DEPRESCRIBING PROTON PUMP INHIBITORS, BENZODIAZEPINES, ANTIPSYCHOTICS, AND ANTIHYPERGLYCEMIC MEDICATIONS IN A RURAL CLINIC IN AN ELDERLY POPULATION

by

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TABLE OF CONTENTS

TABLE OF CONTENTS CONTINUED

LIST OF FIGURES

ABSTRACT

Background: Polypharmacy affects many patients as they age and develop multiple health problems. The increased number of medications has been directly related to adverse drug events (ADEs) which include overdoses, falls, diarrhea, or insomnia. A panel of experts at the Bruyère Research Institute identified four classes of medications (proton pump inhibitors [PPIs], benzodiazepines receptor agonists [BZRAs], antipsychotics [ASs], and antihyperglycemics [AGs]), which are especially problematic in the elderly. They created four algorithms to help evaluate the necessity of these medications and offer suggestions for deprescribing them.

Aim*:* The aim of this project was to decrease the unnecessary use of PPIs, BZRAs, ASs and AGs among the elderly by using the Bruyère algorithm and to increase provider deprescribing self-efficacy scores.

Methods: This quality improvement project was conducted in a small rural community clinic in Northwest Montana. Two nurse practitioners (NPs) were involved. A survey was filled out by both the NPs at the beginning and the end of the project to assess their self-reported self-efficacy. A brief description of the Bruyère algorithm was provided to the NPs. This algorithm was then applied over a ten-week period to all patients over the age of 60 who had been previously prescribed the medications of interest. The rates of deprescribing as well as changes in provider self-efficacy scores (SES) were measured at the end of the project.

Results**:** A total of 29 patients were encountered during the project. Ten of the patients were on a PPI and one was on a BZRA. None of the patients screened were on any of the other two classes of medications. At the end of the project, none of the targeted medications were discontinued, although PPI dosing was decreased from twice daily to daily in two patients. Overall, provider self-efficacy scores improved by 15% during the intervention period.

Conclusions*:* The deprescribing algorithms likely improved provider self-efficacy scores and may reduce the medication burden faced by patients over the age of 60.

CHAPTER ONE

PROBLEM IDENTIFICATION AND EVIDENCE

Polypharmacy is defined as the regular use of multiple medications, either prescribed or over the counter, which becomes the norm for many individuals as they age and develop multiple health problems (Pasina et al., 2016). Although polypharmacy is appropriate and justifiable when treating numerous conditions, taking multiple medications increases risk of injury resulting from taking the medications themselves. Injuries, such as organ damage, overdoses, allergic reactions, or insomnia, related to medication usage, are known as adverse drug events (ADEs) (Wynne et al., 2017). The challenge for providers then becomes minimizing these risks while managing chronic medical conditions.

Background and Significance

Masnoon et al. (2017) defined polypharmacy by the total number of medications a patient prescribed; frequently, the number used is five. This definition, however, does not explain the appropriateness of these medications, as a patient might have multiple chronic health conditions that might require fifteen different medications to treat those conditions. Polypharmacy increases with age, with some studies showing an increase in prevalence from 13.5% in the 1990s to over 40% in 2015 among US adults over the age of 65. This increase in prevalence among the elderly has also been observed in other developed countries (Mangin et al., 2018).

Polypharmacy is frequently associated with potentially inappropriate prescribing (PIP) error. PIP errors involve either incorrect doses, treatment for conditions that are no longer active, or initiating treatment where risks outweigh the benefits. Kua et al. (2019) estimates that PIPs could be as high as 50% in the elderly population, with 40% of nursing home residents receiving at least one potentially inappropriate medication. Where inappropriate medications are encountered, Reeve et al. (2017) recommends to systematically discontinue or reduce the dose of medications with high risk to benefit ratio, a process referred to as deprescribing.

The number of medications a patient takes is the major predictor of ADEs and has been linked to poor health outcomes such as falls, increased hospitalizations, impaired cognition and death (Page et al., 2016; Reeve et al., 2017; Wallis et al., 2017). ADEs affect the elderly more severely. For instance, while only 14% of the US population is over the age 65, they account for half the ADE-related hospitalizations (Budniz et al., 2006).

The financial burden of polypharmacy and the associated ADEs are significant. Estimates vary as to what the actual costs of ADEs to the US healthcare system is, but Sultana et al. (2013) estimated it to be $30 billion per year. Additionally, polypharmacy places a financial burden on older adults who are often retired and on fixed incomes. In 2016, the total annual spending by Medicare patients on medications was $3,896, which was more than that of inpatient care or office clinic visits (Schoen et al., 2019).

Guidelines have been developed to help reduce polypharmacy. Some of the more common guidelines include the Beers List (BL) and the Screening Tool of Older Persons' Prescriptions (STOPP). The BL was developed in 1991 and is meant to be a guideline for identifying medications for which the risks may outweigh the benefits (Gray et al., 2018). Categories in BL include medications which should be avoided in the elderly, those which should be avoided with certain medical conditions, and those which are relatively contraindicated in the elderly (2019 American Geriatrics Society, 2019). The inclusion of a medication on the BL does not mean that it should never be used in elderly patients; it is up to the prescriber's clinical judgement to determine if a medication is appropriate. Since its inception, it has undergone five revisions to keep it up to date with prescribing practices. The 2019 version of the BL has 30 individual medication/medication classes to avoid, and 40 medication/medication classes to use with caution or to avoid with certain disease conditions (2019 American Geriatrics Society, 2019). Numerous studies have validated the ability of the BL to identify inappropriate medications in the elderly (Bjerre et al., 2015; Charlesworth et al., 2015)

The Screening Tool of Older Persons' Prescriptions (STOPP) was developed in 2008 by a consensus panel of 18 experts in Europe to help providers avoid potentially inappropriate medications (O'Mahoy et al., 2015). STOPP provides information on the evidence (or lack thereof) for specific medications, the length of time the medications should be used, and possible drug interactions. In comparison to BL, in clinical trials STOPP was shown to identify more potentially inappropriate medications per patient than BL (4.3 vs 1.9, $p<0.001$) (O'Mahony et al., 2015). STOPP guidelines are extensive, frequently comprising up to 20 pages of information (Bennet et el., 2020).

Despite both of these guidelines being available for over a decade and being recommended by many geriatric societies, deprescribing guidelines remain underutilized (Paque et al., 2019). Reasons frequently cited by primary care providers for not utilizing these guidelines include: patient reluctance to stop medications, apprehensions for withdrawal, discontinuing or altering a medication prescribed by another provider, concern for failure in disease management, and limited time (Anderson et al., 2014; Farrell et al., 2018; Paque et al., 2019). Since these guidelines are underutilized, other agencies, such as the Institute for Healthcare Improvement

(IHI) and the Canadian Geriatrics Society (CGS), suggest focusing on specific classes of medications which are known to be problematic (Hart & Giancroce, 2015; IHI, 2020).

Another agency that is recommending focusing on specific classes of medications is the Bruyère Research Institute in Ottawa, Canada. This agency produced four evidence-based guidelines to aid providers in deprescribing proton-pump inhibitors (PPIs), benzodiazepine receptor agonists (BZRAs), antipsychotics (ASs), and antihyperglycemic medications (AGs). These classes were selected based on a literature review to identify potentially inappropriate medications for the elderly. To generate and achieve consensus, this was followed by expert panel discussion and three rounds of surveys regarding priorities for deprescribing guidelines for the elderly (Farrell, Tsang et al., 2015). The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was used to assess the quality of the supporting evidence and to evaluate the risk versus benefit of these medications (Farrell, Tsang et al., 2015). There is currently a clinical trial underway, which is set to be completed in 2022, trialing the use of these guidelines (ClinicalTrials.gov, 2018)

Risks associated with long term PPI use is well documented in the literature. In a systematic review and meta-analysis consisting of 16 studies and 7703 patients, Tarig et al. (2017) examined the relationship between PPI use and recurrent *Clostridium difficile* (C.diff) infections. This review suggested patients who are on PPIs are 5% more likely to redevelop *C. diff* than those who are not (Tarig et al., 2017). In a scoping review of 33 systematic reviews, PPI use was associated with increased rates of community-acquired pneumonia, hip fractures, electrolyte imbalances, and *C.diff* (Abramowitz et al., 2016). Long term PPI use has been linked to an increased risk of kidney disease, kidney disease progression, and end-stage kidney disease (Lazarus et al., 2016; Xie et al., 2016).

Benzodiazepines (BZRAs) are frequently prescribed in the elderly for insomnia. Studies suggest BZRAs initially decrease sleep latency by 4.2 minutes and increase total sleep duration by 61 minutes; however, loss of therapeutic effect occurs in 7 to 28 days (Holbrook et al., 2000; Vinkers & Olivier, 2012). BZRA use in the elderly is associated with cognitive changes, delirium, dizziness, and increased falls (Sithamparanathan et al., 2012). Additionally, psychological and physiologic dependence occurs with chronic use of these medications. Common withdrawal symptoms include insomnia, anxiety, irritability and gastrointestinal symptoms; discussions regarding their discontinuation are frequently met with great resistance from patients (Green et al., 2007).

Antipsychotic medications are often prescribed for the management of the behavioral and psychological symptoms of dementia; they are among the medications most frequently associated with harm in long-term care facilities (Gurwitz et al., 2005). The use of antipsychotic medications for behavioral modification in long-term care facilities is widespread. A study of 19,780 older adults with no history of major psychosis prior to admission found antipsychotic therapy was prescribed for 17% of patients within 100 days of their admission to the long-term care facility (Leipzig et al., 1999). Antipsychotic medication use is associated with an increased risk for falls, stroke, death, confusion, dizziness, and orthostatic hypotension (Inouye et al., 2014)

The medications that are most frequently linked to hypoglycemia are insulin, meglitinides, and sulfonylureas (Lamos et al., 2013). Older adults are at higher risk for hypoglycemia and its consequences, such as dizziness, weakness, delirium and confusion due to undernutrition and decreased muscle mass; these risks are considered to outweigh the benefits of tighter glycemic control (Sjöblom et al., 2008). Controlled studies have found that tighter glucose control in patients with limited life expectancy has marginal benefit, since the long-term complications seen with the disease is not observed in the shorter lifespan of the elderly (Seidu et al., 2019). As such, those medications which have a higher likely hood of causing hypoglycemia, such as insulin, meglitinides, and sulfonylureas, are to be deprescribed if possible.

Scope of the Problem at Project Site

Polypharmacy is frequently encountered at a clinic owned by two nurse practitioners (NPs) in a rural central Montana farming community. According to the Center for Disease Control and Prevention (2019) rural residents are generally older, less educated, and have more chronic illnesses; the residents in this community are likely similar to many rural residents living in the United States. They also face limited access to care, because the closest specialty care is 20 miles away. Additionally, many of the patients who seek care at the clinic frequently list vitamins, oils, or herbal supplements as a part of the medications they take on a daily basis, which increases their risk for ADEs (Center for Disease Control and Prevention, 2019).

This town has a 30-bed assisted living facility (ALF); 17 of the residents at this ALF utilize the clinic for primary care at least annually for wellness visits and more frequently as ailments arise. The average age of the residents is 86 years. A chart review on 21 of the patients showed the average medication number to be 13. There was no documentation available on falls which did not lead to hospitalizations, as the DNP student did not attempt to get records from the ALF itself. Additionally, of the charts reviewed, ten patients were on one or more of the following classes of medications: proton pump inhibitors, benzodiazepines, antipsychotics, and antihyperglycemic medications, with four patients being on two or more.

Whenever a resident from the ALF comes to the clinic for care, a medication list is updated by the medical aide who rooms the patient to ensure the medications the patient takes are consistent with the list the clinic has. These lists are then reviewed by the NP during the visit to ensure the medications are appropriate for the patients' current medical conditions. The NPs rely on clinical judgement and experience to evaluate the correctness of medical therapy; no standardized screening tool, such as the Beers List, is used to evaluate the appropriateness of the prescribed regimen.

