Deprescribing Falls Risk Increasing Drugs in Older Adults

Reham Ahmed Kalim

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Declaration

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Abstract

Aim

The purpose of this thesis was to examine the facilitators of, and barriers to, implementing deprescribing of falls risk increasing medicines (FRIDs) in healthcare professionals' practices, by exploring the perspectives of multiple stakeholders and integrating them with the existing literature, with a view to future use of this knowledge to inform an intervention that could readily be integrated into clinical practice without the need for significant additional resources.

Methods

Two systematic reviews of the existing literature were undertaken. The first review investigated the role of pharmacists in medication management for older patients at hospital discharge. Scientific databases and the grey literature were searched systematically for randomised controlled studies addressing this topic. The Cochrane Handbook for Systematic Reviews of Interventions guided the data analysis and reporting. The second was a systematic review of qualitative studies that investigated patients' or carers' opinions of deprescribing FRIDs. The data from these studies were coded to the Theoretical Domains Framework (TDF) and the studies' quality was assessed using the Critical Appraisal Skills Programme (CASP) checklists.

Semi-structured interviews were conducted with hospital doctors, general practitioners and pharmacists in Ireland. The data gathered during the interviews were transcribed verbatim. Initial deductive analysis mapped the themes identified to the domains of the TDF, followed by inductive analysis to generate additional themes and subthemes. NVivo 12 software (QSR International Limited, UK) facilitated the process of analysis. A focus group was also conducted with older adults to explore the results of previous research from their points of view, and to determine their ideas about how older people feel about FRIDs deprescribing to reduce the risk of falls.

All qualitative data were matched with behavioural change techniques to suggest possible interventions for implementing deprescribing in primary and secondary care.

Results

The first systematic review identified common interventions undertaken by pharmacists and their outcomes in hospital settings. Only mortality and healthcare use outcomes were eligible for meta-analysis. The rest of the outcomes were described and the results highlighted how pharmacists can preserve or enhance the quality of care for older adults with polypharmacy.

The stakeholders' qualitative interviews and systematic data syntheses resulted in a rich account of themes and potential target behaviours. The main themes arising from data analysis included: environmental challenges (in hospitals and general practice clinics), patients' and family members' involvement, pharmacists' role in deprescribing, personal knowledge, concerns and reinforcement. Challenges and enablers were identified for each theme, supported by sample quotes. Commonalities across all stakeholder groups were identified.

The data from all the above contributed to the design of a potential future intervention involving encouragement of patients to engage with their prescribers on the issues of deprescribing FRIDs, and concise education and reminder tools for healthcare professionals to facilitate more widespread consideration of deprescribing.

Conclusion

In this thesis the beliefs, concerns and potential roles of core stakeholders in the deprescribing of FRIDs were investigated and analysed. The resultant data lays the foundation for implementation of future deprescribing interventions in clinical practice.

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Abbreviations

ABBREVIATION	DEFINITION
ADE	Adverse Drug Events
APEASE criteria	Affordability, Practicability, Effectiveness/cost-effectiveness, Acceptability, Side-effects/Safety, and Equity.
BCT	Behavioural Change Technique
BNF	British National Formulary
BZD	Benzodiazepines
CDC	Centers for Disease Control and Prevention
CDM	Chronic Disease Management
CENTRAL	Cochrane Central Register of Controlled Trials
CI	Confidence Interval
COREQ	The Consolidated Criteria for Reporting Qualitative Studies
COVID-19	Coronavirus Disease 2019
DBI	Drug Burden Index
ED	Emergency Department
FORTA	Fit fOR The Aged
FRID	Fall Risk Increasing Drug
GP	General Practitioner
GT	Grounded Theory
HCP	Healthcare Professional
HDrs	Hospital Doctors
HIQA	Health Information and Quality Authority
HSE	Health Service Executive
ICTRP	International Clinical Trials Registry Platform

ABBREVIATION	DEFINITION
iSIMPATHY	Implementing Stimulating Innovation Management of Polypharmacy and Adherence in The Elderly
MAI	Medication Appropriateness Index
MedEl	Medicine for the Elderly
MIMS	Monthly Index of Medical Specialties
NHS	National Health Services
NICE	National Institute for Health and Care Excellence
LOS	Length Of Stay
PIM	Potentially Inappropriate Medication
PPI	Public and Patient Involvement
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SARS-CoV-2	Severe Acute Respiratory Syndrome CoronaVirus 2, the virus causing COVID-19
SHO	Senior House Officer
START	Screening Tool to Alert to Right Treatment
STEADI	Stopping Elderly Accidents, Deaths, and Injuries
STOPFALL	Screening Tool of Older Persons Prescriptions in older adults with high fall risk
STOPP	Screening Tool of Older People's Prescriptions
SOPPS REC	The School of Pharmacy and Pharmaceutical Science Research
SPPIRE	The Supporting Prescribing in Older Adults with Multimorbidity in Irish Primary Care
TDF	Theoretical Domains Framework
WHO	World Health Organization
Z-drugs	Non-benzodiazepine drugs (Zolpidem, zopiclone, and zaleplon)

Publications

- Kalim R A, McMahon N M, Ryder S A. Pharmacist interventions at discharge and the quality of older patients' care: A systematic review. Poster presentation at: Getting Research into Policy and Practice. 5th Annual Conference of the Structured Population and Health-services Research Education Network; 2019 Feb 26; Dublin, Ireland.
- Kalim R A, McMahon N M, Ryder S A. Pharmacist interventions at discharge and the quality of older patients' care: A systematic review. Poster presentation at: The 41st All-Ireland Schools of Pharmacy Conference; 2019 Apr 17 - 18; Dublin, Ireland.
- Kalim R A, McMahon N M, Ryder S A. Pharmacist interventions at discharge and the quality of older patients' care: A systematic review. Poster presentation at: Innovation, Advances and Excellence in Ageing. The 67th Annual and Scientific Meeting of the Irish Gerontological Society. 2019 Sep 26 – 28; Cork, Ireland.
- Kalim R A, McMahon N M, Ryder S A. (2019). Pharmacist Interventions at Discharge and the Quality of Older Patients' Care: A Systematic Review. [Abstract], Age and Ageing, 48, iii17–iii65.
- Kalim R A, McMahon N M, Ryder S A. Pharmacist interventions at discharge and the quality of older patients' care: A systematic review. Poster session presented at: The 9th All Ireland Pharmacy Conference; 2019 Oct 14-15; Dundalk, Ireland.
- R. A. Kalim, S. A. Ryder, C. J. Cunningham, N.M. McMahon. Doctors' Perceptions of Barriers and Facilitators to Deprescribing Fall-Risk Increasing Drugs in Older

Adults. Poster presentation at: 50th ESCP Symposium on Clinical Pharmacy Polypharmacy and ageing; 2022 Oct 19 – 21; Prague, Czech.

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- R. A. Kalim, S. A. Ryder, C. J. Cunningham, N.M. McMahon. (2022). Doctors' Perceptions of Barriers and Facilitators to Deprescribing Fall-Risk Increasing Drugs in Older Adults. [Abstract], International Journal of Clinical Pharmacy, 44(6), 1464-1566.

1. Introduction

The world's ageing population continues to grow, and by 2050 there will be one and a half billion people aged 65 and older (United Nations, 2020). Of these, 426.4 million will be older than 80 years. In Europe and North America, the older population reached 200.4 million in 2019, and it is expected to increase to 269.2 million within the next three decades (United Nations, 2020). In the Republic of Ireland, the number of people aged 65 and older has been estimated to reach approximately 1.6 million by 2051 (Sheehan & O'Sullivan, 2020).

With age comes certain physiological changes that make the body more predisposed to diseases, multimorbidity and the side effects of medications (Turnheim, 2003). Examples of common changes are reduced renal and hepatic function, manifested in a reduced number of functioning glomeruli, blood flow and filtration rate in the kidneys. In the liver, the blood flow decreases, which hinders the metabolism and excretion of some drugs. Similarly, the secretion of some hormones is reduced, for example antidiuretic, thyroid, insulin, and renin hormones (Schlender et al., 2018). The deterioration of cognitive function might affect drugs' pharmacology as well (Turnheim, 2003).

1.1. Polypharmacy

The term 'polypharmacy' refers to the use of multiple drugs, but there is no standard definition according to a systematic review of the polypharmacy literature (Masnoon et al., 2017). Eighty per cent of the literature contains numerical definitions, where the range varies widely, between ≥ 2 and ≥ 11 medications. However, the use of five or more medications concomitantly is the most common definition used by researchers (Masnoon et al., 2017).

Polypharmacy can be classified into appropriate and inappropriate uses. Appropriate polypharmacy means optimum medications prescribed using the best medical evidence, aligned with the medical needs of the patient, and where the medications are clinically beneficial to the patient (Cadogan et al., 2016), whereas inappropriate or problematic polypharmacy means the inappropriate prescribing of medications where the benefits do not outweigh the risk of harm from the medications (Duerden et al., 2013). Inappropriate polypharmacy also refers to a situation where the 'pill burden' is affecting the adherence by and satisfaction of the patient. The prevalence of potentially inappropriate prescribing (PIP) in Ireland was 37.3% in 2012 (Moriarty et al., 2015).

There are many causes of polypharmacy, including multimorbidity, guideline-based prescribing, inappropriate prescribing, and prescribing cascades. In addition, the use of preventive treatments and over-the-counter medications increase polypharmacy (Duerden et al., 2013). Multimorbidity is one of the reasons that leads to the use of multiple medications to treat different conditions. Clinical

guidelines for treating a single chronic condition can add to the complexity of treatment regimens and medication list accumulation (Gao et al., 2017). Prescribing medication can be challenging when the guidelines for treatments are not specific to older patients and they are excluded from certain randomised trials used to determine the guidelines (Wastesson et al., 2018; Zulman et al., 2011). Hence, guideline-based prescribing can contribute to polypharmacy (Curtin et al., 2019).

