current role in the GIM clinic?**
 ____ attending physician ____ resident physician ____ NP ____ PA ____ other (please specify)

- **How many years have you had prescriptive authority?** (Round up to nearest one year): _____

Knowledge

- **Of the choices below, which medications are on the 2019 Updated American Geriatric Society (AGS) Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults? (Select all that apply)****

Note** There are many medications on the Beers Criteria® in subcategories for special considerations such as exacerbation of certain *comorbidities*. This question is asking to select only medications that are on the general list of medications that are sufficiently unique/particularly problematic for older adults compared to their younger cohorts.

- | | | |
|--|--|--|
| - Famotidine <input type="checkbox"/> | - Morphine <input type="checkbox"/> | - Metoprolol <input type="checkbox"/> |
| - Pantoprazole <input type="checkbox"/> | - Diazepam <input type="checkbox"/> | - Risperidone <input type="checkbox"/> |
| - Diphenhydramine <input type="checkbox"/> | - Haloperidol <input type="checkbox"/> | - Ibuprofen <input type="checkbox"/> |
| - Hydromorphone <input type="checkbox"/> | - Metronidazole <input type="checkbox"/> | - Acetaminophen <input type="checkbox"/> |
| - Docusate <input type="checkbox"/> | - Atorvastatin <input type="checkbox"/> | - Cyclobenzaprine <input type="checkbox"/> |
| - Zolpidem <input type="checkbox"/> | - Nifedipine <input type="checkbox"/> | - Glimepiride <input type="checkbox"/> |
-
- **There is controversy in the evidence defining the term "polypharmacy." In your own experience, polypharmacy refers to concurrent use of at least how many medications?**

- **Which of the following is true regarding the AGS Beers Criteria®?**
 - a.) The purpose is to identify potentially inappropriate medications that should be avoided in *all* adults
 - b.) The goal is to reduce adverse drug events/ drug related problems and improve medication selection/ medication use in older adults
 - c.) It is designed for use *only* in primary care settings, but it is also used as an educational, quality, and research tool
 - d.) All of the above
 - e.) None of the above

Current Prescribing Practices

When caring for the older adult patient population (age ≥ 65):

- **Do you perform a comprehensive medication reconciliation at the start of each patient visit by evaluating the risk and benefit of each individual medication the patient is taking?**

almost always frequently occasionally rarely never
 - **Do you consider intentionally deprescribing medications in older adults to reduce polypharmacy?**

almost always frequently occasionally rarely never
 - **Do you utilize the Beers Criteria® as a resource in your practice?**

almost always frequently occasionally rarely never
 - **When appropriate, how often do you use the evidence-based tools, knowledge, and/or algorithms for deprescribing PIMs in older adults that were given to you during this project?**

almost always frequently occasionally rarely never
 - **What is/are the most common potentially inappropriate medication(s) that you see on active medication lists of older adults in your practice?**
-

Self-efficacy*

This section of the survey is designed to help us gain a better understanding of how clinicians rate their self-efficacy in deprescribing an older adult (age ≥ 65) patients’ medication(s). Self-efficacy refers to one’s belief in their capability to carry out specific tasks. In this case, we are interested in your belief in your capability to carry out the tasks related to deprescribing (tapering or stopping) a medication an older adult patient is currently taking. using the scale below. Please rate how certain you are right now that you can carry out these tasks using the scale below:

- **Overall, how comfortable are you deprescribing or adjusting dosages of medications, including those that you did not initially prescribe to the patient?**

extremely confident very confident somewhat confident
 not so confident not at all confident

*These self-efficacy portions of the survey were adapted with permission directly from Dr. Barbara Farrell of the Bruyère Research Institute. Completion of this Deprescribing Project will aid in validating the psychometric properties of the instrument. The published article with results from the original pilot can be found at <http://dx.doi.org/10.1016/j.sapharm.2017.01.003>

Bonus Questions!

What was the most beneficial resource(s) you received from this project?

What is the most important lesson you learned from this project?

What could have been done to further improve knowledge and practice of deprescribing?

Other comments (optional):



"I feel a lot better since I ran out of those pills you gave me."