Proposed Project and Planned Practice Change

In order to complement their clinical judgement when assessing the appropriateness and safety of patient medications, and to ultimately prevent ADEs, the NPs expressed an interest in utilizing a deprescribing tool. As previously mentioned, although there are multiple guidelines, such as the Beers List or Screening Tool of Older Persons' Prescriptions (STOPP) available which could assist with this endeavor, this quality improvement (QI) project targeted four classes of medications which the literature indicates are especially problematic in the elderly: proton pump inhibitors (PPIs), benzodiazepines receptor agonists (BZRAs), antipsychotics (ASs), and antihyperglycemic medications (AGs) (Farrell, Tsang et al., 2015, Greiver et al., 2019). As such, the aim of this project was to decrease the unnecessary usage of PPIs, BRZAs, ASs, and AMs for the clinic's patients who reside at the ALF by 25% during this projects time frame.

Congruence of DNP Project to the Organization

This project aligned with recent recommendations made by the Institute for Healthcare Improvement (IHI) (2020) to stop medications in the elderly which could impair patient mobility, decease their mentation, or interfere with what is important to the patient (2020). Additionally, the two NPs at the rural clinic know many of their patients and their immediate families on a personal level which enables them to provide comprehensive family centered care. Since the goal of this DNP project was to reduce medications that could potentially cause issues in the elderly, it aligns with the mission of the clinic, which is to maintain a "collaborative and respectful relationship between…employees and…patients, fellow caregivers, and the community as a whole" (Project Site Website, n.d. para. 1).

The vision of the clinic is that "the residents of [town] and surrounding communities will achieve better health and easier access to care because of the services provided by [the clinic]" (Project Site Website**,** n.d. para. 2). This project is in congruence with the vision of improving health care in the region in that a systematic approach to deprescribing utilizing evidence-based practice will optimize health for the local population. Additionally, the NPs feel a personal and professional responsibility to incorporate evidenced-based care to their patients and surrounding community.

CHAPTER TWO

REVIEW AND SYNTHESIS OF THE EVIDENCE IN THE LITERATURE

One of the underpinnings of successful change in healthcare is to first identify gaps in care for which there is evidence of need, followed by an evidence-based intervention with demonstrated benefit. Monsoon et al. (2019) report that polypharmacy, defined by the act of being on five or more medications, likely affects over 80% of residents in nursing homes and contributes to adverse drug events (ADE); this information indicates there is a need to focus on reducing polypharmacy in the elderly. Additionally, despite overwhelming evidence of the harmful effects of potentially inappropriate medications (PIM) in older adults, and despite the availability of multiple evidence-based guidelines, many clinicians are still prescribing medications without first considering safer alternatives, such as prescribing cognitive behavior therapy instead of benzodiazepines for insomnia (World Health Organization, 2017).

A search in PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHL), utilizing the terms “polypharmacy”, “deprescribing”, “guidelines”, “inappropriate medications”, and “elderly,” revealed a large body of evidence surrounding polypharmacy. Multiple systematic reviews (SR), meta-analyses (MA), and randomized control trials (RCTs) looking at polypharmacy in adults were reviewed. Many articles located were written in 2019 and 2020, which demonstrates that there is a recent growing body of literature surrounding these topics.

Benefits of Reducing Medication Number

Exploring the balance between risk and benefit in an elderly population achieved with a systematic approach to deprescribing was a topic investigated by Page et al. (2016) in a SR and MA. Risks identified with polypharmacy included cognitive impairment, disability, falls, frailty, and increased mortality. After analyzing 132 papers, these authors concluded that non-randomized trials indicate mortality, as well as other negative outcomes, can be significantly reduced by applying patient-specific deprescribing interventions, such as targeting specific medications to deprescribe and then actively deprescribing those specific medications (Page et al., 2016).

Kua et al. (2019) evaluated 41 RCTs (18,408 residents) looking at the effect deprescribing had on hospitalizations, all-cause mortality, and falls in a nursing home setting. Of the 41 studies Kua et al. (2019) evaluated, 14 appraised the effect of medication discontinuation by a physician or a pharmacist. Additionally, 11 of the studies evaluated the efficacy of using a standardized deprescribing tool such as the Beers List or Screening Tool of Older Persons' Prescriptions (STOPP) for medication reduction. The conclusion of this SR was that a structured approach to deprescribing can reduce risk to patients, such as all-cause mortality and falls. However, the authors conceded that these findings could be premature as most of these randomized control trials were of short duration (Kua et al., 2019).

Gray et al. (2018) reviewed 13 RCTs related to optimizing medications to avoid ADEs. Interventions, such patient interviews, chart reviews, or computer decision support, led by pharmacists, primary care providers, and other health professionals were reviewed. The result of this analysis was that those patients who had any of the intervention were 21% less likely to suffer any ADE, and 36% less likely to experience a severe ADE (Gray et al., 2018). It was unclear if these interventions were able to prevent a major medical event, such as a hospitalization.

Deprescribing Tools and Enablers

A SR conducted by Thompson et al. (2019) looked at tools and guidelines available to prescribers to help with medication management in frail older adults; 15 were identified. The reviewers organized those 15 into three categories: tools that defined a framework for approaching deprescribing, tools that delineated a deprescribing approach for the entire medication list, and tools that specified medication specific advice. Only four of the tools had undergone clinical testing. Additionally, these authors felt the clinical testing of the tools was of reduced quality due to poor methodology. As such, these researchers questioned if the tools currently available to practitioners, such as the Beers List and STOPP, are likely to improve clinical outcomes or reduce inappropriate medication use (Thompson et al., 2019).

In a nonrandomized clinical trial, Tinetti et al. (2019) explored whether conducting medication reviews focused on patients' goals rather than clinical guidelines can reduce medication burden and improve patients' quality of life. A total of 366 patients participated in this study and were followed for nine months. This study established that deprescribing based on patients' health goals can be an effective way to decrease medication burden and improve quality of life and diagnostic testing, while at the same time not significantly increasing healthcare visits.

Identifying barriers and enablers to deprescribing in the elderly was the focus of a SR conducted by Paque et at. (2019). The five studies that met the criteria for this SR identified three types of enablers: organizational, which includes adequate staffing and training, professional, which includes communications between the health care team, and patient-related, which includes patients' interest in decreasing the number of daily medications and decreasing costs. Organizational support and multidisciplinary teams were the most significant enablers of deprescribing. Barriers identified were patients being concerned with deprescribing, as they frequently felt they were being cut off from therapies due to their age, as well as staff caring for these patients fearing an exacerbation in patient conditions, such as an increase in agitation and insomnia with the discontinuation of psychotropic agents (Paque et at., 2019).

Deprescribing Specific Classes of Medications

Various agencies and societies have recently published position statements and recommendations regarding the importance of reducing medication burden for the elderly. The Lown Institute, a national think-tank, convened 22 experts in 2019 and created 11 suggestions to address the main drivers of medication overload; these recommendations included advocating for the limited use of preventive medications, such as proton pump inhibitors, and interventions once patients are already on too many medications (The Lown Institute, 2020). The World Health Organization (WHO) (2017) made it a global goal of reducing severe, avoidable medication-related harm by 50% over the next five years. This campaign, known as Medications without Harm, also challenged healthcare professionals around the world to take actions that will reduce the risk of harm from medication errors. In 2019 the American Geriatric Society updated the Beers List with their latest recommendation of medications to potentially avoid or consider with caution in the elderly, because they often present an unfavorable balance of benefit to harm ratio (2019 American Geriatrics Society Beers Criteria® Update Expert Panel, 2019).

Additionally, numerous agencies have voiced concern over the use of certain medication classes in the elderly. The Institute for Healthcare Improvement (IHI) (2020) published a recommendation that primary care providers should deprescribe benzodiazepines and antipsychotics (among others) and avoid their use whenever possible. The American Geriatric Society recommends that PPIs should not be used for more than eight weeks, BZRAs and APs should be avoided, and since sulfonylureas have a high risk for prolonged hypoglycemia, they should be avoided as well (2019 American Geriatrics Society Beers Criteria® Update Expert Panel, 2019). Additionally, the Canadian Geriatrics Society recommends the limited use of these four classes (PPis, BZRAs, ASs, AGs) of medications (Hart & Giancroce, 2015).

In a performance improvement project, Dharmarajan et at. (2019) tracked the success of deprescribing various classes of medications in an elderly population. Deprescribing was initiated following a discussion with the patient or their caregiver. No specific research-based guidelines (STOPP or Beers) were used. During 383 patient encounters, on average 1.3 medications were discontinued per patient. The medications most frequently deprescribed were: antihistamines (46.7%), analgesics (32.2%), multivitamin-minerals supplements (29.7%), acid blockers (26.2%), and lipid-lowering agents (22.9%) (Dharmarajan et at., 2019). Lack of provider time was identified most frequently as the one factor that hindered deprescribing efforts.

Farrell, Richardson et al. (2018) explored the benefit of educating providers on the negative effects proton-pump inhibitors (PPIs), benzodiazepine receptor agonists (BZRAs), antipsychotics (ASs), and antihyperglycemic medications (AGs) can have on the elderly, and the effect this education has on provider self-efficacy scores. This study targeted physicians, nurse practitioners and pharmacists at three long-term care (LTC) facilities and three Family Health Teams in Ottawa, Canada. Provider self-efficacy regarding these three classes of medications (PPIs, BZRAs, and APs) was first assessed via survey. An evidence-based guideline for proper medication use was then educated upon and implemented. Six months later self-efficacy was reassessed. With the implementation of the guidelines, self-efficacy scores increased, with the largest increase seen in the clinicians at the LTCs who routinely used the guidelines (Farrell, Richardson et al., 2018).

Strengths and Limitations of the Literature

Recent recommendations by the IHI (Institute of Healthcare Improvement, 2020) and numerous systematic reviews (Page et al., 2016, Kua et al., 2019, Seidu et al., 2019) point to the importance and significance of addressing polypharmacy in the elderly. This evidence will assist the NPs at the clinic to prepare for the challenges associated with deprescribing. Considering these barriers and enablers, and in an effort to make a positive impact, guidelines have been created which focus on four common medication classes. The NPs at the clinic will be able to easily implement this practice change with limited time commitments.

One of the limitations of this intervention (deprescribing PPIs, BSRAs, ASs, AGs at the same time) is that there is no data available on the effectiveness of utilizing the guidelines and tools suggested by the Bruyère Research Institute in clinical trials. While there are ongoing clinical trials, they are not scheduled to be completed until 2022. Additionally, the NPs at the clinic might be hesitant to target specific classes of medications to deprescribe as they might feel those medications are appropriate in the patients at the assisted living facility.

Conclusion

Elderly patients who take five or more medications are at risk for increased mortality related to adverse drug events (ADEs), falls, increased hospitalizations, and decreased quality of life (World Health Organization, n.d.). Although there are a host of guidelines and tools available to aid primary care providers with the reduction of medication burden, these guidelines are underutilized; one reason frequently cited is a lack of provider time (Dharmarajan et at. (2019). There is an increased emphasis in the literature for providers to focus on certain medication classes which are known to be problematic and to employ patient preferences in the deprescribing process, rather than utilizing extensive lists such as the Beers List or STOP to guide the process (Hart & Giancroce, 2015; Institute for Healthcare Improvement (IHI), 2020; Tinetti et al., 2019). To speak to that need, researchers at the Bruyère Research Institute created four simple, evidence-based guidelines, which all providers, including the NPs at the clinic can use to start the deprescribing discussions with their patients.

CHAPTER THREE

SETTINGS AND METHODS

Theoretical Framework: Kurt Lewin's Planned Change Theory

Change is frequently met with resistance and skepticism. Kurt Lewin, a German psychologist, proposed a systematic method of planned change in 1951; he suggested that impulsive or chaotic change creates a sense of uncertainty and anxiety among those involved, but that a systematic approach can be implemented with minimal disruptions (Oberleitner, 2019). Lewin's Planned Change Model illustrates that for a new transition to be successful, there must be a recognition for the need to change, some momentum to push toward a new way of functioning, and consistent stabilization of the new process (Oberleitner, 2019). If stabilization is successful, the change is assimilated into the system. The three parts to this process are: unfreezing, movement, and refreezing (Oberleitner, 2019).