Polypharmacy can also be precipitated by a prescribing cascade (McGrath et al., 2017), that is, polypharmacy carries the risk of drug interactions and adverse effects, which lead to the prescription of more medications to treat the resulting symptoms. In other words, the side effect of one medication is treated with another. This is also considered inappropriate prescribing.

Older people can be affected by inappropriate prescribing (Scott et al., 2014). Inappropriate medications are drugs that lack indications, are the incorrect dose, do not provide benefit, or cause intolerable adverse effects to the patient (Scottish Government Polypharmacy Model of Care Group, 2018). The number of medications a person is taking is a predictor of inappropriate prescribing (Musich et al., 2017).

It is possible to evaluate the appropriateness of medications by using tools such as the Screening Tool of Older People's Prescriptions (STOPP), the Screening Tool to Alert to Right Treatment (START) (Gallagher et al., 2008), Beer's list (Beers, 1997), or the Medication Appropriate Index (MAI) (Hanlon et al., 1992). These tools guide and help providers with the prescribing process and are described in more detail in section 1.3.2.

1.1. Aim

The aim of this thesis is to explore the barriers to and facilitators of implementing the deprescribing process in healthcare providers' current practices by investigating stakeholders' opinions and developing a strategy for deprescribing fall risk-increasing drugs.

1.1.1. The consequences of polypharmacy in older people

The consequences of polypharmacy are troublesome (Maher et al., 2014). Wastesson et al. (2018) developed a framework, dividing the consequences into four categories, namely: 1) drugs' interactions, poor adherence, and adverse reactions; 2) adverse events; 3) physical and cognitive function; and 4) hospitalisation and death. In addition to the direct effects of drug-related problems, such as side effects and drugs' interactions, polypharmacy's adverse consequences include falls and fractures, renal failure, and delirium. Such adverse events might affect the dependency and quality of

life of older patients and lead to an increase in healthcare use, costs, and mortality rates (Maher et al., 2014 ; Wastesson et al., 2018).

In 2016, a Spanish hospital reported a 10% mortality rate among patients admitted with adverse drug reactions (ADRs). Almost 86% of those patients were on polypharmacy (Pedrós et al., 2016). In a systematic review conducted in 2018, polypharmacy was found to be associated with increasing the risk of falls as well (OR 1.75 (1.27–2.41)) (Seppala et al., 2018a). This subject will be discussed in more detail in section **Error! Reference source not found.**.

The problem of inappropriate polypharmacy has not been resolved, and more studies are needed to improve the quality of prescribing. Most studies have reported improvement in the number of medications; however, little is known about patient clinical outcomes (Cooper et al., 2015).

1.2. Falls in older adults

Falls have been defined by the Prevention of Falls Network Europe *as 'an unexpected event in which the participant comes to rest on the ground, floor or lower level'* (Lamb et al., 2005). In Ireland, Bhangu et al. (2018) reported the prevalence of falls in people aged 50 years and older as being equal to 19.2% in one year, based on data from an Irish longitudinal study. The percentage increased with age, as people older than 75 years had the highest prevalence, which was 24.4%, compared to the younger age range (17.5% for ages 50–64 years) (Bhangu et al., 2017). Falls can be accidental due to a slip or trip, or non-accidental due to syncope or other symptoms. Non-accidental falls occur in 8% of the older population (75 years and older). Females report a higher prevalence of falls (20.1%) compared to males (18.2%) (Bhangu et al., 2017).

It has been estimated that, in Ireland alone, the number of deaths due to falls might be more than 600 per year by 2031 (The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life, 2008). Based on the most recent information about major trauma in Ireland, the most frequent cause of injury was reported to be falling from short distances (less than 2 m), which occurred in 62% of cases (n = 2,559 of 4,146) (National Office of Clinical Audit, 2022). In addition, death from fall injuries was reported to be 64% in 2020 The median age of the population in this report was 64 years (National Office of Clinical Audit, 2022).

1.2.1. Risk factors

The factors that lead to falls are many, and they are classified differently in the literature. The World Health Organisation divides these factors into behavioural, biological, socioeconomic and

environmental risk factors (2007), while the HSE divides the factors into intrinsic, extrinsic and environmental risk factors (The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life, 2008). Factors can also be categorized as nonmodifiable and potentially modifiable (Moncada & Mire, 2017). A recent review of the risk factors of falls included 101 studies from 34 countries and classified the factors based on their association with falls and consistency among the literature. Their classification included a strong positive contribution, a positive causal relationship of major risk factors, or no strong relationship (Zhu et al., 2020).

No matter what classification is used, the factors are the same. This discussion will be based on nonmodifiable and potentially modifiable risk factors. Nonmodifiable factors include aspects such as age and history of falls, while potentially modifiable factors include aspects such as medications and environmental hazards such as slippery surfaces (see Figure 1.1).

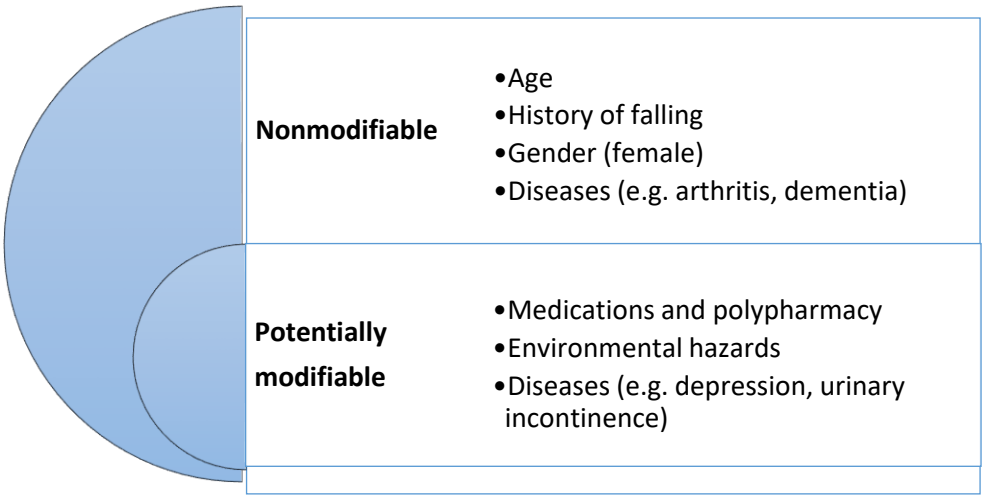


Figure 1.1: Risk factors for falls, adapted from Moncada et al. (Moncada & Mire, 2017)

1.2.1.1. Age and physiological changes

Advanced age is strongly associated with an increased risk of falls (Early et al., 2019). Patients who are ≥ 95 years old have a higher risk of falling in one year compared to patients in the age category of < 75 years old (Haagsma et al., 2020).

Deterioration in the function of the vestibular system may increase dizziness in older adults (Iwasaki & Yamasoba, 2014). Physiological changes such as the loss of vestibular cells and neurons affect the main components of the system, which are the visual, vestibular and somatosensory neurons. Therefore, there is an increase in a person's chance of falling due to a delayed response to postural changes (Iwasaki & Yamasoba, 2014).

Cognitively impaired patients may have a high risk of falls. Falls increase functional decline in cognition due to injury and hospitalisation. Sarcopenia in older people leads to loss of muscle mass and disability. Musculoskeletal pain leads to impaired mobility, functional decline and frailty, all of which will reduce the quality of life and increase dependency. Fortunately, physical frailty is reversible and early treatment can help (Cuevas-Trisan, 2019).

1.2.1.2. Diseases

Diseases have a strong association with falls. In a systematic review, diseases constituted one of the most studied risk factors and showed a strong association with falls across all studies (Zhu et al., 2020). Having five or more cardiovascular diseases were associated with falls (OR for non-accidental falls = 2.89, 95% CI 1.28–6.52) (Bhangu et al., 2017). For example, the adjusted odds ratio for non-accidental falls for people with heart failure was 1.38 (CI 0.68–2.81) and for stroke, it was 1.65 (CI 0.96–2.85) (Bhangu et al., 2017).

Some diseases amplify the consequences of falls. For example, osteoporosis leads to an increased risk of fractures in some cases, which leads to slower healing, increased care costs and reduced quality of life (The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life, 2008).

1.2.1.3. History of falls

Having had a fall is strongly associated with an increased risk of falls (Zhu et al., 2020). A study involving 377,561 women aged 65 years and older; indicated that 10% had another fracture within one year of a fall, and 31% had a similar incident within five years of the first fall (Balasubramanian et al., 2019).

1.2.1.4. Environmental hazards

This type of factors is considered a major risk factor (Zhu et al., 2020) and includes anything in the surrounding environment that could pose a risk of imbalance to the person, at home or outside of the home. These factors include the flooring, the presence of loose rugs, poor lighting and narrow stairs (WHO, 2007).

1.2.1.5. Medications

Medications are considered a major risk factor for falls (Zhu et al., 2020). Polypharmacy is connected to falls related hospitalisation, according to an observational study in UK that included 6,226 older patients. The higher the number of medications, the higher the percentage of falls, for example, 7.9% of falls incidents were reported by patients using five to nine medications, compared to 14.8% among

those with 10 or more medications (Zaninotto et al., 2020). Fifty-three per cent of 188 older patients with a history of falls in Czech Republic, were found to use a mean of 3.8 high-risk medications (Michalcova et al., 2020).

The mechanism leading to a medication-related fall risk is one or more of the following adverse drug effects: sedation, syncope, dizziness, or hypotension (Michalcova et al., 2020; The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life, 2008). Wilson et al. noticed that the anticholinergic burden, when measured in older patients, has been associated with impaired physical function. In their study, they advised doctors advised to limit older patients' exposure to drugs with anticholinergic and sedative effects to prevent an increase in the risk of falls (Wilson et al., 2011).