Kurt Lewin's Planned Change Theory provided a useful framework for this DNP project. In the unfreezing stage, the nurse practitioners (NPs) agreed that change was needed and desired to move away from their standard practice of prescribing, which was based mostly on clinical judgement. In stage two, moving, the DNP student conducted an educational session at the clinic for both NPs. A brief overview of the issues with polypharmacy in the elderly, which include increased falls and hospitalizations, was presented. The four guidelines created by the Bruyère Institute, targeting the appropriate use/deprescribing of proton pump inhibitors (PPI), benzodiazepine receptor agonists (BZRA), anti-psychotics (AS), and antihyperglycemic medications (AG) (see Appendix G), were introduced and justification offered as to why the intervention was a worthwhile endeavor to embark upon. The providers were then encouraged to start using the tool. Finally, in stage three, refreezing occurred where following these guidelines became a practice-wide standard for all patients.

Agency Description

Setting

The project was implemented at Complete Care Clinic (pseudonym), which is a rural primary care clinic in north central Montana. For the sake of this project, the clinic will be referred to as CCC. CCC has been in operation since 2012 and is equally owned by two NPs, who are the sole providers at the clinic, as well as the only primary care providers in this town of 650 people. Clinic staff includes a receptionist and two medical assistants. The clinic provides primary care services for all age groups, including 21 elderly patients who reside at a nearby assisted living facility. There is a critical access hospital approximately 20 miles away. The closest specialty center is 40 miles away. The clinic is open Monday through Friday from 0830 to 1630 hours.

Target Population

The target population for this intervention were the 21 elderly patients who reside at the local assisted living facility and seek care at CCC. They were considered at high risk for polypharmacy and adverse drug events due to their age. The average age for these 21 patients was 80 years. For the sake of this project, the assisted living facility will be referred to as ALF.

Description of Stakeholders

The two NPs who are the owners and sole providers were some of the key stakeholders in this project, as the project had a direct impact on their clinical practice and prescribing habits. The other staff members were included in the education intervention as well, due to their role in determining current medications, reviewing compliance with medications, and providing direct clinical care to the patients. Patients at ALF were also important stakeholders because of the direct effects the intervention had on them.

Facilitators and Barriers to Implementation

The facilitators and barriers of this project were analyzed utilizing the Strengths, Weaknesses, Opportunities, and Threats (SWOT) Model (see Appendix A). One of the strengths of this project was the growing body of evidence supporting the discontinuation of harmful, inappropriate, and unnecessary medications in patients with limited life expectancy, such as those living at ALF. Another strength was that CCC already had an excellent medication review process in place, although there was no structured focus on deprescribing. All medication lists were reviewed and reconciled by the medical assistants (MAs) during each patient visit which made it conducive for the project.

Opportunities included possible increased patient satisfaction related to taking less medications, which would also reflect well on CCC and ALF. Additionally, and more importantly, taking less medications would potentially improve health outcomes and provide better quality of life for this patient population.

The time frame for implementation and data collection for this project was ten weeks. As such, one of the barriers to this project was the limited length of time available to implement and analyze the data of the deprescribing practices at repeated intervals. Also, during this time frame, it was hard to determine the number of patients from ALF who would seek care at CCC. There was also the likelihood that some patients would refuse to have their medication deprescribed, especially the benzodiazepines, thus hindering the success of the project.

Project Design

This project was designed to reduce inappropriate usage of proton pump inhibitors (PPIs), benzodiazepine receptor agonists (BZRAs), anti-psychotics (ASs), and antihyperglycemic medications (AGs) in patients residing at ALF during primary care visits. As part of the project, provider self-efficacy regarding the usage/deprescribing of these classes of medications was assessed prior to project implementation. This was recorded via survey and was reassessed upon completion of the project.

The goals of this project were:

- to decrease the usage of the targeted medication classes at ALF by 25% in eight weeks
- to increase provider self-efficacy scores regarding these four classes of medications by 50%, upon the completion of the project

Project Methods

Procedure and Implementation

The two NPs at CCC were made aware of this project during a site visit; they agreed to host this project. At the start of the project, a self-efficacy survey was completed by the NPs to assess their comfort with deprescribing these classes of medications: proton pump inhibitors (PPI), benzodiazepine receptor agonists (BZRA), and anti-psychotics (AS). This survey was emailed to the clinic four days prior to the first educational session; the recipient of the email was confirmed. The NPs were asked to print a copy of the survey, fill it out, and then place the completed survey into an envelope. This was to ensure the survey responses remained anonymous. The DNP student later collected the surveys at the clinic after the first educational session. This process was repeated at the end of the project with the NPs again printing a copy of the survey, filling it out, and placing it in an envelope.

Clipboards are utilized at CCC to gather and provide patient specific information. Prior to each patient visit, the medical assistant (MA) attaches three sheets to the clipboard: a medication list, an intake sheet, and a billing sheet. The MAs at CCC were instructed to attach the four guidelines to the clipboard for any patient who resides at ALF during the intervention period. This assisted the NPs with familiarizing themselves with the guidelines. When the NP saw the guidelines attached to the clipboard, it alerted them to review the patient's medication list for any of the four targeted medication classes and reminded them to discuss the reduction or discontinuation of those medications with the patient if they were not clinically indicated.

The initial plan was for the DNP student to visit the clinic every one-to-two weeks to encourage use of the guidelines, evaluate the effectiveness of the intervention, get feedback on how things were going, and answer questions. Weekly phone calls to CCC staff revealed that no patients came to CCC for care in the first four weeks after the implementation of this project, a consequence likely due to local Covid-19 restrictions. Subsequently, weekly clinic visits were felt to be unnecessary, since it was winter in Montana and CCC was 40 miles from where the DNP student lived.

The target population was altered after eight weeks to all patients over the age of 60 who came to CCC. This change was necessary because of the limited number of patients who came from ALF to CCC during the initial phase of the project. The project was extended for an additional two weeks and took a total of ten weeks to complete.

Education Intervention

Deprescribing was introduced to the NPs and clinic staff as the dose reduction or stopping of medications that could cause harm or were no longer beneficial (Reeve et al., 2018). The education was designed to highlight the deprescribing algorithms created by the Bruyère Research Institute. This one-hour group session helped familiarize the NPs with the guidelines, afforded them the opportunity to ask questions, and provided a tangible method to aid in their deprescribing practices.

Human Subject's Protection

The Montana State University-Bozeman (MSU-Bozeman) Institutional Review Board (IRB) was consulted prior to the initiation of this project (see Appendix C). This project was deemed by MSU IRB to meet criteria for exemption from full review (IRB LW112320-EX). When the target population was changed, a request was resubmitted to MSU-IRB and was also approved (see Appendix D).

The NPs self-efficacy scores related to deprescribing were assessed via survey. Since there were no personal identifiers on these surveys, the NPs identities were not compromised.

When the target population changed, a simple sheet was created (see Appendix B) to assist with identifying patients and for tracking medication changes. This sheet had patients' names on it, but it did not leave CCC and was present in de-identified format to maintain confidentiality.

<u>Measurements and Outcomes</u>

The outcomes of this DNP project were measured both quantitatively and qualitatively. Utilizing the medication lists in the electronic health record (EHR), a spreadsheet was created in Excel at the initiation of the project to catalog all the patient medications. At the end of the project, a new spreadsheet was created to analyze changes.

A pre-and post-intervention survey (Appendix E) was used to measure self-efficacy in deprescribing the medication classes targeted in this project. The Self-Efficacy Survey (SES) consists of 3 sections—a demographic section, a practice rating section, and a self-efficacy section. The self-efficacy section is divided into four subsections. The same nine items are asked of BZRAs, PPIs, and SA (total 27 questions). The fourth subsection is composed of fifteen-question section related to "Deprescribing Under Potentially Impeding Circumstances" which focuses on general deprescribing in the presence of specific challenging circumstances. In each subsection, the respondent is asked to rate their ability to carry out items on a scale of 0-100. For example, respondents are queried about their ability to weigh benefit versus harms of continuing the medication, ability to weigh benefit versus harms of deprescribing, and ability to consider patient goals and preferences.

The self-efficacy score for each medication subsection is determined by adding all the scores together and dividing by nine; conversely the 15 question "Deprescribing Under Potentially Impeding Circumstances" scores are summed and then divided by 15 for an average score.

At the time of this project, no psychometric testing had been completed on this instrument to assess its validity, reliability, or predictive ability for provider guideline adherence (Farrel, Richarson, et al., 2018). It was, however, developed utilizing theory-based construction, which enables the identification of relevant concepts of deprescribing (Farrel, Richarson, et al., 2018). This resulted in "high internal consistency that suggests the survey contains tasks that measure self-efficacy for deprescribing reliably" (Farrel, Richarson, et al., 2018, p.23).

A paper copy of the *Deprescribing Self-Efficacy Survey* was administered prior to the educational session. This same survey was administered at the completion of the project, and scores analyzed to assess changes in self-efficacy scores.

After eight weeks, this project was expanded to include all patients over 60. The plan was also to collect demographic information (age, sex, medications) at the completion of the project based on the sheets collected. However, at the conclusion of the project, it was learned that instead of containing patients' names on the sheets, 16 of the 29 sheets only contained the patients' initials. This made it difficult to collect individual patient information.

Timeline

This project involved the implementation of deprescribing guidelines at a rural clinic. IRB approval was obtained on November 23, 2020, and the provider self-efficacy survey and provider education was completed by December 8, 2020. The medical assistants (MAs) started attaching the guideline to the clipboards by December 9, 2020. On February 8, 2021 the population was expanded to include patients over 60. This was implemented for two weeks. The whole project was completed in ten weeks to meet the constraints of the academic calendar.

Resources

Costs associated with this project to CCC were minimal. The education session, along with the self-efficacy survey, was completed during the NPs/MAs scheduled lunch break, with this DNP student providing lunch. Attaching the algorithms to the clipboard took minimal effort;

as such, there was no significant increased time or labor costs associated with this task. Additionally, medication reviews are completed yearly by the NPs during annual visits to assess the appropriateness of all medications; as such, scanning patient medication lists for the targeted medications took minimal time.

CHAPTER FOUR

OUTCOMES

The goals of this DNP project were two-fold. The first goal was to see a reduction in the targeted classes of medications in the patients residing at ALF by 25%. The second was to increase the providers self-efficacy scores by 50% regarding the classes of medications in the project, as captured by the self-efficacy survey by the end of the project.

Deprescribing Outcomes

Likely due to Covid-19 restrictions, clinic visits by residents at ALF dropped dramatically during project implementation. Only two patients came to CCC during the initial eight weeks of this project. One patient was not on any of the targeted medications. The other patient was on a PPI; however, this patient was acutely ill during this visit and ended up being transferred to the hospital. As such, the goal of reducing medications in this population was not met.

Due to the limited data available on the effectiveness of the intervention targeting only residents at ALF, the decision was made to screen everyone over the age of 60 who came to CCC for the targeted classes of medications. This screening took place for a two-week period to meet the constraints of the academic calendar. A total of 29 patients in this age group came to the clinic during this time period. Ten of those patients were on a PPI and one on a BZRA. None of the patients screened were on any of the other two classes of medications. None of the targeted medications were discontinued, although PPI dosing was decreased from twice daily to daily in two patients.

Provider Self-Efficacy

The two providers at CCC were asked to fill out a self-efficacy survey (SES) regarding their confidence in deprescribing potentially inappropriate medications (see Figure 1 for initial scores). The SES included nine items specifically asking about deprescribing PPIs, BZRAs, and ASs, and fifteen questions about deprescribing under potentially impeding circumstances. Items were rated on a "sliding bar" format with a scale of 0 to 100 (0 = cannot do at all, 50 = moderately certain can do, 100 = highly certain can do). The self-efficacy survey was filled out again at the completion of the project (see Figure 2 for combined pre/post scores). Total scores in these four categories increased 15% during the intervention period. The largest score increase was in "deprescribing under potentially impeding circumstances" with scores increasing exactly 47% for both providers in this category (see Figure 1). Since the overall goal was to increase self-efficacy scores by 50%, this goal was not met (see Appendix F for individual item scores).

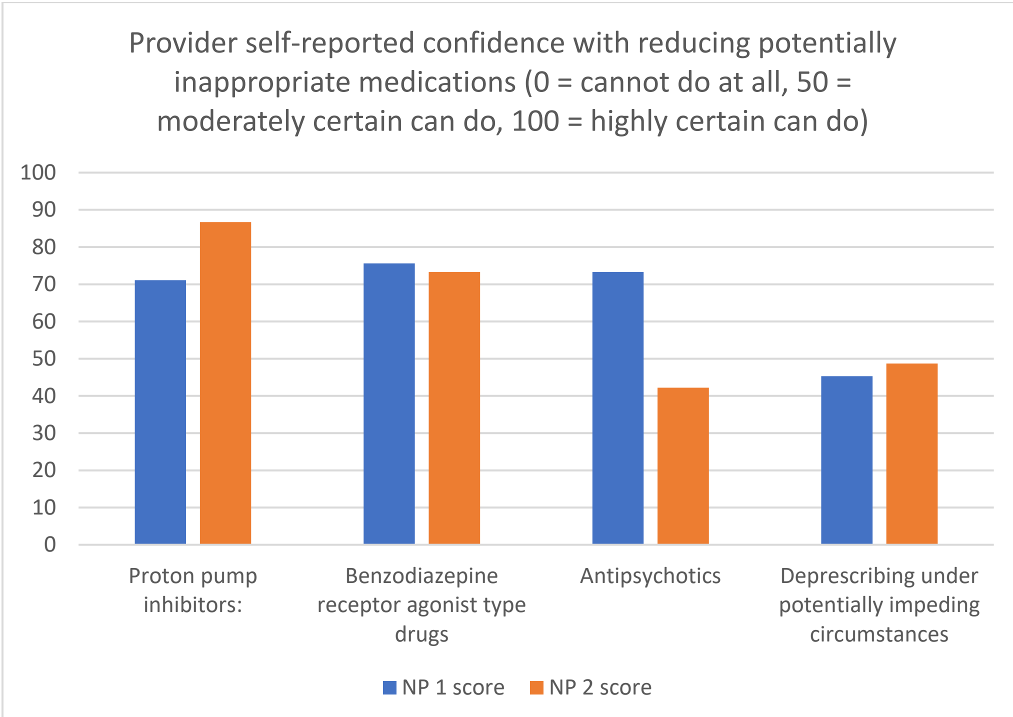

Figure 1. Initial Self Efficacy Scores

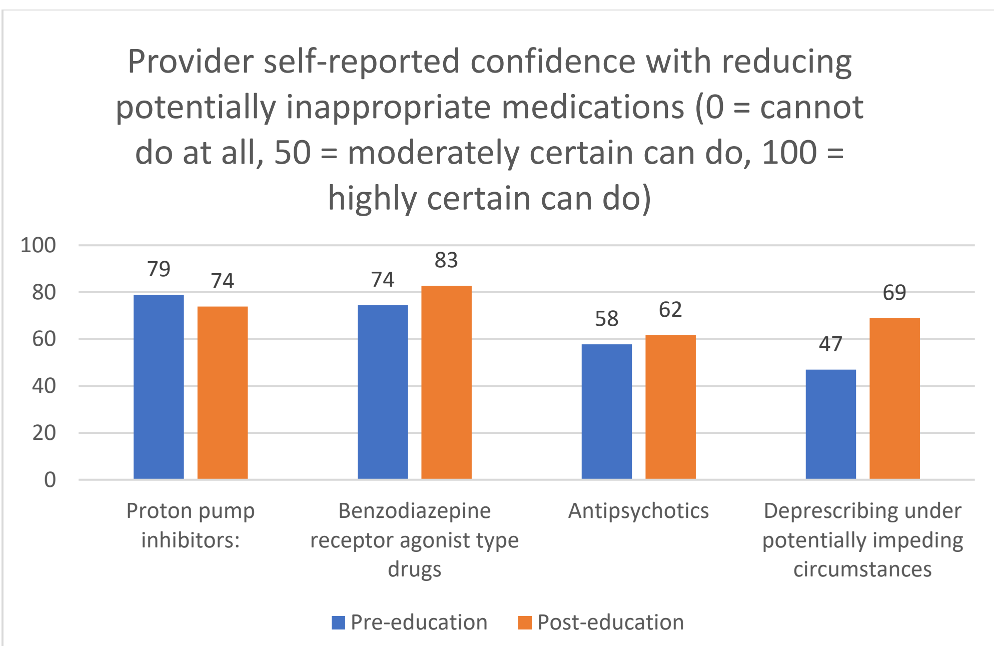

Figure 2. Pre/Post Education Scores

The education session and the algorithms were well received. The NPs were genuinely interested to learn which medications have been identified as being the most problematic in the elderly. Additionally, they verbalized appreciation for being provided with a guide on how to wean BRZAs and ASs. After the education session, they asked to keep the copy they had been provided, as they felt it would enhance their practice.

CHAPTER 5

DISCUSSION

This project was implemented at a rural clinic in central Montana, here referred to as CCC, to assist the two NPs who own CCC in their deprescribing practices. Concerning the target population for this project, the DNP student initially made the decision to focus this intervention specifically on 21 patients who reside at a local long-term living facility nearby, here referred to as ALF, and depend on these NPs for primary care.

The project began with the NPs completing a self-efficacy survey assessing their general deprescribing practices, as well as their comfort with managing and deprescribing three separate classes of medications: proton pump inhibitors (PPIs), benzodiazepine receptor agonists (BRZAs), and antipsychotics (AS). After this, an in-office educational session was conducted via PowerPoint format discussing polypharmacy, and the deprescribing algorithms created by the Bruyère Institute. An emphasis was placed on deprescribing in the elderly. The medical assistants (MAs) who prepare clipboards with patient demographics and medication lists for the NPs were educated on the proposed project and instructed to attach the algorithms to each clipboard for patients who reside at ALF prior to their visit. The DNP student then conducted weekly phone calls to check how many patients from ALF had come to CCC during that week. When at the end of an eight-week period only two patients from ALF had come to CCC, the decision was made to try the algorithm on any patient over 60 who came to CCC. This was trialed over a two-week period.

Self-Efficacy Score Discussion

Farrel et al. defined self-efficacy as "the belief that one is capable of organizing and completing actions to achieve specific results and reflects how long one will persevere when faced with challenges" (2018, p.19). To gain an understanding of the NPs self-reported self-efficacy regarding deprescribing, a survey was first completed by the NPs prior to the educational session at the start of the project. This survey was again completed ten weeks later at the conclusion of this project.

When comparing before/after results regarding the NPs' scores concerning deprescribing, mixed results were observed (Figure 1). Self-efficacy scores related to deprescribing PPIs decreased by 6% for both providers. This partially makes sense in that the providers likely found stopping PPIs more difficult than they initially imagined even when using the algorithms. Scores for "Deprescribing Under Potentially Impeding Circumstances" increased 47% for both providers. This could be as a result of the initial education session and the implementation of the algorithms.

Related to PPI self-efficacy scores, there was no identifiable pattern that revealed which specific items contributed to this decrease. Some items were rated high by one provider and low by the other; additionally, although one NP may have increased the rating on a specific item from the first survey to the second, the inverse may have been true for the other NP. It is difficult to determine what might have contributed to the overall decrease in PPI self-efficacy scores. It is reassuring though that the results were consistent concerning PPIs- a decrease in 6% for both providers.

Ten weeks elapsed between the initial education session and the completion of the last survey, so some of the initial knowledge gained during this session was likely lost. In hindsight, it might have been beneficial to repeat the education session either at midpoint, or after the target population changed. The PPI algorithm was likely the one that was reviewed most frequently by the NPs, especially towards the end of this project, as PPIs were the most frequently observed on patient lists. Since the project had limited decreases in medications, the NPs potentially realized at the completion of the project that deprescription was more difficult than they had anticipated. This may have contributed to their decrease in self-efficacy scores. The average score for PPIs was still 74, which indicated a moderate-to-high self-efficacy score related to deprescribing PPIs.

Self-efficacy scores for both BZRAs and ASs varied widely (see Appendix F). When considering BZRAs scores, NP 1's score decreased by 24%, while NP 2's score remained unchanged at 75%. Additionally, pre-post survey results related to ASs fluctuated widely, with NP 2 reporting a 61% increase and NP 1 reporting a 24% decrease. An explanation to account for these scores is difficult. Certainly, the length of time that elapsed from the education session to the final survey played a part, as did the fact that there were no patients on an AS and only one on a BZRA. The small sample (n=2) of providers who filled out the survey affected the range of scores as well.

It was reassuring to see scores for "Deprescribing Under Potentially Impeding Circumstances" increase by 47% for both providers (average pre-post score 47 vs. 69). This item focused on general deprescribing, not necessarily on any medication class. It speaks to the potential long-term impact of this project and the implementation of these algorithms in that there was clearly an increase in the confidence of the NPs when it came to deprescribing in the elderly.

Deprescribing Discussion

A review of the medical record prior to the implementation of this project indicated that among the 21 patients who seek care at CCC, patients averaged 13 medications. Ten patients were on a PPI, two on an AS, and one on a BRZA. This NP student felt these numbers established the need for this quality improvement project. This data was presented to the NPs during the education session at the beginning of the project.

The implementation of this project occurred in December 2020, in the middle of the Covid-19 pandemic. At that time stringent measures were in place across the United States regarding social distancing and public mandatory masking. Moreover, lockdowns were in place for many assisted living facilities across the United States, as the elderly were at higher risk for developing serious complications related to COVID-19. Some of the rules enacted included Covid-19 testing for all employees twice a week, no visitors/family allowed, and limited excursions outside the facility. These safeguards likely impacted the volume of patients seen at CCC.

The probability of a limited number of patients arriving at CCC for healthcare due to Covid-19 restrictions was carefully considered prior to the planning and implementation of this project. However, at that time Covid-19 guidelines and restrictions were changing on a seemingly weekly basis (and continued to change as of February 2021). As such, it was difficult to project what the situation would be in six months when this project was originally slated to take place.

Ultimately, the decision was made to proceed with the target population based on a publication by the Institute of Healthcare Improvement (2020), which discussed the wide-spread use of potentially inappropriate medications (PIMs) in the elderly, the economic burden of these medications, and the increased need for primary care providers to focus on deprescribing. This publication advocated for the use of deprescribing algorithms which had recently been developed by the Bruyère Institute and focused on systematically deprescribing specific classes of medications in the elderly. The knowledge that 40% of the patients at ALF were on a PPI also factored into this decision. These residents and setting provided the possibility of making a significant impact in the health and wellbeing of a vulnerable population, for whom even a limited reduction in medications could make a significant difference in their quality of life.

By the end of this eight-week project, two residents from ALF came to CCC. Although the algorithms were on the clipboard per verbal report, one patient was not on any of the targeted medications. The other patient came to CCC when acutely ill; he was admitted to the hospital where he stayed for ten days.

After only a limited number of the targeted population came to CCC, the decision was made to screen and apply the algorithms on every patient who came to CCC over the age of 60 for a two-week period. Two of those patients (20%) were switched from twice daily to daily dosing. While not completely weaned off, this reduction in PPI dosing could still be impactful in the long-term health of these patients such as reducing their risk of osteoporosis, kidney disease, anemia, vitamin deficiencies, and *Clostridium difficile* infections (Strand et al., 2017).

Any reductions in medication usage results in immediate cost savings. The approximate price for 30 pantoprazole tablets is around $30 (goodrx.com). In a patient who takes pantoprazole daily, this translates into a $360 annual savings if this medication is stopped. If seven of the ten residents at ALF who are on a PPI stopped their PPI or had their doses decreased from twice daily to daily dosing, a direct saving of $2520 ($360 x7) could be realized.

Written comments made by the NPs regarding the decision to not change any of the other prescriptions included: “controlling symptoms, declines,” “tried to wean off,” and “have attempted weaning in the past” among others. Nevertheless, over half of the sheets where a patient was on a PPI had no comments.