A prospective cohort study in Ireland included 6,666 patients aged 50 and over. The researchers found that polypharmacy containing antidepressants increased the risk of falls in patients aged 50 years and older (adjusted Relative Risk (aRR) 1.28, 95% CI 1.06–1.54) (Richardson et al., 2015). In addition, they found that patients on benzodiazepines had a higher number of falls (aRR 1.32, 95% CI 1.05–1.65) and can lead to injurious falls when coupled with polypharmacy (aRR 1.40, 95% CI 1.04–1.87) (Richardson et al., 2015). Fall risk-increasing drugs (FRIDs) will be discussed in more detail in chapter three.

1.2.1. Prevention of falls

Falls could be prevented by managing potentially modifiable risk factors (Bergen et al., 2021). Early interventions, such as screening for and managing the risk factors in older patients whenever possible, will maintain patients' function and activity level and reduce the progression of disability and dependency (Cuevas-Trisan, 2019; Khow & Visvanathan, 2017). Falls prevention programmes should target high-risk populations who would benefit the most, such as FRIDs users and previous fallers (Moncada & Mire, 2017; Musich et al., 2017).

There are many fall prevention strategies but not all interventions are effective as single interventions for falls prevention (Dautzenberg et al., 2021). Exercise and environmental safety have been found to be the most effective for people living in the community (Gillespie et al., 2012). Exercise is the most studied intervention, and it has been demonstrated to significantly reduce the rate of falls as a single intervention (Dautzenberg et al., 2021). Specifically, the balance strength exercise offered by Tai Chai has been shown to significantly reduce the risk of falling (RR 0.71, 95% CI 0.57–0.87) (Gillespie et al., 2012).

Home safety assessment and modification interventions are effective in reducing the rate of falls as well as the risk of falls, especially when done by an occupational therapist (Gillespie et al., 2012). Based on Cameron et al.'s systematic review, supplementation with vitamin D may reduce the rate of falls in patients with low vitamin D at baseline (Cameron et al., 2018).

Medication review had been studied as a single intervention, or as part of multifactorial interventions (Seppala et al., 2022). There is not enough evidence to support medication review as a single intervention. It is inadvisable to assess the risk of falls based on medication without considering the other confounders leading to falls (Seppala et al., 2022). However, medication review has been demonstrated to be effective in multifactorial interventions. For example, Pit et al. (2007) concluded that it led to a significantly reduced risk of falling. Their multifactorial intervention included medication review, deprescribing, public and staff education by a clinical pharmacist, patients' self-assessment of medication use, feedback on prescribing practices, and financial rewards for staff.

Interventions that target more than one potentially modifiable risk factor may help reduce falls (Cuevas-Trisan, 2019; Gillespie et al., 2012). Multifactorial interventions in hospitals may reduce the rate of falls in a subacute hospital setting (Cameron et al., 2018). Effective interventions included different combinations of interventions targeting different factors of falls, such as medication review, environmental assessment and modifications, and exercise (Dautzenberg et al., 2021).

1.3. Deprescribing

The term 'deprescribing' was first used and defined by Woodward et al. in 2003. Other authors used different definitions, until a systematic review generated a general definition based on the available literature up to 2015 (Reeve et al., 2015). Reeve et al. defined deprescribing as follows:

> *The process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes* (Reeve et al., 2015).

Deprescribing is usually mentioned in the literature as medication stopping, withdrawal, or discontinuation. It has been proposed in recent times as a solution or approach for the prevention or reduction of the harmful consequences of polypharmacy (Scott et al., 2015). Kua et al. (2019) conducted a systematic review and meta-analysis and concluded that deprescribing significantly reduces potentially inappropriate medications (PIMs) in nursing homes and significantly reduced the number of residents with PIMs, by 59%.

The safety and efficacy of deprescribing are still uncertain and, similar to prescribing, deprescribing has both benefits and disadvantages (Reeve et al., 2018), but some review authors have described it as safe and effective (Page et al., 2016a; Scott et al., 2015). The nature of the deprescribing taking place will influence its characteristics: For example, a review of deprescribing assessed five randomised studies on deprescribing cardiovascular medications and found that deprescribing statins may be effective and safe (Krishnaswami et al., 2019; Kutner et al., 2015). Other reviews have argued that deprescribing might limit adverse effects and reduce falls and mortality. In addition, it might improve cognitive and psychomotor function, adherence and quality of life (Reeve et al., 2018; Scott et al., 2015). However, all these claims need to be further evaluated in large, randomised studies (Krishnaswami et al., 2019).

Safety concerns include withdrawal symptoms, return of the medical condition, or reversal of drug-drug interactions (Reeve et al., 2018). Therefore, deprescribing should be done in a controlled, systematic manner with close monitoring (Reeve et al., 2018). Individualised plans should also be considered for older adults (Page et al., 2016a).

1.3.1. Deprescribing and preventing falls

Medication withdrawal is discussed in the literature as a fall preventive measure. According to a systematic review of deprescribing health benefits conducted by Page et al., participants in the deprescribing group with a history of falls had significantly fewer falls overall than those in the control group (Page et al., 2016a). A subgroup analysis of another systematic review suggested that deprescribing interventions could reduce the number of fallers by 24% (OR 0.76, 95% CI 0.62–0.93) (Kua et al., 2019). Gradual withdrawal of psychotropic medication reduced the rate of falls (Campbell et al., 1999). Another study found that deprescribing of even a small number of PIM classes may reduce the risk of falls (Early et al., 2019).

Withdrawal of FRIDS may be effective as a single intervention in a geriatric hospital ward, as proven in a study by (Van Der Velde et al., 2007). Withdrawal resulted in the improvement of all mobility tests in the group of fallers who used FRIDs, as opposed to other groups including non-fallers and fallers who was not using FRIDs. However, there is limited evidence about the benefits of discontinuing some FRIDs to the risk of falls as a solo intervention (Lee et al., 2021; Seppala et al., 2019). In many guidelines, there is agreement that medication review should be part of fall prevention programmes (Montero-Odasso et al., 2021).

Despite the previous evidence about FRIDs withdrawal, doctors rarely adjust or change these medications (Stam et al., 2016b). Investigating the reasons for or the barriers to deprescribing is needed (Thompson et al., 2019).

1.3.2. Tools and guidelines

Several research groups around the world are working to develop the bases for the deprescribing process (Pravodelov, 2020). For example, the Australian Deprescribing Network and the Canadian Deprescribing Network are working to promote research on and awareness of deprescribing to support the implementation of the process in routine clinical practice. In addition, the Canadian network developed some tools and guidance to help healthcare providers with decision-making (Pravodelov, 2020).

Some guidelines for the medication deprescribing process have been established (Table 1.2 and Table 1.1). Researchers established basic steps to simplify the process for healthcare providers. For example, there is the five-step process by Starkey and Omorinoye (2013) and the seven steps suggested by the Scottish guidelines for deprescribing. The latter programme puts patients first, discussing the plan and tailoring it to the patient's needs, conditions, ability to follow the plan and satisfaction (Scottish Government Polypharmacy Model of Care Group, 2018). In addition, there are the five steps by Scott et al. (2015), The Principles of Deprescribing by Woodward (2003) and The Prescription for Deprescribing In Psychiatry by Gupta and Cahill (2016). All guidance and steps share similar principles and process elements but differ in their presentation.

Table 1.1: Examples of deprescribing guidelines

Guide (Name or author, year, country)	**Steps**	**Description**	**Comments**
Woodward et al., 2003 Australia	Five principles: 1. Review all current medications. 2. Identify medications to be targeted for cessation. 3. Plan a deprescribing regimen. 4. Plan in partnership with patients and carers 5. Frequent review and support	A simple guide on how to start and plan for medications' deprescribing. It includes suggestions for treatment plan changes for some of the common classes of medications.	
Scott et al., 2015 Australia	Involves a five-step process: 1. Medication reconciliation. 2. Consider overall risk of harm. 3. Assess benefits and prioritize drugs for discontinuation (e.g.	It contains an algorithm for how to approach the deprescribing process and detailed steps.	

Guide (Name or author, year, country)	Steps	Description	Comments
	drugs with the lowest benefit-harm ratio, lowest likelihood of withdrawal reactions). 4. Implement a discontinuation plan. 5. Monitor patients for improvement or adverse effects.		
Polypharmacy Guidance, Realistic Prescribing, 2018 The Scottish Government	The seven steps are as follows: 1. Determine a treatment goal with the patient. 2. Identify essential medications. 3. Identify unnecessary medications. 4. Evaluate the effectiveness of current therapy. 5. Determine the safety of the current medications. 6. Evaluate the cost effectiveness. 7. Evaluate the patient's understanding and agreement.	It contains a patient-centred medication review guide, case studies, tools and experts' opinions. There is also a specific section about FRIDs.	Advantages: • Developed by experts in medication review of different healthcare professionals. • Targets healthcare professionals, policymakers and patients. • Helps manage polypharmacy, determines the safety and appropriateness of medicine. • Used for medication review and for prescribing new medication. Disadvantages: • Not validated in practice.
Smith et al., 2019 United Kingdom	Process steps: 1. Assess the patient. 2. Define the goals. 3. Identify medications with potential risks. 4. Assess risks and benefits. 5. Agree to stop, reduce, continue, or start a drug. 6. Communicate the action with all parties. 7. Monitor and adjust regularly.	Includes additional tools: 1. The Treatment, Prevention, Reassessment (TPR) tool to assist with the medication review process. 2. A health coaching model—such as 'the four Es', to guide patients' education. 3. Recommendations based on the Capability, Opportunity, and Motivation (COM-B) model of behavioural change. Assesses medication adherence. 4. Case studies	Comprehensive guide that uses a patient-centred approach.

Guide (Name or author, year, country)	Steps	Description	Comments
Starkey, V., & Omorinoye, T., 2013 NHS, United Kingdom	Five steps: 1. Obtain a comprehensive medication history and check adherence. 2. Identify any PIP. 3. Determine whether the PIP can be stopped. 4. Plan the withdrawal regimen. 5. Follow up and monitor.	It is a guide for deprescribing containing advice about choosing eligible patients and how to approach the deprescribing process. Also, it provides some resources for physicians, such as an online course, table of medications to be considered for deprescribing and links to deprescribing algorithms.	Disadvantages: • The guide is for use within the NHS institution, and not validated clinically.