Limitations

This project had several limitations. First, the small sample size limits its generalizability. In addition, only two NPs were involved, and their deprescribing practice may not be reflective of what happens in other practices. Secondly, the project was carried out in a small clinic in a rural town and may not be applicable in urban settings. However, the protocol could be applied to all geriatric patients in any setting. Third, it was conducted in the middle of the Covid-19 pandemic with the target population being residents of a local assisted living facility who had lots of restrictions and lockdowns. These lockdowns made it difficult to adequately follow the patients nor get adequate sample size to fully assess the efficacy of the intervention. Ideally, screening of patients over the age of 60 would have lasted longer to fully assess the discontinuation rates of the medications. However, the project was cut short due to academic constraints.

Feasibility and Plan for Sustainability

Implementing the algorithms could easily be accomplished in any primary care office with minimal effort and cost involved, making widespread feasibility one of the highlights of this project. This project is also sustainable in that the algorithms are easily printed off the Internet, free of charge, from *deprescribing.org*. The algorithms could also be laminated and left in each provider's room for future reference. A panel of experts through a rigorous evidence-driven process identified which medication classes to target, making it easier for providers to remember which medications to prioritize for deprescribing when reviewing medication lists; this speaks to the generalizability of this project. An additional motivator for all providers to implement these algorithms is the incentive to decrease healthcare costs, which is achieved by eliminating unnecessary medications.

There was no upfront cost to the NPs to implement this project. Medication lists were already reviewed with each patient visit; since the project focused on four classes of medications, additional time needed to review patients' medication lists with a specific eye towards these four classes was nominal.

Recommendations for Future Work

After the initial education period, the NPs appeared excited about the project and were ready to take a different approach to medication deprescribing in their patients. According to Kurt Lewin's Planned Change Theory, this was the "unfreezing" stage. However, because a very limited number of patients came during the initial eight-week period, "movement" never took place. One recommendation would be to try to reinstall "excitement", such as offering the initial education session again if "movement" never occurs. One can only wonder if more medications would have been discontinued in the "60 and over population" had this been the target population from the start, while the education was fresh in the minds of the NPs.

This project has corroborated many of the findings in the literature about the widespread, potentially inappropriate use of PPIs (Heidelbaugh et al., 2010; Delcher et al., 2015). Future projects could simply target inappropriate PPI use in all ages using the algorithms created by the

Bruyère Institute. Additionally, these algorithms were well received by the NPs; as such they could be introduced to all providers in the primary care setting; priority should be given to getting them in the hands of geriatricians and those who have a large older patient population.

DNP Essentials

The American Association of Colleges of Nursing (AACN) created eight competencies which "are the foundational outcome competencies deemed essential for all graduates of a DNP program regardless of specialty or functional focus" (AACN, 2006, p. 8). From its earliest stages, this project exemplified many of the DNP Essentials, from the original stages of problem recognition to the final stages of implementation and evaluation.

This first essential *Scientific Underpinning for Practice* speaks to the need for science and theory to be the foundation for advanced nursing practice. This underpinning guided the literature review to gain a deep understanding of the drivers of polypharmacy, the significance of the issue, and possible evidence-based solution to this significant issue. This knowledge, along with Kurt Lewin's Change Theory, was used to bridge the gap from research to practice. Essential II and VII: *Organizational and Systems Leadership for Quality Improvemen*t and *Systems Thinking and Clinical Prevention and Population Health for Improving the Nation's Health* guided the decision to focus on an older, vulnerable population in a rural location and to implement four algorithms targeting four classes of medications which were known to be problematic in the elderly. This in turn will reduce the risk of medication adverse effects and health care costs. Finally, Essential VI: *Inter-Professional Collaboration for Improving Patient and Population Health Outcomes* was demonstrated through the education provided to the NPs, the collaboration with the support staff at the clinic, and the algorithms introduced to combat inappropriate medication use in a vulnerable population.

Conclusion

Recent evidence suggests that the number of medications a patient takes is the single most important predictor of harm (Thompson et al., 2019). While it is critical for providers to ponder the advantages and consequences of all prescribed medications, it is essential to identify those which pose increased risks to the elderly. The algorithms introduced and utilized in this project can be useful tools for not only identifying inappropriate medication use, but also offering guidance on how to stop or taper those medications. This could improve health outcomes not only in the elderly but also in the general population. Additionally, this project has shown that a brief education intervention on deprescribing can have a major impact on providers' confidence in deprescribing medications. Based on this observation, an education session on deprescribing and the implementation of the algorithms could assist all primary care providers reduce the negative effects of polypharmacy.

REFERENCES CITED

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

Abramowitz, J., Thakkar, P., Isa, A., Truong, A., Park, C., & Rosenfeld, R. M. (2016). Adverse event reporting for proton pump inhibitor therapy: an overview of systematic reviews. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*, *155*(4), 547–554. https://doi.org/10.1177/0194599816648298

American Association of Colleges of Nursing (AACN) (2006). The essentials of doctoral education for advanced nursing practice. https://www.aacnnursing.org/Portals/42/Publications/DNPEssentials.pdf

Anderson, K., Stowasser, D., Freeman, C., & Scott, I. (2014). Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. BMJ open, 4(12), e006544. https://doi: 10.1136/bmjopen-2014-006544.

Bennett, F, Ferner, R, & Sofat, R. (2020). Overprescribing and rational therapeutics: Barriers to change and opportunities to improve. *British Journal of Clinical Pharmacology*, *British Journal of Clinical Pharmacology*, 1-5. DOI: 10.1111/bcp.14291

Bjerre, L. M., Halil, R., Catley, C., Farrell, B., Hogel, M., Black, C. D., Williams, M., Ryan, C., & Manuel, D. G. (2015). Potentially inappropriate prescribing (PIP) in long-term care (LTC) patients: validation of the 2014 STOPP-START and 2012 Beers criteria in a LTC population--a protocol for a cross-sectional comparison of clinical and health administrative data. *BMJ Open, 5*(10), e009715. https://doi.org/10.1136/bmjopen-2015-009715

Budnitz, D.S., Pollock, D.A., Weidenbach, K.N., Mendelsohn, A.B., Schroeder, T.J., & Annest, J. (2006) National surveillance of emergency department visits for outpatient adverse drug events. *JAMA 296(*15), 1858-66.

Center for Disease Control and Prevention (2019) *Rural health.* https://www.cdc.gov/chronicdisease/resources/publications/factsheets/rural-health.htm

Charlesworth, C. J., Smit, E., Lee, D. S. H., Alramadhan, F., & Odden, M. C. (2015). Polypharmacy among adults aged 65 years and older in the United States: 1988-2010. *The Journals of Gerontology, 70(*8), 989-995. doi:10.1093/ger ona/glv013

ClinicalTrials.gov (2018) SPIDER: a research & qi collaboration supporting practices in improving care for complex elderly patients (SPIDER). https://clinicaltrials.gov/ct2/show/results/NCT03689049

Delcher, A., Hily, S., Boureau, A. S., Chapelet, G., Berrut, G., & de Decker, L. (2015) Multi-morbidities and over prescription of proton pump inhibitors in older patients. *PLoS ONE, 10*(11). doi:10.1371/ journal.pone.0141779

Dharmarajan, T.S., Choi, H., Hossain, N., Munasinghe, U., Lakhi, F., Lourdusamy, D., Onuoha, S., Murakonda, P., Skokowska-Lebelt, A., Kanagala, M., & Russell, R.O. (2019). Deprescribing as a clinical improvement focus. *Journal of the American Medical Directors Association*. DOI:10.1016/j.jamda.2019.08.031

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

Farrell, B., Tsang, C., Raman-Wilms, L., Irving, H., Conklin, J., & Pottie, K. (2015). What are priorities for deprescribing for elderly patients? Capturing the voice of practitioners: a modified delphi process. *PloS One, 10*(4), e0122246. https://doi.org/10.1371/journal.pone.0122246

Frontier Family Practice (n.d) *Mission, vision, & values*. https://www.frontierfamilypractice.com/?page_id=15 [Redacted to protect anonymity]

Goodrx.com (2021) *Pantoprazole*. https://www.goodrx.com/pantoprazole

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

Green, J. L., Hawley, J. N., & Rask, K. J. (2007). Is the number of prescribing physicians an independent risk factor for adverse drug events in an elderly outpatient population?. *The American journal of geriatric pharmacotherapy*, *5*(1), 31–39.

Greiver, M., Dahrouge, S., O'Brien, P., Manca, D., Lussier, M. T., Wang, J., Burge, F., Grandy, M., Singer, A., Twohig, M., Moineddin, R., Kalia, S., Aliarzadeh, B., Ivers, N., Garies, S., Turner, J. P., & Farrell, B. (2019). Improving care for elderly patients living with polypharmacy: protocol for a pragmatic cluster randomized trial in community-based primary care practices in Canada. *Implementation science 14*(1), 55. https://doi.org/10.1186/s13012-019-0904-4

Gurwitz, J. H., Field, T. S., Judge, J., Rochon, P., Harrold, L. R., Cadoret, C., Lee, M., White, K., LaPrino, J., Erramuspe-Mainard, J., DeFlorio, M., Gavendo, L., Auger, J., & Bates, D. W. (2005). The incidence of adverse drug events in two large academic long-term care facilities. *The American journal of medicine*, *118*(3), 251–258. https://doi-org.proxybz.lib.montana.edu/10.1016/j.amjmed.2004.09.018

Hart, M & Giancroce, P. (2015) Safer prescribing in elderly patients. *CGS Journal of CME 5*(1) 16-22

Heidelbaugh, J., Goldberg, K., & Inadomi, J. (2010). Magnitude and economic effect of overuse of anti-secretory therapy in the ambulatory care setting. *Am J Manag Care, 10*(16). 228-234.

Holbrook, A. M., Crowther, R., Lotter, A., Cheng, C., & King, D. (2000). Meta-analysis of benzodiazepine use in the treatment of insomnia. *CMAJ : Canadian Medical Association journal 162*(2), 225–233. Inouye, S. K., Marcantonio, E. R., & Metzger, E. D. (2014). Doing damage in delirium: the hazards of antipsychotic treatment in elderly persons. *The Lancet. Psychiatry*, *1*(4), 312–315. https://doi.org/10.1016/S2215-0366(14)70263-9

Inouye, S. K., Marcantonio, E. R., & Metzger, E. D. (2014). Doing damage in delirium: the hazards of antipsychotic treatment in elderly persons. *The Lancet. Psychiatry*, *1*(4), 312–315. https://doi.org/10.1016/S2215-0366(14)70263-9

Institute of Healthcare Improvement (2020) *Age-friendly health systems: Guide to using the 4Ms in the care of older adults*. http://www.ihi.org/Engage/Initiatives/Age-Friendly-Health-Systems/Documents/IHIAgeFriendlyHealthSystems_GuidetoUsing4MsCare.pdf

Kua, C., Mak, V. S. L., & Huey Lee, S. W. (2019). Health outcomes of deprescribing interventions among older residents in nursing homes: A systematic review and meta-analysis. *Journal of the American Medical Directors Association, 20*(3), 362-372.e11. doi:10.1016/j.jamda.2018.10.026

Lamos, E. L., Stein, S. A., & Davis, S. N. (2013). Sulfonylureas and meglitinides: historical and contemporary issues. *Panminerva medica*, *55*(3), 239–251.

Lazarus, B., Chen, Y., Wilson, F. P., Sang, Y., Chang, A. R., Coresh, J., & Grams, M. E. (2016). Proton pump inhibitor use and the risk of chronic kidney disease. *JAMA Internal Medicine*, *176*(2), 238–246. https://doi-org.proxybz.lib.montana.edu/10.1001/jamainternmed.2015.7193

Leipzig, R. M., Cumming, R. G., & Tinetti, M. E. (1999). Drugs and falls in older people: a systematic review and meta-analysis: I. Psychotropic drugs. *Journal of the American Geriatrics Society*, *47*(1), 30–39. https://doi.org/10.1111/j.1532-5415.1999.tb01898.x

Mangin, D., Bahat, G., Golomb, B. A., Mallery, L. H., Moorhouse, P., Onder, G., Petrovic, M., & Garfinkel, D. (2018). International group for reducing inappropriate medication use & polypharmacy (IGRIMUP): Position statement and 10 recommendations for action. *Drugs & Aging, 35*(7), 575–587. https://doi.org/10.1007/s40266-018-0554-2

Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions. *BMC geriatrics, 17*(1), 230. https://doi.org/10.1186/s12877-017-0621-2

National Center for Health Statistics (2020) *Therapeutic drug use.* https://www.cdc.gov/nchs/fastats/drug-use-therapeutic.htm

Oberleitner, M. G. (2019). Theories, models, and frameworks from leadership and management. In M. McEwen & E. M. Wills, *Theoretical basis for nursing (5th ed.)* (pp. 376-408).Wolters Kluwer.

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M. N., Ryan, C., & Gallagher, P. (2015). STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age and ageing*, *44*(2), 213–218. https://doi.org/10.1093/ageing/afu145

Page, A. T., Clifford, R. M., Potter, K., Schwartz, D., & Etherton-Beer, 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

Paque, K., Vander Stichele, R., Elseviers, M., Pardon, K., Dilles, T., Deliens, L., & Christiaens, T. (2019). Barriers and enablers to deprescribing in people with a life-limiting disease: A systematic review. *Palliative Medicine, 33*(1), 37–48. https:// doi: 10.1177/0269216318801124

Pasina, L., Brucato, A., Falcone, C., Cucchi, E., Bresciani, A., Sottocorno, M., & Nobili, A. (2014). Medication non-adherence among elderly patients newly discharged and receiving polypharmacy. *Drugs & Aging, 31*(4), 283-289. doi: 10.1007/s40266-014-0163-7

Reeve, E., Thompson, W., & Farrell B. (2017) Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. *Eur J Intern Med, 38*, 3-11.

Schoen, C, Willink, A, & Davis, K (2019) *Medicare spending trends 2010–2016: increase in prescription drug spending more than offsets lower beneficiary costs for other services.* https://www.commonwealthfund.org/publications/issue-briefs/2019/nov/medicare-spending-trends-2010-2016-increase-prescription-drug

Seidu S, Kunutsor, S.K., Topsever P, Hambling C.E., Cos, F.X, Khunti, K. (2019) Deintensification in older patients with type 2 diabetes: a systematic review of approaches, rates and outcomes. *Diabetes Obes Metab*.21: 1668- 1679.

Sithamparanathan K, Sadera A, Leung L. Adverse effects of benzodiazepine use in elderly people: a meta-analysis. *Asian J Gerontol Geriatr* 2012;7:107–11.

Sjöblom, P., AndersTengblad, Löfgren, U. B., Lannering, C., Anderberg, N., Rosenqvist, U., Mölstad, S., & Ostgren, C. J. (2008). Can diabetes medication be reduced in elderly patients? An observational study of diabetes drug withdrawal in nursing home patients with tight glycaemic control. *Diabetes Research and Clinical Practice, 82*(2), 197–202. https://doi.org/10.1016/j.diabres.2008.08.014

Strand, D., Kim, D., & Peura, D. (2017). 25 years of proton pump inhibitors: A comprehensive review. *Gut Liver, 11*(1), 27-37. doi:10.5009/gnl15502

Sultana, J., Cutroneo, P., & Trifirò, G. (2013). Clinical and economic burden of adverse drug reactions. *Journal of pharmacology & pharmacotherapeutics, 4*(Suppl 1), S73–S77. https://doi.org/10.4103/0976-500X.120957

Tariq, R., Singh, S., Gupta, A., Pardi, D. S., & Khanna, S. (2017). Association of gastric acid suppression with recurrent clostridium difficile infection: A systematic review and meta-analysis. *JAMA Internal Medicine, 177*(6), 784–791. doi.org/10.1001/jamainternmed.2017.0212

Tinetti, M. E., Naik, A. D., Dindo, L., Costello, D. M., Esterson, J., Geda, M., Rosen, J., Hernandez-Bigos, K., Smith, C. D., Ouellet, G. M., Kang, G., Lee, Y., & Blaum, C. (2019). Association of patient priorities-aligned decision-making with patient outcomes and ambulatory health care burden among older adults with multiple chronic conditions: a nonrandomized clinical trial. *JAMA internal medicine, 179*(12), 1688–1697. https://doi.org/10.1001/jamainternmed.2019.423

The Lown Institute (2020) *Eliminating medication overload: A national action plan.* https://lowninstitute.org/wp-content/uploads/2020/01/lown-eliminating-medication-overload-web.pdf

Thompson, W., Lundby, C., Graabæk, T., Nielsen, D. S., Ryg, J., Søndergaard, J., & Pottegård, A. (2019). Tools for deprescribing in frail older persons and those with limited life expectancy: A systematic review. *Journal of the American Geriatrics Society, 67*(1), 172-180.

Vinkers, C. H., & Olivier, B. (2012). Mechanisms underlying tolerance after long-term benzodiazepine use: a future for subtype-selective GABA(a) receptor modulators?. *Advances in pharmacological sciences*, *2012*, 416864. https://doi.org/10.1155/2012/416864

Wallis, K.A., Andrews, A., & Henderson, M. (2017) Swimming against the tide: primary care physicians's views on deprescribing in everyday practice. *The Annals of Family Medicine. 15*(4). doi:10.1370/afm.2094

World Health Organization (2017). The third WHO global patient safety challenge: Medication without harm. Retrieved from https://www.who.int/patientsafety/medication-safety/en/

Wynne, A.L., Woo, T.M, & Olyacei, A.J. (2007) *Pharmacotherapeutics for nurse practitioner prescribers.* (2nd ed.) F.A. Davis

Xie, Y., Bowe, B., Li, T., Xian, H., Balasubramanian, S., & Al-Aly, Z. (2016). Proton Pump Inhibitors and Risk of Incident CKD and Progression to ESRD. *Journal of the American Society of Nephrology : JASN*, *27*(10), 3153–3163. https://doi-org.proxybz.lib.montana.edu/10.1681/ASN.2015

APPENDICES

APPENDIX A

SWOT ANALYSIS

Strengths	Weakness
• Growing body of evidence to support deprescribing • Clinic has excellent medication review in place • Guidelines being implemented are simple • Data readily available for analysis	• Project duration eight weeks • Sample size could be small due to Covid-19
Opportunities • Increased patient/family satisfaction • Improved patient health • Less medication for staff to dispense • Cost savings for patients	Threats • Pt might refuse to have medications discontinued • Staff might express hesitancy • Providers might not like guidelines being implemented

APPENDIX B

DATA COLLECTION SHEET

Is patient over 60?_____If yes, patient name.________________________

Is patient on:

__Proton pump inhibitor_________________________________

__Benzodiazepine receptor agonist ________________________

__Sulfonylurea____

__Antipsychotic____________________

APPENDIX C

IRB APPROVAL

MONTANA STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

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c/o Microbiology & Immunology
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Telephone: 406-994-4706
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MEMORANDUM

TO: Lucas Wurz and Susan Luparell

FROM: Mark Quinn *Mark Quinn cj*
Chair, Institutional Review Board for the Protection of Human Subjects

DATE: November 23, 2020

RE: *"Deprescribing Proton Pump Inhibitors, Benzodiazepines, Antipsychotics, and Antihyperglycemic Medications in an Elderly Population at a Rural Clinic" [LW112320-EX]*

The above research, described in your submission of November 21, 2020, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

____ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

__X__ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation; and (iii) the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by section 16.111(a)(7).

____ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

____ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.

____ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

____ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.

Appendix D

SUBJECT CONSENT FORM
FOR
PARTICIPATION IN HUMAN RESEARCH AT
MONTANA STATE UNIVERSITY

Title: Deprescribing Proton Pump Inhibitors, Benzodiazepines, Antipsychotics, and Antihyperglycemic Medications in an Elderly Population at a Rural Clinic

Dear Provider,

You are being asked to participate in a self-efficacy scores related to deprescribing proton pump inhibitors (PPIs), benzodiazepines (BZAs), antipsychotics (AS), and antihyperglycemic medications (AMs). Your participation in this project is important and may help us obtain a better understanding of how comfortable providers are in deprescribing those specific medications.

Participation is voluntary. If you agree to participate, you will be asked to complete a survey exploring your comfort in assessing the need for, discontinuing, and then monitoring for side effects for PPIs, BZAs, AS, and AM. We anticipate the total time to complete the survey will be approximately 10-15 minutes and there are no additional costs to you. There are no identifiable risks to you, nor are there direct benefits to you.

The results obtained from this study may be published in scholarly journals or presented at scholarly conferences and meetings. However, no identifying information is requested on the question, and thus specific data may not be linked to you by name, title, or any other identifying features. Data will be reported in aggregate.

Your participation in this survey is completely voluntary and your completed questionnaire will serve as consent to participate. You are free to decide not to participate in the project or to withdraw at any time without adversely affecting your relationship with the investigators or acquiring any loss of benefits to which you are otherwise entitled.

If at any time you have any questions about the study, you may contact me or my faculty advisor, Dr. Susan Luparell. Our contact information is listed below. If you have additional questions about the rights of human subjects, you may also contact, Dr. Mark Quinn, the Chair of the Institutional Review Board at Montana State University at (406) 994-4707 or by email at mquinn@montana.edu.

Thank you in advance for considering this request.

Sincerely,

Lucas Wurz, BSN-RN, DNP Student
Montana State University
Phone: 406-231-2488
Email: thehute@hotmail.com

Susan Luparell, PhD, RN (Faculty advisor)
Montana State University
Phone: 406-771-4459
Email: luparell@montana.edu

APPROVED
MSU IRB
11/23/2020
Date approved

APPENDIX D

STUDY MODIFICATION IRB APPROVAL

Hi Lucas,

This email acknowledges receipt of the request for a minor modification to the IRB Protocol #LW112320-EX and serves as the official Approval Letter that the modification is **approved**.

Thank you,
Kelly Beiswanger

IRB Administrator & Program Manager
Office of Research Compliance
Hamilton Hall 114
Montana State University
kelly.beiswanger@montana.edu
406-994-4706
https://www.montana.edu/orc/irb

APPENDIX E

DEPRESCRIBING SELF-EFFICACY SURVEY

User Agreement

Thank you for interest in the Deprescribing Self-Efficacy Survey. We welcome additional psychometric testing and use of the survey in deprescribing evaluation and research. Permission to use the survey is given provided you inform our research team about the context in which you are using the survey (by emailing deprescribing@bruyere.org), and it is correctly cited as follows: Farrell B, Richardson L, Raman-Wilms L, de Launay D, Alsabbagh MW, Conklin J. Self-efficacy for deprescribing: a survey for health care professionals using evidence-based deprescribing guidelines. Research in Social and Administrative Pharmacy. Published online: 2018 Jan;14(1):18-25. doi: 10.1016/j.sapharm.2017.01.003.

Introduction

Welcome! Thank you for agreeing to participate in our Deprescribing Self-Efficacy survey. We value your input and appreciate your participation in this process. There are 4 sections.

- Section 1 (this page): generate unique survey ID.
- Section 2: demographics.
- Section 3: practice rating self-efficacy for an unrelated topic.
- Section 4: rate your certainty in your capability to carry out specific deprescribing tasks for three different classes of medications, and under potentially impeding circumstances. For each of the three subsequent survey iterations, you will be asked to complete ratings for the same three classes ofmedications.

Section 1: Generate unique survey ID:

In order to ensure your confidentiality, please generate a survey code using the following instructions. These same instructions will be used in future surveys to link responses over time:

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 from questions 1-3. (eg. F23R) (This is your survey ID) Please enter your survey ID:______________

Section 2: Practice Rating

To familiarize yourself with the rating form for self-efficacy, please complete this practice item first. Certainty in one's ability to complete a task may depend on the difficulty of the task involved. This practice item will help you practice making assessments of your ability to complete tasks of varying levels of difficulty.