Table 1.2: Some common deprescribing websites

Website	Description

The Canadian website Deprescribing.org ("Deprescribing guidelines and algorithms,")	It contains:
	• Information about deprescribing for patients (videos and leaflets).
	• Information for researchers.
	• Guidelines and algorithms for healthcare providers for some classes of medications:
	  ○ Proton pump inhibitors
	  ○ Antipsychotics
	  ○ Antihyperglycemics
	  ○ Benzodiazepines
	  ○ Cholinesterase inhibitors and memantines
	• There is a smartphone application linked to this website as well.

The US Deprescribing Research Network (US deprescribing network, 2019)	The network involves research groups in different areas to generate evidence to improve medication use in older adults:
	  ○ Development
	  ○ Exploratory
	  ○ Stakeholders' involvement
	  ○ Data and resources
	  ○ Tools' development groups

Forty-six different tools for assessing inappropriate prescribing have been identified, 36 of them focusing on the older population (Kaufmann et al., 2014). Tools were divided into two categories: explicit and implicit criteria. Explicit criteria are lists of drugs potentially inappropriate for use in older patients. These criteria are usually drug- or disease-specific problems and were developed based on expert consensus (Payne, 2016). Implicit criteria are used to evaluate any medication and could include a list of questions or a mathematical equation to give a score to each drug, resulting in a total score for the whole list of a patient's medications (Kaufmann et al., 2014). This helps capture the patient's entire medication regimen (Payne, 2016). Both explicit and implicit tools can help prioritize medication for deprescribing.

A recent systematic review is an update of Kaufmann et al. (Kaufmann et al., 2014; Masnoon et al., 2018). In their evaluation of prescribing appropriateness assessment tools and criteria, the researchers found that fewer than half of tools were clinically validated, which limits their use in

clinical practice. A few of these tools included alternative treatment suggestions and considered drug dosing.

Two significant deprescribing tools are the Drug Burden Index (DBI) (Hilmer et al., 2007) and NO TEARS (Lewis, 2004). There are also local tools, such as the German FORTA lists (Wehling et al., 2016) and the PrescQIPP Polypharmacy and Deprescribing webkit, which is mainly for prescribers in the UK (PrescQIPP, 2018). Yet others are directed at certain populations, such as STOPPFrail for frail older adults (Curtin et al., 2021) and OncPal for patients with cancer (Lindsay et al., 2015). As mentioned above, there are many other tools, but these are examples of the most common tools used internationally.

The DBI is one of the tools to help guide decisions after the medication review process (Hilmer et al., 2007). It determines the magnitude of the effect of each medication on the list. High total scores are associated with the poor cognitive and physical functioning of older patients (Hilmer et al., 2007). When used to research falls, the DBI scores were higher among those who screened positive for falls compared to those who did not ($p < 0.0001$) (Blalock et al., 2020). The DBI is therefore a useful tool that could be used to improve future research and practice by focusing on those individuals at the greatest risk of medication-related falls.

A new tool specific for falls, called STOPPFall, was launched in 2020 (Seppala et al., 2020). It has a more comprehensive list of FRIDs and contains medication classes not mentioned by previous tools, such as alpha-blockers, antihistamines, and anticholinergics. It is combined with a practical deprescribing tool to assist doctors with clinical decision-making and FRIDs management. It was intended to standardize the guidelines for managing FRIDs across Europe (Seppala et al., 2020). Compared to STOPP/START (Gallagher et al., 2008), this tool contains 14 classes plus algorithms for deprescribing each class of medications. The algorithms include advice on when to switch to alternatives, when to involve patients and what to monitor. This tool needs to be validated in clinical practice.

The most common tools are the Beers Criteria (Beers, 1997) and STOPP/START (Gallagher et al., 2008) tools (Table 1.3). These two tools are well recognized internationally and widely used in research (Curtin et al., 2019). When compared, STOPP, Beers and FORTA focus on different sensitivities and specificities (Awad & Hanna, 2019). In a cross-sectional study, the STOPP criteria had the highest sensitivity (68.6%) and specificity (80.2%) to detect PIMs compared to the Beers Criteria and FORTA (Awad & Hanna, 2019). It also demonstrated efficacy in clinical trials as an intervention tool (Curtin et

al., 2019). Another study compared STOPP/START and Beers Criteria to the Medication Appropriateness Index (MAI) and found that the MAI detected a greater number of potentially inappropriate prescribed medications. This study indicated strong agreement between the MAI and the recently updated STOPP (2014) (Lopez et al., 2020).

Table 1.3: Common tools used to guide medication review and deprescribing.

Tool name	Description	Comments
STOPP and START (Gallagher et al., 2008) **Last updated: Version 2 in 2015**	**STOPP criteria** include a list of inappropriate medications in older persons arranged by physiological system (80 criteria). **START criteria** encompass medications that should be considered when prescribing for older people with certain conditions (34 criteria).	• There is a section about fall medications, including some of the most commonly used drugs, but it is not an explicit list of FRIDs. • Does not include suggestions for alternative therapy.
Beers Criteria (American Geriatrics Society, Beers Criteria Update Expert, 2012 #1087) **Last updated in 2012**	It includes a list of medications (88 medications or classes) to be avoided or used with caution in older adults. Also, medications that should be avoided or have their dose adjusted based on kidney function; and some clinically important drug–drug interactions associated with harmful effects in older adults.	• It includes medications used in the US mainly and may not be applicable internationally. • There is no information about missing drugs or palliative therapy (Curtin, 2019). • Does not include suggestions for alternative therapy.
Medication Appropriateness Index	Involves ten criteria: indication, effectiveness, dosage, correct directions, practical directions, drug-drug interactions, drug-disease interactions, duplication, duration and expense. Each medication in the patient list is given a score based on these criteria, and then a total score is given to the patient's complete list.	Can be used as standard to compare tools (Lopez et al., 2020).
Drug Burden Index **Hilmer et al., 2007**	This tool is used to calculate the degree of exposure to anticholinergic and sedating medications. Uses a certain equation that depends on the daily dose, and the minimum recommended daily dose. The resulting score of each medication is added to the overall score of the list of medications under review.	An online calculator is available for clinical use.
STOPPFRAIL **2013** **Updated in 2021**	It includes 27 criteria of medications that are inappropriate to be used in frail older adults at the end of life.	• Should be used for appropriate patients only and clinical judgment should be applied. • The updated version contains recommendations about shared decision-making and the deprescribing of antihypertensive and anti-anginal medications and vitamin D preparations. • It has been validated by a randomised controlled trial study by the creator of the tool.
STOPPFall	It is a tool to support clinicians in the management of FRIDs and to facilitate the deprescribing process.	This tool is new and has not been validated in clinical trials.

2020	It includes 14 medication classes in the STOPPFall, mainly psychotropic medications.	

Despite the availability of some deprescribing guidance, there are certain challenges hindering the implementation of deprescribing (Reeve et al., 2018). A randomised study that evaluated deprescribing inappropriate medications at discharge from hospital found that the higher the clinical importance of the deprescribing recommendation, the lower the discontinuation rate (Dalleur et al., 2014). Only 25% of PIMS with significant clinical importance were discontinued, compared with 75% of minor PIMs (Dalleur et al., 2014). There is a need for more evidence, not only quantitative but also qualitative research, to investigate the barriers to and facilitators of implementing the deprescribing process in practice and understanding the role and contribution of each stakeholder in the deprescribing process (Thompson et al., 2019).

1.3.3. Medication reconciliation

Medication reconciliation is defined as 'the process of creating and maintaining the most accurate list possible of all medications a person is taking – including drug name, dosage, frequency and route – in order to identify any discrepancies and to ensure any changes are documented and communicated, thus resulting in a complete list of medications' (Health Information and Quality Authority, 2014). Medication reconciliation consists of three main steps, namely collecting, checking the accuracy of the prescription and communicating the list to other places (Health Information and Quality Authority, 2014).

Having a complete and updated list of medications is important for the medication review and deprescribing process (Starkey & Omorinoye, 2013). Most guidance tools include medication reconciliation as the initial step of deprescribing (Table 1.1). Medication reconciliation can happen at different points of care, such as admission, transfer between institutions, and discharge from health institutions (Health Information and Quality Authority, 2014).

1.3.4. Medication review

Medication review means 'any systematic assessment of the pharmacotherapy of an individual patient that aims to evaluate and optimise patient medication by providing a recommendation or by making a direct change in prescriptions' (Mikkel & Andreas, 2016). For pharmacists, the Pharmaceutical Care Network Europe (PCNE) defines medication review as follows: 'Medication review is a structured evaluation of a patient's medicines with the aim of optimising medicines use

and improving health outcomes. This entails detecting drug-related problems and recommending interventions.' The review can be conducted by pharmacists, prescribers or nurses.

There are three levels of medication review, according to the PCNE: simple, intermediate and advanced. Not all types require patients' involvement. A simple review refers to a patient's medication history, whereas the advanced level involves a patient interview and clinical data.

A medication review is likely to result in medications changes (Sheehan et al., 2018). It is essential to identify drug-related problems (e.g. adverse effects), inappropriate prescribing (e.g. prescribing cascade) and adherence problems (Blenkinsopp et al., 2012; Scott et al., 2015). A medication review helps identify PIM and prioritize medications for discontinuation (Scott et al., 2015). Consequently, it is a core part of deprescribing.

Some factors can affect the review process's efficacy (Blenkinsopp et al., 2012). The availability of pharmacists in the care team, the clinical team's relationship, the manner of communication among the care team, the availability of the patient's history and the health care provider's (HCP) skills all affect the medication review process.

A recent Cochrane review of the effect of medication review interventions on healthcare outcomes revealed that they may reduce emergency visits and unplanned readmissions to hospital. However, it is unclear whether the type of medication review affects the efficacy (Bulow et al., 2023).

1.4. Stakeholders

Interprofessional teams are emerging as a common approach to caring for older people (Trivedi et al., 2013). Collaboration might potentially improve the quality of healthcare services. Stakeholders can include healthcare providers, policymakers, patients, families and caregivers; each has a role in the process of the prescribing and use of medications. Thus, to promote deprescribing, collaboration among multiple stakeholder groups is needed (Anderson et al., 2014). Therefore, investigating stakeholders' opinions about deprescribing is necessary (Thompson et al., 2019).

In this thesis, the focus is on exploring stakeholders' opinions on deprescribing FRIDs. Understanding the views of key stakeholders, that is, healthcare providers and patients, regarding the management and use of medications might help understanding their behaviours, and therefore, understanding how to change these behaviours to tackle the barriers to and enhance the facilitators of implementing the deprescribing of FRIDs in fall prevention programmes (Atkins et al., 2017). The role of each stakeholder, and the barriers to and facilitators of deprescribing FRIDs from their point of view, will be discussed in more detail in the following chapters.

1.5. Objectives

The objectives of this thesis are:

- To explore the role of pharmacists in the quality of patients' care at the time of discharge;
- To explore stakeholders' opinions about deprescribing fall risk-increasing drugs, where the stakeholders include doctors (hospital and general practitioners), pharmacists and patients;
- To investigate the barriers to and facilitators of implementing FRIDs' deprescribing process in practice; and
- To initiate design of a multifaceted intervention to improve the deprescribing of FRIDs in primary care clinics and hospitals.

2. Pharmacist Interventions at Discharge and the Quality of Older Patients' Care: A Systematic Review and Meta-Analysis

2.1. Introduction

The previous chapter presented how polypharmacy affects older adults' health, as well as the importance of medication reconciliation, medication review, and deprescribing for managing and reducing the risks of polypharmacy. After discharge from hospital, older adults with polypharmacy are at risk of side effects and errors related to medication discrepancies, which are defined as 'differences in documentation between settings' (Mueller et al., 2012). Such discrepancies might include the unintentional addition of medications to, or their omission from, a list of medications, duplication, or substitution (Almanasreh et al., 2020). These types of medication errors are common upon the transfer of older adults from one healthcare facility to another. Caleres et al. (2020) conducted a study to investigate the rate of occurrence of medication discrepancy. They scanned discharge summaries for 933 patients and found discrepancies in 38% of the summaries.

Medication discrepancies have the potential to lead to medication-related harm and increase medical care use (Midlov et al., 2008). The prevalence of medication harm can be as high as 51.2% in older adults after discharge from hospital settings (Parekh et al., 2018), consequently increasing hospital readmission shortly after discharge, which leads to additional healthcare costs (Parekh et al., 2018).

Maintaining the continuity of care may reduce unplanned hospital admission (Tammes et al., 2017), reduce the adverse drug event (ADE) costs, and improve adherence (Spinewine et al., 2012). The WHO (2017) has developed an action plan for healthy aging promotion and recommended coordination between different healthcare sectors aimed at caring for aging populations. The plan includes improving living conditions and community support to minimise the need for hospitalisation and long-term facility transitioning.

The term 'continuity of care' has many definitions and types according to Cornwell (2012). In this review, we will address the continuity of healthcare management during transitions, defined as 'the sharing of patient information and communication about care-planning, along with coordination of the care required by the patient across institutions' (Haggerty et al., 2003).

Continuity of care is subsumed by a wider term, namely 'integrated care', which means connecting all health resources and personnel based on patients' needs and targeted outcomes. Integrated care has other definitions and categories; for example, horizontal integration is one category that involves

service providers and the community, which greatly facilitates the complex care of older patients (Goodwin, 2016).

Pharmacists play an important role in improving older care, either alone or as members of an interdisciplinary team (Ansryan et al., 2018; Ellitt, 2009). As the most accessible healthcare professional for patients and providers, pharmacists are an invaluable resource for medication information (Fritsch & Shelton, 2019). Further, clinical pharmacy services may reduce drug-related problems in hospitalised older patients (Somers et al., 2013). Thus, incorporating pharmacists into multidisciplinary programmes across healthcare settings is essential for the continuity of care (Ensing et al., 2015).

Pharmacist interventions have a positive impact on adjusting the treatment for older patients both inside the hospital and outside, in the community setting (Spinewine et al., 2012). For example, home follow-up and community pharmacist collaborative interventions have enhanced the prevention of drug-related problems after discharge (Nazar et al., 2015).

Reviews of pharmacist interventions in older patient transitions have focused either on specific outcomes, such as unplanned readmission (Thomas et al., 2014; Van der Linden et al., 2020), or specific settings, such as nursing homes (Fredrickson & Burkett, 2019) or hospitals (Delgado-Silveira et al., 2021; Kiesel & Hopf, 2018). This review summarises the data on the efficacy of pharmacist interventions at discharge and, where possible, their effect on care quality indicators.

2.1.1. Aim

To examine the evidence from pharmacist interventions at discharge of older patients from hospitals and the quality of patient care.

2.1.2. Objectives

- Summaries evidence for the efficacy of pharmacists' interventions at hospital discharge
- Conduct a metanalysis for studies with aligned outcomes

2.2. Methods

Nine databases were searched systematically from inception to date for published articles, using the appropriate search strategy for each database (Appendix 1). These databases were CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL), Embase, PyschINFO, Scopus, Web of Science, Academic Search Complete, and PubMed.

Eight additional websites were searched for grey literature: Lenus, the World Health Organisation trials portal (ICTRP), ClinicalTrials.gov, EudraCT, ANZCT, Google Scholar, Open Grey, and ProQuest

Dissertations & Theses A&I. Full article references were hand-searched, and articles for potential inclusion were added to the library. No filters or restrictions, such as language or dates, were applied to any of the searches. The Cochrane handbook (Higgins JPT & Green, 2011) was consulted for conducting the systematic review; the PRISMA checklist and flow chart were used as well (Page et al., 2021).

2.2.1. Inclusion criteria

Prospective randomised or quasi-randomised controlled studies have focused on pharmacist interventions at hospital discharge. Such studies were only included if the patients were aged 65 years or older, of either gender, and discharged alive from a hospital setting to home, nursing home or a step-down facility in primary care. Pharmacist interventions were defined as interventions undertaken by a pharmacist alone or as part of a team. Interventions undertaken by other members of the pharmacy team (e.g., pharmacy technicians) under the direction of a pharmacist or multidisciplinary teams were included (*Table 2.1*).

Participants undergoing palliative care, intensive care, dialysis patients, oncology patients or patients who were transferred to another hospital ward or department were excluded. Studies focusing on interventions upon hospital admission or addressing interventions carried out by other healthcare practitioners (e.g., nurses or physicians) were also excluded.

2.2.2. Types of outcomes

The included studies had at least one of the following, measured as a primary or secondary outcome (using validated tools where applicable):

1. Healthcare utilisation as measured by hospital readmission rates, duration of hospitalisation, or number of visits to outpatient clinics, general practice, or the emergency department (ED);
2. Prescribing outcomes (e.g., measures of inappropriate prescribing and rates of drug-related problems and mortality rates);
3. Measures of patients' quality of life, satisfaction with the service, medication knowledge, or medication adherence; and
4. Intervention costs and duration of follow up.

Table 2.1: Inclusion criteria in PICO structure.

Patient	Older people (aged 65 and older) discharged alive from a hospital setting
Intervention	• Interventions by a pharmacist, by a member of the pharmacy team under pharmacist's direction, or by a pharmacist as member of multidisciplinary team • Interventions that occurred at discharge from hospital
Comparison	Any type of control group (as described in the studies)
Outcome	Healthcare utilisation, clinical/prescribing outcomes, quality of life, satisfaction, knowledge, costs, time commitment, mortality rates, length of stay (LOS), acceptance of pharmacists' recommendations

2.2.3. Data collection and analysis

2.2.3.1. Selection of studies

One author screened titles and abstracts to identify potentially relevant full texts. After that, full texts identified were reviewed to determine initial eligibility for inclusion. Consensus on final inclusion was reached by team discussion. Authors of identified trials were contacted to request full articles, information about the studies' publication status, missing data, or clarifications on study data.

A PRISMA flow diagram was constructed showing all the details of the study selection process. In addition, a primary list of the included studies was collated in RevMan5 software for analysis. Where there were multiple reports from a single study, these were linked. Reasons for exclusion were also tabulated (Appendix 2).

2.2.3.2. Data extraction

Data extraction from the included studies using standardised data extraction forms within RevMan5 was conducted.

The following data were extracted:

- Study design;
- Patient characteristics: number of participants, inclusion/exclusion criteria, and average age;

- Setting: where the study took place and to where the patients were transferred after discharge;
- Details of the intervention, type of intervention, duration of the follow-up, personnel involved in conducting the intervention, and whether it was a pharmacist alone or a team of providers including pharmacists;
- Types of outcomes and measurement methods; and
- Results data for both groups (control and intervention).

2.2.4. Quality of studies and level of evidence

The criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions (Higgins JPT & Green, 2011)* formed the basis of the assessment. The risk of bias was assessed for each study, and a summary of risk of bias assessment table was generated using RevMan5 software ("Review Manager (RevMan Web)," 2020). The overall quality of the body of evidence was assessed for the healthcare use and mortality outcome using the GRADE tool. Publication bias was assessed using a funnel plot.

2.2.5. Assessing heterogenicity

A meta-analysis for studies with aligned patient conditions, site, control situation, type of intervention, outcomes and reported results as odds ratio or number of patients was performed. RevMan5 software was used to generate the plot using the Mantel-Haenszel test. The data for these studies were pooled for the readmission to hospital/ED and mortality outcomes . The data for each study that was not included in the meta-analysis were summarised. Sensitivity analysis was conducted excluding the outlier data.