Physical strength practice item

Please rate how certain you are right now that you can lift the specified weight by recording a number from 0-100 using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot Do at all					Moderately certain can do					Highly certain can do

Section 3: Deprescribing Self-Efficacy Survey

This survey is designed to help us gain a better understanding of how clinicians rate their self-efficacy in deprescribing an elderly patient's medication(s) and how that self-efficacy changes over time as clinicians use deprescribing guidelines. 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 elderly patient is currently taking.

Class #1: Proton pump inhibitors:

Please rate how certain you are right now that you can carry out these tasks for deprescribing proton pump inhibitors by recording a number, 0 to 100 using the scale given below:

0 10 20 30 40 50 60 70 80 90 100

Cannot Do at all — Moderately certain can do — Highly certain can do

For a patient older than 65 years of age who is taking a proton-pump inhibitor (PPI), I am able to:

Item Certainty (0-100)

1. Weigh the benefits vs. harms of continuing the PPI	
2. Weigh the benefits vs. harms of deprescribing the PPI	
3. Consider the patient's preferences, care goals and life expectancy in deciding whether to continue or deprescribe the PPI	
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the PPI	
5. Determine the best dosing approach to deprescribing the PPI	
6. Develop a monitoring plan to determine the outcome of deprescribing the PPI	
7. Negotiate a deprescribing plan for the PPI with the patient and his/her carers	
8. Monitor and follow-up to determine the outcome of deprescribing the PPI	
9. Determine if PPI tapering should stop, or if the PPI should be restarted	

Class #2: Benzodiazepine receptor agonist type drugs

Please rate how certain you are right now that you can carry out these tasks for deprescribing benzodiazepine receptor agonist type drug (BZRA) by recording a number, 0 to 100 using the scale given below:

0 10 20 30 40 50 60 70 80 90 100

Cannot Do at all — Moderately certain can do — Highly certain can do

For a patient older than 65 years of age who is taking a benzodiazepine receptor agonist type drug (BZRA), I am able to: Item Certainty (0-100)

1. Weigh the benefits vs. harms of continuing the BZRA	
2. Weigh the benefits vs. harms of deprescribing the BZRA	
3. Consider the patient's preferences, care goals and life expectancy in deciding whether to continue or deprescribe the BZRA	
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the BZRA	
5. Determine the best dosing approach to deprescribing the BZRA	
6. Develop a monitoring plan to determine the outcome of deprescribing the BZRA	
7. Negotiate a deprescribing plan for the BZRA with the patient and his/her carers	
8. Monitor and follow-up to determine the outcome of deprescribing the BZRA	
9. Determine if BZRA tapering should stop, or if the BZRA should be restarted	

Class #3: Antipsychotics

Please rate how certain you are right now that you can carry out these tasks for deprescribing antipsychotics by recording a number, 0 to 100 using the scale given below:

0 10 20 30 40 50 60 70 80 90 100

Cannot Do at all — Moderately certain can do — Highly certain can do

For a patient older than 65 years of age who is taking an antipsychotic, I am able to: Item Certainty (0-100)

1. Weigh the benefits vs. harms of continuing the antipsychotic	
2. Weigh the benefits vs. harms of deprescribing the antipsychotic	
3. Consider the patient's preferences, care goals and life expectancy in deciding whether to continue or deprescribe the antipsychotic	
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the antipsychotic	
5. Determine the best dosing approach to deprescribing the antipsychotic	
6. Develop a monitoring plan to determine the outcome of deprescribing the antipsychotic	
7. Negotiate a deprescribing plan for the antipsychotic with the patient and his/her carers	
8. Monitor and follow-up to determine the outcome of deprescribing the antipsychotic	
9. Determine if antipsychotic tapering should stop, or if the antipsychotic should be restarted	

Deprescribing under potentially impeding circumstances:

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

Please rate how certain you are right now that you can deprescribe medications in the elderly by recording a number, 0 to 100 using the scale given below:

0 10 20 30 40 50 60 70 80 90 100

Cannot Do at all — Moderately certain can do — Highly certain can do

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

APPENDIX F

DEPRESCRIBING SELF-EFFICACY SURVEY SCORES

Deprescribing Self-Efficacy Survey Scores (Pre/post education session)	NP 1		NP 2	
Class #1: Proton pump inhibitors: For a patient older than 65 years of age who is taking a proton-pump inhibitor (PPI), I am able to: Cannot do at all Moderately certain can do Highly certain	Pre	Post	Pre	Post
1. Weigh the benefits vs. harms of continuing the PPI	80	80	80	70
2. Weigh the benefits vs. harms of deprescribing the PPI	60	80	90	70
3. Consider the patient’s preferences, care goals and life expectancy in deciding whether to continue or deprescribe the PPI	60	80	100	90
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the PPI	60	50	90	90
5. Determine the best dosing approach to deprescribing the PPI	80	80	70	80
6. Develop a monitoring plan to determine the outcome of deprescribing the PPI	80	50	80	80
7. Negotiate a deprescribing plan for the PPI with the patient and his/her carers	80	50	90	80
8. Monitor and follow-up to determine the outcome of deprescribing the PPI	80	50	90	80
9. Determine if PPI tapering should stop, or if the PPI should be restarted	60	80	90	90

Class #2: Benzodiazepine receptor agonist type drugs For a patient older than 65 years of age who is taking a benzodiazepine receptor agonist type drug (BZRA), I am able to: Item Certainty (0-100)				
1. Weigh the benefits vs. harms of continuing the BZRA	80	80	90	90
2. Weigh the benefits vs. harms of deprescribing the BZRA	80	80	80	90
3. Consider the patient’s preferences, care goals and life expectancy in deciding whether to continue or deprescribe the BZRA	80	80	70	90
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the BZRA	80	80	80	90
5. Determine the best dosing approach to deprescribing the BZRA	60	80	60	90
6. Develop a monitoring plan to determine the outcome of deprescribing the BZRA	80	60	70	90
7. Negotiate a deprescribing plan for the BZRA with the patient and his/her carers	80	80	70	90
8. Monitor and follow-up to determine the outcome of deprescribing the BZRA	80	60	70	90
9. Determine if BZRA tapering should stop, or if the BZRA should be restarted	60	80	70	90

Class #3: Antipsychotics For a patient older than 65 years of age who is taking an antipsychotic, I am able to: Item Certainty (0-100)				
1. Weigh the benefits vs. harms of continuing the antipsychotic	80	60	60	60
2. Weigh the benefits vs. harms of deprescribing the antipsychotic	80	60	50	60
3. Consider the patient's preferences, care goals and life expectancy in deciding whether to continue or deprescribe the antipsychotic	80	60	60	80
4. Determine whether a non-pharmacological intervention would facilitate deprescribing the antipsychotic	60	40	40	80
5. Determine the best dosing approach to deprescribing the antipsychotic	60	60	30	60
6. Develop a monitoring plan to determine the outcome of deprescribing the antipsychotic	80	40	30	70
7. Negotiate a deprescribing plan for the antipsychotic with the patient and his/her carers	80	60	30	60
8. Monitor and follow-up to determine the outcome of deprescribing the antipsychotic	80	60	40	70
9. Determine if antipsychotic tapering should stop, or if the antipsychotic should be restarted	60	60	40	70

4. Deprescribing under potentially impeding circumstances: A number of situations are described below which can make it difficult to deprescribe medications in the elderly. For a patient older than 65 years of age, I am able to deprescribe a medication: Certainty (0-100)				
1. When I am concerned about adverse drug withdrawal events	80	80	70	90
2. When I am concerned about exacerbations of the underlying condition the drug is being used to treat	60	60	70	90
3. When disease-specific clinical guidelines recommend the use of a medication	60	80	60	80
4. When the medication is coupled to performance indicators	60	80	60	80
5. When I receive little support from colleagues for stopping or reducing medications	60	60	60	80
6. When I have too much work to do	40	60	60	50
7. When I am concerned about damage to my provider-patient relationship	40	60	60	70
8. When the patient is resistant to change	40	60	50	80
9. When the patient's family/caregivers are resistant to change	40	60	50	80
10. When there is no literature describing the effects of medication tapering or discontinuation	40	80	40	70
11. When there is no guidance on how to taper or stop a medication	40	80	20	50

12. When I am not the original prescriber of the medication	30	60	40	60
13. When the medication was prescribed by a specialist	30	60	20	50
14. When I am unsure why the medication was started originally	30	60	30	70
15. When the medication is being used to treat an adverse effect of another medication	30	60	40	70

APPENDIX G

DEPRESCRIBING GUIDELINES

deprescribing.org | Antipsychotic (AP) Deprescribing Algorithm

August 2018

Why is patient taking an antipsychotic?

- Psychosis, aggression, agitation (behavioural and psychological symptoms of dementia - BPSD) treated ≥ 3 months (symptoms controlled, or no response to therapy).

- Primary insomnia treated for any duration or secondary insomnia where underlying comorbidities are managed

Recommend Deprescribing

Strong Recommendation (from Systematic Review and GRADE approach)

Taper and stop AP (slowly in collaboration with patient and/or caregiver; e.g. 25%-50% dose reduction every 1–2 weeks)

Stop AP
Good practice recommendation

Monitor every 1-2 weeks for duration of tapering

Expected benefits:

- May improve alertness, gait, reduce falls, or extrapyramidal symptoms

Adverse drug withdrawal events (closer monitoring for those with more severe baseline symptoms):

- Psychosis, aggression, agitation, delusions, hallucinations

If BPSD relapses:

Consider:

- Non-drug approaches (e.g. music therapy, behavioural management strategies)

Restart AP drug:

- Restart AP at lowest dose possible if resurgence of BPSD with re-trial of deprescribing in 3 months
- At least 2 attempts to stop should be made

Alternate drugs:

- Consider change to risperidone, olanzapine, or aripiprazole

If insomnia relapses:

Consider

- Minimize use of substances that worsen insomnia (e.g. caffeine, alcohol)
- Non-drug behavioural approaches (see reverse)

Alternate drugs

- Other medications have been used to manage insomnia. Assessment of their safety and effectiveness is beyond the scope of this deprescribing algorithm. See AP deprescribing guideline for details.

- Schizophrenia
- Schizo-affective disorder
- Bipolar disorder
- Acute delirium
- Tourette's syndrome
- Tic disorders
- Autism
- Less than 3 months duration of psychosis in dementia
- Intellectual disability
- Developmental delay
- Obsessive-compulsive disorder
- Alcoholism
- Cocaine abuse
- Parkinson's disease psychosis
- Adjunct for treatment of Major Depressive Disorder

Continue AP

or consult psychiatrist if considering deprescribing

Bjerre LM, Farrell B, Hogel M, Graham L, 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 Bruyère open

deprescribing.org | Antipsychotic (AP) Deprescribing Notes

August 2018

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 (Xylac®, Loxapac®)	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®)	IR T 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

Bjerre LM, Farrell B, Hogel M, Graham L, 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 Institut de recherche Bruyère Research Institute open Ontario Pharmacy Evidence Network deprescribing.org | Benzodiazepine & Z-Drug (BZRA) Deprescribing Algorithm

February 2019

Why is patient taking a BZRA?

If unsure, find out if history of anxiety, past psychiatrist consult, whether may have been started in hospital for sleep, or for grief reaction.

- Insomnia on its own OR insomnia where underlying comorbidities managed
  For those ≥ 65 years of age: taking BZRA regardless of duration (avoid as first line therapy in older people)
  For those 18-64 years of age: taking BZRA > 4 weeks

Engage patients

(discuss potential risks, benefits, withdrawal plan, symptoms and duration)

Recommend Deprescribing

Taper and then stop BZRA

(taper slowly in collaboration with patient, for example ~25% every two weeks, and if possible, 12.5% reductions near end and/or planned drug-free days)

- For those ≥ 65 years of age (strong recommendation from systematic review and GRADE approach)
- For those 18-64 years of age (weak recommendation from systematic review and GRADE approach)
- Offer behavioural sleeping advice; consider CBT if available (see reverse)

Monitor every 1-2 weeks for duration of tapering

Expected benefits:

- May improve alertness, cognition, daytime sedation and reduce falls

Withdrawal symptoms:

- Insomnia, anxiety, irritability, sweating, gastrointestinal symptoms (all usually mild and last for days to a few weeks)

Use non-drug approaches to manage insomnia

Use behavioral approaches and/or CBT (see reverse)

If symptoms relapse:

Consider

- Maintaining current BZRA dose for 1-2 weeks, then continue to taper at slow rate

Alternate drugs

- Other medications have been used to manage insomnia. Assessment of their safety and effectiveness is beyond the scope of this algorithm. See BZRA deprescribing guideline for details.