2.3. Results

A total of 9,738 articles were obtained: 8,119 unique articles remained after duplicate removal. After full-text screening, 14 studies (17 publications) met the inclusion criteria and proved eligible (Figure 2-1) (Al-Rashed et al., 2002; Alassaad et al., 2014; Basger et al., 2015; Crotty et al., 2004; Fretwell et al., 1990; Gillespie et al., 2009; Koehler et al., 2009; Lenssen et al., 2018; Lipton et al., 1992; Lipton & Bird, 1994; Nazareth et al., 2001; Owens et al., 1990; Roblek et al., 2016; Santolaya-Perrín et al., 2019; Smith et al., 1997; Spinewine et al., 2007; Vinluan et al., 2015). The total number of patients included was 3,747 older adults. All included studies compared intervention groups to usual care, which varied across studies based on the site.

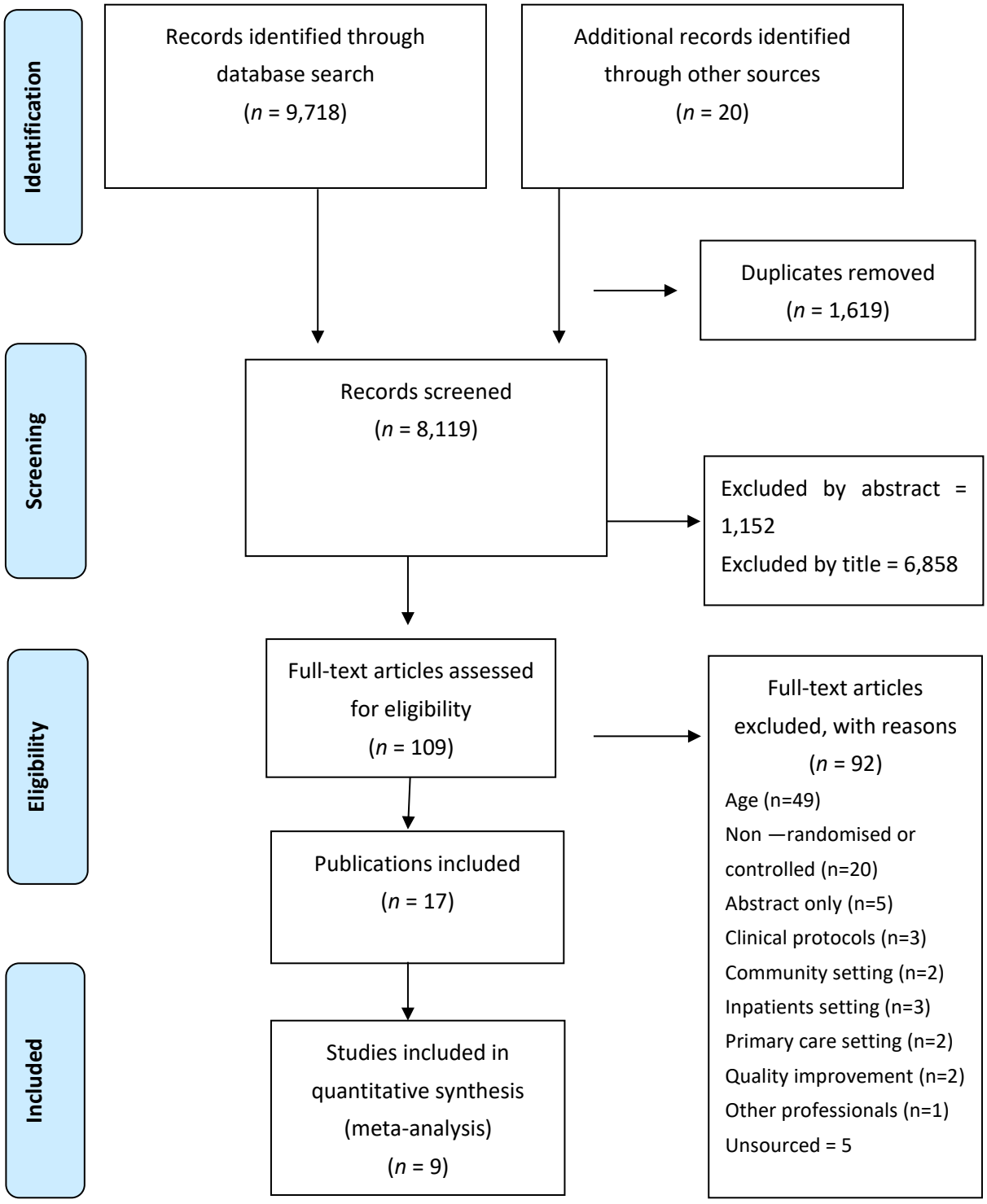


Figure 2-1: PRISMA diagram for pharmacists' interventions at discharge search

Table 2.2: Summary of included publications.

Included studies	Setting	Sample size	Demographic Inclusion	Exclusion	Intervention	Follow-up duration	Outcomes
Alassaad et al. (2014) (a publication of Gillespie et al. 2009)	Hospital	400	□ Aged 80 years or older □ Admitted to acute internal medicine ward	□ Previously admitted to the study wards during the study period □ Scheduled admissions	□ Medication reconciliation at admission □ Drug review □ Discharge counselling □ Communication with the GP and follow-up by phone after discharge	12 months	**Primary:** Number of visits to the ED **Secondary:** Changes in STOPP and START scores from admission to discharge, medication review outcomes
Al-Rashed et al. (2002)	Hospital/ patient's home	43	□ > 65 years, □ Four or more regular items □ Discharged home □ Mental score greater than seven out of 10 □ English speaker	-	□ Home visits for 2–3 weeks and at 3 months after discharge □ Counselling about medicines and compliance □ Discharge summary to GP □ Medicine reminder card	3 months	**Primary:** □ Drug knowledge and compliance □ Unplanned primary care visits and hospital readmissions □ Staff satisfaction with discharge information
Basger et al. (2015)	Hospital	88	□ Cognitively well English-speaking patients aged 65 years or over taking five or more medications □ Live within 15 km of hospital	□ PT with cognitive Problems	□ Medication counselling and an in-depth interview from the clinical pharmacist to facilitate completion of a medication review, sent to the GP within 3 days of discharge	3 months	**Primary:** □ The number of prescribing criteria met at follow-up □ Health-related quality of life (SF-36) □ Number and causes of DRP □ Rate of acceptance of recommendations

Included studies	Setting	Sample size	Demographic Inclusion	Exclusion	Intervention	Follow-up duration	Outcomes
Crotty et al. (2004)	Hospital	110	□ Mean age 82.7 years □ Discharge to long-term residential care □ Life expectancy more than one month	-	□ Pharmacist transition □ Coordinator □ Medication transfer summaries from hospitals □ Medication reviews by community pharmacists (10–14 days after transfer). □ Case conferences with physicians, family, nurse, and pharmacists (14–28 days after transfer).	8 weeks	**Primary:** Quality of prescribing, measured using the Medication Appropriateness Index (MAI). **Secondary:** ED department visits, hospital readmissions, adverse drug events, falls, worsening pain, mobility, confusion, or behaviours
Fretwell et al. (1990) (A publication of Owens et al. 1990)	Hospital	436	□ 75 years and older □ On protocol treatment transferred from the intensive or coronary-care units	□ Received coronary or intensive care at admission.	□ Evaluation by an interdisciplinary team on admission	6 months	**Primary:** □ Length of stay □ Mortality □ Cost □ Functional, emotional, and mental status □ Discharge destination
Gillespie et al. (2009)	Hospital	168	□ 80 years or older □ Admitted to acute internal medicine ward	□ Admitted to the study wards during the study period □ Had scheduled admissions	□ Medication review □ Advising physician □ Patient counselling (admission and discharge) □ Discharge summary sent to GP by pharmacists □ A follow-up telephone call to patients 2 months after discharge	12 months	**Primary:** Frequency of hospital visits (ED department and readmissions) **Secondary:** Cost of hospital care and mortality
Koehler et al. (2009)	Hospital	41	□ > 70 years, □ Use of > 5 medications regularly □ > 3 chronic comorbid conditions □ High level of dependency and living at home or assisted living □ English speaker □ Approachable by phone contact	□ Surgery admission □ Palliative patients □ Nursing home residents □ Denied participation and admission for more than three days	□ Patient counselling □ Medication reconciliation by a clinical pharmacist □ Condition-specific education □ Enhanced discharge planning by a care coordinator □ Phone follow-up after discharge	60 days	**Primary:** □ Hospital readmission and/or ED visitation following discharge □ LOS

Included studies	Setting	Sample size	Demographic Inclusion	Exclusion	Intervention	Follow-up duration	Outcomes
Lenssen et al. (2018)	Hospital	60	□ 65 years of age and older □ On chronic medication □ Admitted for three days or longer □ Ambulatory care patients from nursing home	□ Previous participation in the study	□ Medication reconciliation medication safety check □ Patient counselling before discharge □ Medication reconciliation □ Recommendations and letter at discharge	1 year	**Primary:** Drug-related readmission **Secondary:** Adverse drug reactions, potentially inappropriate medication, LOS and the number of medication changes after discharge
Lipton et al. (1992)	Hospital	236	□ Age 65 or older □ Medicare insurance □ Three or more medications □ No mental problems □ Live within 35 miles of the study site □ Speak English □ Phone access □ Not discharged to nursing home or hospice	-	□ Pharmacist consultation with doctors and patients at discharge □ Phone follow-up after discharge.	3 months	**Primary:** □ Prescribing appropriateness
Lipton and Bird (1994) (a publication of Lipton et al. 1992)	Hospital	706	□ Age 65 years or older □ Discharged on three or more medications □ Medical insurance □ Reside within 35 miles □ English speaking □ Mentally competent □ Phone access	□ Psychiatric ward □ Discharged to nursing home	□ Medication reviews □ Patient and physician consultations with clinical pharmacists. □ Follow-up at 1 week, 2–4 weeks, 2 months, and 3 months post-discharge	6 months	**Primary:** □ Medical care use Compliance □ Patients' knowledge about medication □ Cost □ Number of medications
Nazareth et al. (2001)	Hospital and community pharmacy	326	□ > 75 years old, □ On four or more medicines at discharge	□ Non-English speaker □ Acute cases	□ Discharge plan by hospital pharmacist □ Assessment by community pharmacist	6 months	**Primary:** Hospital readmission **Secondary:** □ Number of deaths □ Hospital outpatient □ Clinic or general practice visits □ LOS □ General well-being □ Service satisfaction □ Knowledge and medication adherence