- Other sleeping disorders (e.g. restless legs)
- Unmanaged anxiety, depression, physical or mental condition that may be causing or aggravating insomnia
- Benzodiazepine effective specifically for anxiety
- Alcohol withdrawal

Continue BZRA

- Minimize use of drugs that worsen insomnia (e.g. caffeine, alcohol etc.)
- Treat underlying condition
- Consider consulting psychologist or psychiatrist or sleep specialist

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)

This algorithm and accompanying advice support recommendations in the NICE guidance on the use of zaleplon, zolpidem and zopiclone for the short-term management of insomnia, and medicines optimisation. National Institute for Health and Care Excellence, February 2019

deprescribing.org Bruyère open

deprescribing.org | # Benzodiazepine & Z-Drug (BZRA) Deprescribing Notes

February 2019

BZRA Availability

BZRA	Strength
Alprazolam (Xanax®) T	0.25 mg, 0.5 mg, 1 mg, 2 mg
Bromazepam (Lectopam®) T	1.5 mg, 3 mg, 6 mg
Chlordiazepoxide C	5 mg, 10 mg, 25 mg
Clonazepam (Rivotril®) T	0.25 mg, 0.5 mg, 1 mg, 2 mg
Clorazepate (Tranxene®) C	3.75 mg, 7.5 mg, 15 mg
Diazepam (Valium®) T	2 mg, 5 mg, 10 mg
Flurazepam (Dalmane®) C	15 mg, 30 mg
Lorazepam (Ativan®) T, S	0.5 mg, 1 mg, 2 mg
Nitrazepam (Mogadon®) T	5 mg, 10 mg
Oxazepam (Serax®) T	10 mg, 15 mg, 30 mg
Temazepam (Restoril®) C	15 mg, 30 mg
Triazolam (Halcion®) T	0.125 mg, 0.25 mg
Zopiclone (Imovane®, Rhovane®) T	5mg, 7.5mg
Zolpidem (Sublinox®) S	5mg, 10mg

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:
1. Go to bed only when sleepy
2. Do not use bed or bedroom for anything but sleep (or intimacy)
3. If not asleep within about 20-30 min at the beginning of the night or after an awakening, exit the bedroom
4. If not asleep within 20-30 min on returning to bed, repeat #3
5. Use 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 & discourage daytime sleeping
4. Reduce number of naps (no more than 30 mins and no naps after 2 pm)
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

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: https://mysleepwell.ca/

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)

This algorithm and accompanying advice support recommendations in the NICE guidance on the use of zaleplon, zolpidem and zopiclone for the short-term management of insomnia, and medicines optimisation. National Institute for Health and Care Excellence, February 2019

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deprescribing.org | Antihyperglycemics Deprescribing Algorithm

August 2018

Does your elderly (>65 years of age) patient with type 2 diabetes meet one or more of the following criteria:

- At risk of hypoglycemia (e.g. due to advancing age, tight glycemic control, multiple comorbidities, drug interactions, hypoglycemia history or unawareness, impaired renal function, or on sulfonylurea or insulin)
- Experiencing, or at risk of, adverse effects from antihyperglycemic
- Uncertainty of clinical benefit (due to: frailty, dementia or limited life-expectancy)

No → Continue Antihyperglycemic(s)

Yes →

- Set individualized A1C and blood glucose (BG) targets (otherwise healthy with 10+ years life expectancy, A1C < 7% appropriate; considering advancing age, frailty, comorbidities and time-to-benefit, A1C < 8.5% and BG < 12mmol/L may be acceptable; at end-of life, BG < 15mmol/L may be acceptable) (good practice recommendation)

- Address potential contributors to hypoglycemia (e.g. not eating, drug interactions such as trimethoprim/sulfamethoxazole and sulfonylurea, recent cessation of drugs causing hyperglycemia – see reverse)

Still at risk? → No → Continue Antihyperglycemic(s)

Still at risk? → Yes → Recommend Deprescribing

Recommend Deprescribing

- **Reduce dose(s) or stop agent(s)**
  - most likely to contribute to hypoglycemia (e.g. sulfonylurea, insulin; strong recommendation from systematic review and GRADE approach) or other adverse effects (good practice recommendation)
- **Switch to an agent**
  - with lower risk of hypoglycemia (e.g. switch from glyburide to gliclazide or non-sulfonylurea; change NPH or mixed insulin to detemir or glargine insulin to reduce nocturnal hypoglycemia; strong recommendation from systematic review and GRADE approach)
- **Reduce doses**
  - of renally eliminated antihyperglycemics (e.g. metformin, sitagliptin; good practice recommendation) – See guideline for recommended dosing

Monitor daily for 1-2 weeks after each change (TZD – up to 12 weeks):

- For signs of hyperglycemia (excessive thirst or urination, fatigue)
- For signs of hypoglycemia and/or resolution of adverse effects related to antihyperglycemic(s)

Increase frequency of blood glucose monitoring if needed
A1C changes may not be seen for several months

If hypoglycemia continues and/or adverse effects do not resolve:
- Reduce dose further or try another deprescribing strategy

If symptomatic hyperglycemia or blood glucose exceeds individual target:
- Return to previous dose or consider alternate drug with lower risk of hypoglycemia

Farrell B, Black C, Thompson W, McCarthy L, Rojas-Fernandez C, Lochnan H, et al. Deprescribing antihyperglycemic agents in older persons. Evidence-based clinical practice guideline. Can Fam Physician 2017;63:832-43 (Eng), e452-65 (Fr).

deprescribing.org Bruyère CIHR IRSC

Antihyperglycemics and Hypoglycemia Risk

Drug	Causes hypoglycemia?
Alpha-glucosidase inhibitor	No
Dipeptidyl peptidase-4 (DPP-4) inhibitors	No
Glucagon-like peptide-1 (GLP-1) agonists	No
Insulin	Yes (highest risk with regular insulin and NPH insulin)
Meglitinides	Yes (low risk)
Metformin	No
Sodium-glucose linked transporter 2 (SGLT2) inhibitors	No
Sulfonylureas	Yes (highest risk with glyburide and lower risk with gliclazide)
Thiazolidinediones (TZDs)	No

Drugs affecting glycemic control

- Drugs reported to cause hyperglycemia (when these drugs stopped, can result in hypoglycemia from antihyperglycemic drugs) e.g. quinolones (especially gatifloxacin), beta-blockers (except carvedilol), thiazides, atypical antipsychotics (especially olanzapine and clozapine), corticosteroids, calcineurin inhibitors (such as cyclosprine, sirolimus, tacrolimus), protease inhibitors
- Drugs that interact with antihyperglycemics (e.g. trimethoprim/sulfamethoxazole with sulfonylureas)
- Drugs reported to cause hypoglycemia (e.g. alcohol, MAOIs, salicylates, quinolones, quinine, beta-blockers, ACEIs, pentamidine)

Engaging patients and caregivers

- Some older adults prefer less intensive therapy, especially if burdensome or increases risk of hypoglycemia
- Patients and/or caregivers may be more likely to engage in discussion about changing targets or considering deprescribing if they understand the rationale:
  - Risks of hypoglycemia and other side effects
  - Risks of tight glucose control (no benefit and possible harm with A1C < 6%)
  - Time to benefit of tight glucose control
  - Reduced certainty about benefit of treatment with frailty, dementia or at end-of-life
- Goals of care: avoid hyperglycemic symptoms (thirst, dehydration, frequency, falls, fatigue, renal insufficiency) and prevent complications (5-10 years of treatment needed)
- Many countries agree on less aggressive treatment of diabetes in older persons
- Reviewing options for deprescribing, as well as the planned process for monitoring and thresholds for returning to previous doses will help engage patients and caregivers

Hypoglycemia information for patients and caregivers

- Older frail adults are at higher risk of hypoglycemia
- There is a greater risk of hypoglycemia with tight control
- Symptoms of hypoglycemia include: sweating, tachycardia, tremor BUT older patients may not typically have these
- Cognitive or physical impairments may limit older patient's ability to respond to hypoglycemia symptoms
- Some drugs can mask the symptoms of hypoglycemia (e.g. beta blockers)
- Harms of hypoglycemia may be severe and include: impaired cognitive and physical function, falls and fractures, seizures, emergency room visits and hospitalizations

Tapering advice

- Set blood glucose & A1C targets, plus thresholds for returning to previous dose, restarting a drug or maintaining a dose
- Develop tapering plan with patient/caregiver (no evidence for one best tapering approach; can stop oral antihyperglycemics, switch drugs, or lower doses gradually e.g. changes every 1-4 weeks, to the minimum dose available prior to discontinuation, or simply deplete patient's supply)
- Doses may be increased or medication restarted any time if blood glucose persists above individual target (12-15 mmol/L) or symptomatic hyperglycemia returns

Farrell B, Black C, Thompson W, McCarthy L, Rojas-Fernandez C, Lochnan H, et al. Deprescribing antihyperglycemic agents in older persons. Evidence-based clinical practice guideline. Can Fam Physician 2017;63:832-43 (Eng), e452-65 (Fr).

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

August 2018

Why is patient taking a PPI?

If unsure, **find out** if history of endoscopy, if ever hospitalized for bleeding ulcer or if taking because of chronic NSAID use in past, if ever had heartburn or dyspepsia

Indication still unknown?

- Mild to moderate esophagitis or
- GERD treated x 4-8 weeks (esophagitis healed, symptoms controlled)

- Peptic Ulcer Disease treated x 2-12 weeks (from NSAID; *H. pylori*)
- Upper GI symptoms without endoscopy; asymptomatic for 3 consecutive days
- ICU stress ulcer prophylaxis treated beyond ICU admission
- Uncomplicated *H. pylori* treated x 2 weeks and asymptomatic

- Barrett's esophagus
- Chronic NSAID users with bleeding risk
- Severe esophagitis
- Documented history of bleeding GI ulcer

Recommend Deprescribing

Strong Recommendation (from Systematic Review and GRADE approach)

Decrease to lower dose (evidence suggests no increased risk in return of symptoms compared to continuing higher dose), or

Stop and use on-demand (daily until symptoms stop) (1/10 patients may have return of symptoms)

Stop PPI

Continue PPI

or consult gastroenterologist if considering deprescribing

Monitor at 4 and 12 weeks

If verbal:
- Heartburn
- Dyspepsia
- Regurgitation
- Epigastric pain

If non-verbal:
- Loss of appetite
- Weight loss
- Agitation

Use non-drug approaches
- Avoid meals 2-3 hours before bedtime; elevate head of bed; address if need for weight loss and avoid dietary triggers

Manage occasional symptoms
- Over-the-counter antacid, H2RA, PPI, alginate prn (ie. Tums®, Rolaids®, Zantac®, Olex®, Gaviscon®)
- H2RA daily (weak recommendation – GRADE; 1/5 patients may have symptoms return)

If symptoms relapse:

If symptoms persist x 3 – 7 days and interfere with normal activity:

1) Test and treat for *H. pylori*

2) Consider return to previous dose

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 | Institut de recherche Bruyère Research Institute | open Ontario Pharmacy Evidence Network

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

August 2018

PPI Availability

PPI	Standard dose (healing) (once daily)*	Low dose (maintenance) (once daily)
Omeprazole (Losec®) - Capsule	20 mg[+]	10 mg[+]
Esomeprazole (Nexium®) - Tablet	20[a] or 40[b] mg	20 mg
Lansoprazole (Prevacid®) - Capsule	30 mg[+]	15 mg[+]
Dexlansoprazole (Dexilant®) - Tablet	30[c] or 60[d] mg	30 mg
Pantoprazole (Tecta®, Pantoloc®) - Tablet	40 mg	20 mg
Rabeprazole (Pariet®) - 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

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).