Included studies	Setting	Sample size	Demographic Inclusion	Exclusion	Intervention	Follow-up duration	Outcomes
Owens et al. (1990)	Hospital	436	□ 75 years of age or older □ Admitted to hospital	-	□ Patient interview and medication review by pharmacist □ Team conference and recommendations □ Care plan at discharge. □ Phone follow-up by nurse □ Coordinator after discharge	3 months	**Primary:** □ Numbers of medications □ Inappropriate medication prescribing □ Number of medication without indications
Roblek et al. (2016)	Hospital	213	□ Diagnosed with heart failure □ At least two drugs with one drug interaction	-	□ Recommendation by pharmacist □ Drug-drug interaction check at admission and discharge □ Discharge letter to the GP	6 months	**Primary:** Drug-drug interaction at admission and discharge and the difference between them **Secondary:** hospital readmission, mortality, and number of recommendations to GP
Santolaya-Perrín et al. (2019)	ER	665	□ Aged 65 and older □ Chronic disease □ Taking at least one drug	□ Psychiatry unit □ Palliative care department or private healthcare centre □ Inability to communicate □ Lack of written documents about treatment	□ Multidisciplinary team (pharmacists, emergency specialists, and GPs) □ Medication review by pharmacists □ Using STOPP/START criteria □ Pharmacist discussed cases with the emergency specialist and sent recommendations to the GP	12 months	**Primary:** □ Rate of emergency visits and hospital admissions **Secondary:** percentage of therapeutic recommendations that were followed by general practitioner
Smith et al. (1997)	Hospital/ patient's home	53	□ Aged 65 years or over □ Discharged home □ Difficulties managing medication	□ Patients unable to read or open containers	□ Counselling and care plan by pharmacist □ Telephone help line □ Home visit 7–10 days of discharge	10 days	**Primary:** □ Medication-related problems □ Medication changes, compliance and incorrect use

Included studies	Setting	Sample size	Demographic Inclusion	Exclusion	Intervention	Follow-up duration	Outcomes
Spinewine et al. (2007)	ER	186	□ Aged 70 and older □ Presented with acute geriatric problems	□ Palliative care □ Denied participation □ Admission of fewer than two days □ Patient received geriatrician care in another unit □ Previous participation	Pharmaceutical care included: □ Therapeutic plan □ Multidisciplinary rounds □ Involving patient and family □ Medication appropriateness □ Discharge letter □ Counselling □ Contact GP □ Telephone follow-up	12 months	**Primary:** Appropriateness of prescribing on admission, at discharge, and 3 months after. **Secondary:** Mortality, readmission, emergency visits up to 12 months after discharge, satisfaction with the information received on medications
Vinluan et al. (2015)	Hospital	16	□ Aged 65 years or older □ Heart failure exacerbation □ Five or more medications at discharge.	□ Nursing home residents □ Hearing or cognitive impairment □ Non-English speaker, □ Inability to self-medicate □ No phone contact □ Unable to consent	□ Med review by pharmacist □ Follow-up by phone three days after discharge	3 months	**Primary:** Evaluation of medication adherence after hospital discharge **Secondary***:* Hospital readmissions, number and type of pharmacist interventions, and the feasibility of counselling by pharmacist

2.3.1. *Risk of bias*

Most studies reported high scores in the 'performance' and 'other' risk of bias categories (Figure 2-2). Other sources of bias included possible contamination between groups (Al-Rashed et al., 2002; Fretwell et al., 1990; Gillespie et al., 2009; Owens et al., 1990; Roblek et al., 2016; Spinewine et al., 2007), unvalidated method of assessment (Lipton & Bird, 1994), or being underpowered (Koehler et al., 2009; Lenssen et al., 2018; Spinewine et al., 2007).

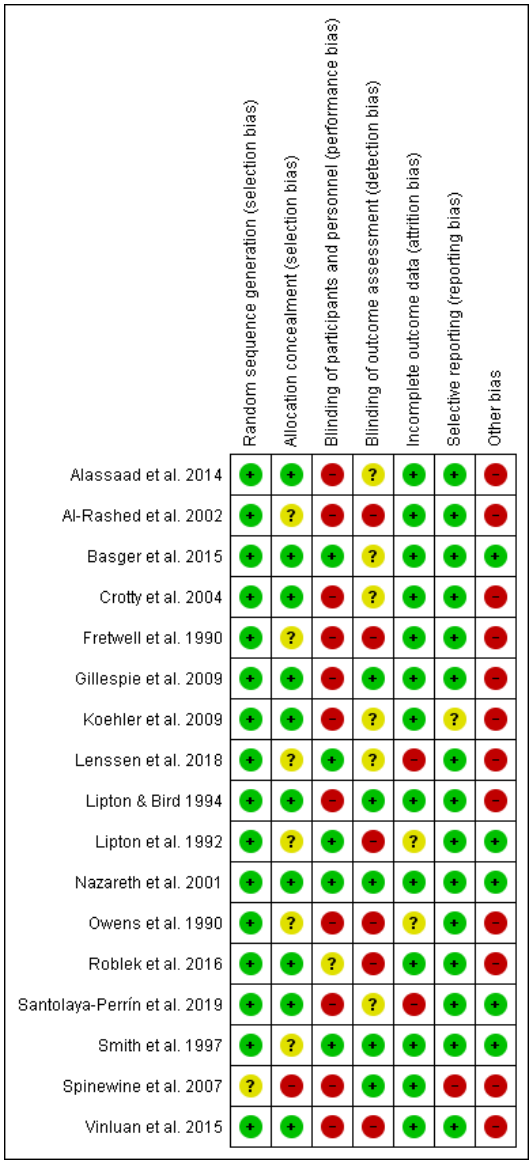


Figure 2-2: Risk of bias for included studies

2.3.2. *Interventions*

Interventions included the following: follow-up either through home visits or phone calls, an interprofessional collaboration programme, medication review, pre-discharge counselling, care co-ordination, a discharge summary to be sent to a community pharmacy or primary care facility,

a medication management transfer summary, and a case conference by a pharmacist and physician. The interventions in most of the studies were combinations of different components of the previously mentioned interventions (Table 2.2), for example, medication review combined with phone calls and/or counselling before discharge (Spinewine et al., 2007). The interventions took place in different settings (e.g., hospital, emergency department, community pharmacy, or patient's home).

2.3.3. Healthcare providers

Interventions were conducted by a pharmacist alone in nine studies (Al-Rashed et al., 2002; Basger et al., 2015; Crotty et al., 2004; Gillespie et al., 2009; Lipton & Bird, 1994; Nazareth et al., 2001; Roblek et al., 2016; Smith et al., 1997; Vinluan et al., 2015). Seven studies involved a multidisciplinary team in which pharmacists were part of the team, along with other healthcare providers, such as physicians, nurses, social workers, or dietitians (Fretwell et al., 1990; Koehler et al., 2009; Lenssen et al., 2018; Lipton et al., 1992; Owens et al., 1990; Santolaya-Perrín et al., 2019; Spinewine et al., 2007).

2.3.4. Outcomes

A wide range of primary and secondary outcome measures were used (Table 2.2), including hospital readmission, medication adherence, and mortality. Quality of life, prescribing quality, cost, length of hospital stays, patients' satisfaction with service, drug-related problems, and falls were also measured in the included studies (see section 2.3.7 for more details).

Most reported outcomes among the included studies were hospital readmission and emergency visits (section 2.3.9). Seven studies had hospital readmission and/or ED visits as their primary outcome (Al-Rashed et al., 2002; Alassaad et al., 2014; Koehler et al., 2009; Lenssen et al., 2018; Lipton & Bird, 1994; Nazareth et al., 2001; Santolaya-Perrín et al., 2019), while four studies had this as a secondary outcome (Crotty et al., 2004; Roblek et al., 2016; Spinewine et al., 2007; Vinluan et al., 2015).

2.3.5. Follow-up duration after discharge

The duration of follow-up after discharge from hospital ranged from 10 days to 12 months (Table 2.2). The most common durations of follow-up were three and six months as five studies used three months (Al-Rashed et al., 2002; Basger et al., 2015; Lipton et al., 1992; Owens et al., 1990; Vinluan et al., 2015) and four used six months (Fretwell et al., 1990; Lipton & Bird, 1994; Nazareth et al., 2001; Roblek et al., 2016; Santolaya-Perrín et al., 2019).

2.3.6. Counselling time

Whether during in-home visits or inpatient counselling interventions, the time spent by a pharmacist counselling each patient, in studies that reported intervention time, was between 15

and 140 min per patient (median = 27.5 min) (Al-Rashed et al., 2002; Gillespie et al., 2009; Koehler et al., 2009; Lipton & Bird, 1994; Nazareth et al., 2001). Travel time for home visits (mean = 17 min [*SD* ± 11]) and pharmacy-related administrative work (median = 32 min) was reported in one study (Nazareth et al., 2001).

2.3.7. Efficacy

Twelve studies showed significant improvements over standard care in the primary outcome or secondary outcomes (Al-Rashed et al., 2002; Crotty et al., 2004; Gillespie et al., 2009; Koehler et al., 2009; Lenssen et al., 2018; Lipton et al., 1992; Lipton & Bird, 1994; Owens et al., 1990; Roblek et al., 2016; Smith et al., 1997; Spinewine et al., 2007; Vinluan et al., 2015); for example, one study reported a 47% reduction in ED visits (95% CI [0.37, 0.7) (Gillespie et al., 2009). However, three studies reported non-significant results (Basger et al., 2015; Nazareth et al., 2001; Santolaya-Perrín et al., 2019).

2.3.8. Medication adherence

Regarding patient compliance, Nazareth et al. reported a non-significant improvement , whereas the intervention groups in Lipton et al., Vinluan et al and Al-Rashed et al. had better adherence than the control by the end of the follow-up period (Al-Rashed et al., 2002; Lipton & Bird, 1994; Vinluan et al., 2015).

2.3.9. Readmission to hospital and ED visits

Dichotomous data were pooled into a meta-analysis from studies with aligned outcomes. Figure 2-3 shows readmission to hospital and/or ED visits for 8 weeks to 12 months of follow-up. The overall result was not statistically significant.

In the funnel plot (Figure 2-4), it is very noticeable that studies with positive outcomes had a low standard error, with some studies crossing the line of no effect. In general, there was some publication bias and an imbalance between the published positive and negative results. Moreover, large studies at low risk of bias were absent. The data for positive results were mostly from small low-quality studies.

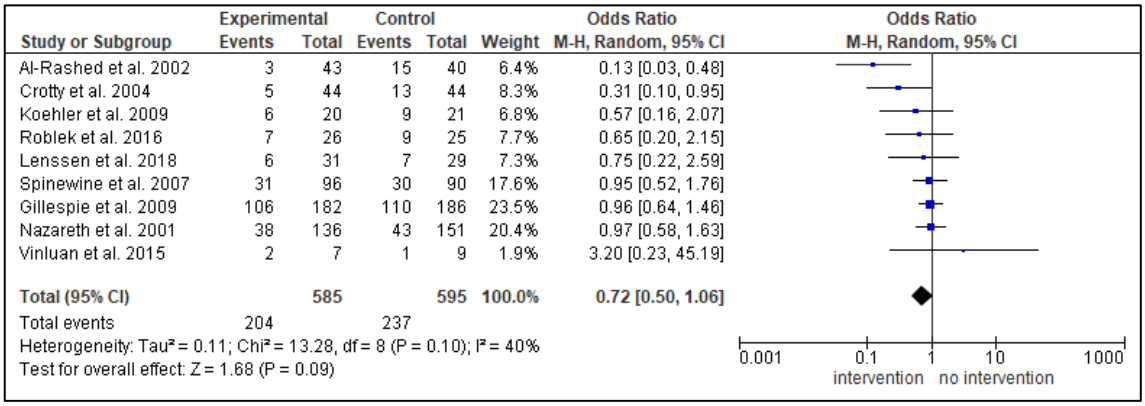


Figure 2-3: Readmission to hospital and/or ED visits for 8 weeks to 12 months follow-up duration (for studies that reported two periods of follow-up, the last one was used)

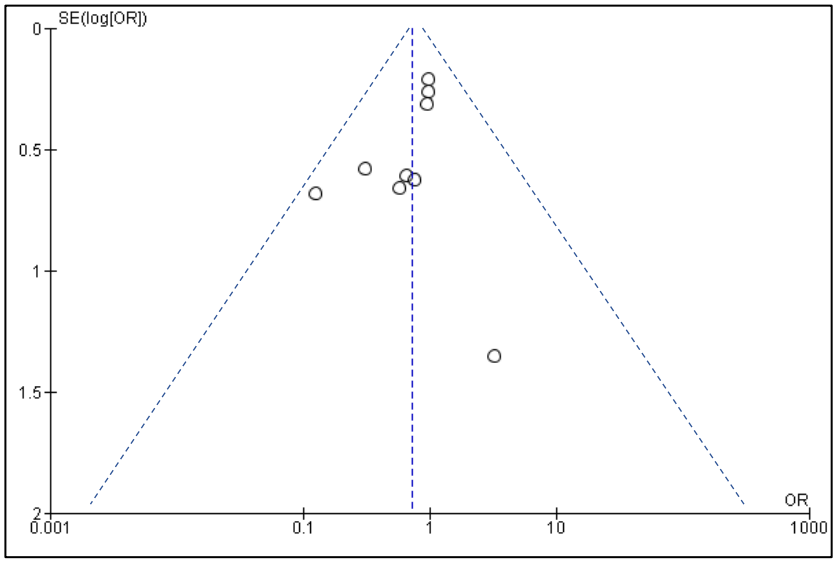


Figure 2-4: Funnel plot for readmission to hospital and/or ED visits during 8 weeks to 12 months of follow-up.

Two studies could not be added to the meta-analysis. The first was that of Alassaad et al., which is a post hoc analysis of Gillespie et al.'s study. The former found significant prevention of ED visits for patients with fewer than five medications, but the results were not statistically significant for the group using five or more medications. The rate ratios (RRs) were 0.22 (95% CI [0.09, 0.52]) and 0.70 (95% CI [0.47, 1.04]), respectively (p = .02) (Alassaad et al., 2014). The second study reported an adjusted rate ratio of 0.808 (95% CI [0.617, 1.059]) at three months for emergency visits and

hospital admissions and a higher ratio at 12 months (RR 0.954; 95% CI [0.772, 1.179]) (Santolaya-Perrín et al., 2019).

One study reported the number of patients who visited the primary care or outpatient clinic after discharge (Nazareth et al., 2001). The authors noticed no significant difference between control and intervention groups after three and six months of follow-up.

A low quality of evidence was observed when the quality of evidence was rated via the GRADE tool (Table 2.3). This may be due to the increased risk of bias in some studies and the inconsistency of their interventions, i.e. moderate heterogeneity with I^2=40% (see Figure 2-3).

Table 2.3: Summary of healthcare use findings and GRADE quality of evidence

Outcomes	**Anticipated absolute effects* (95% CI)**		**Relative effect (95% CI)**	**№ of participants (studies)**	**Certainty of the evidence (GRADE)**	**Comments**
	Risk with usual care	**Risk with pharmacist intervention**				
Healthcare use	40 per 100	32 per 100 (25–41)	OR 0.72 (0.50–1.06)	1,180 (9 RCTs)[a]	⨁⨁◯◯ Low[a,b]	
***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). **CI:** confidence interval; **OR:** odds ratio						
GRADE Working Group grades of evidence **High certainty:** We are very confident that the true effect lies close to that of the estimate of the effect. **Moderate certainty:** We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. **Low certainty:** Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect. **Very low certainty:** We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.						
Explanations a. High risk due to contamination between groups was observed in two studies (Al-Rashed et al., 2002; Gillespie et al., 2009). The control group had to include certain intervention components as the law in the country where the study took place mandated medication review for all patients (Crotty et al., 2004). b. There was one study with non-significant results (Nazareth et al., 2001).						

2.3.10. Mortality

A non-significant effect of the intervention on the mortality rate was found based on the results of five trials (Figure 2-5) (Fretwell et al., 1990; Gillespie et al., 2009; Nazareth et al., 2001; Roblek et al., 2016; Spinewine et al., 2007). No heterogeneity was observed (I^2=0%), however there was

some publication bias as small studies with significant effects were missing (Figure 2-6). The overall level of evidence was low (Table 2.4).

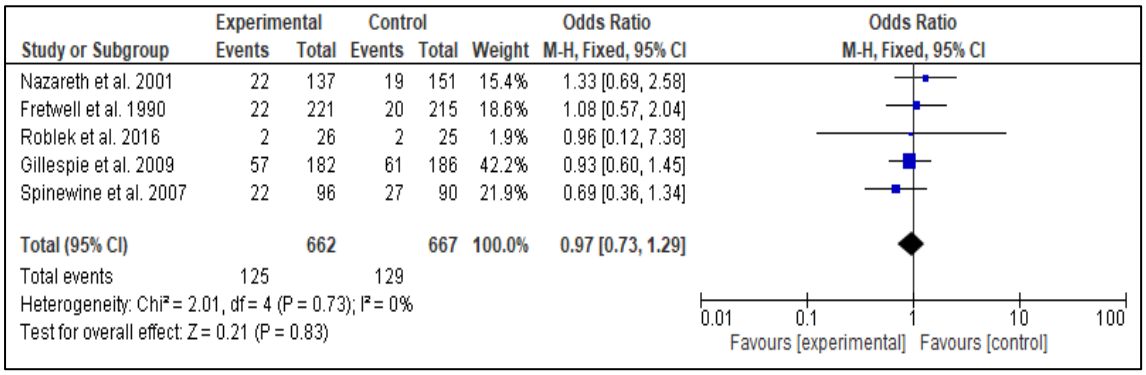


Figure 2-5: The effect of interventions on mortality

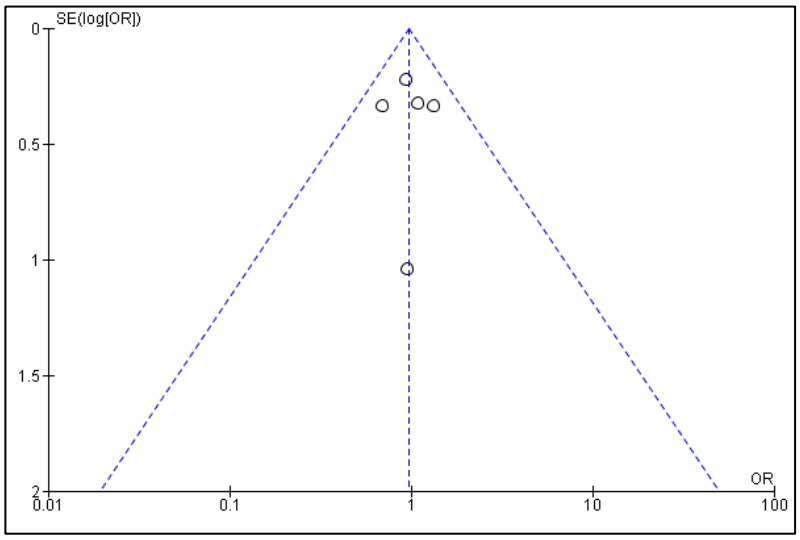


Figure 2-6: Funnel plot for the effect on mortality

Table 2.4: Summary of mortality findings and GRADE quality of evidence

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with Usual care	Risk with Pharmacists interventions				
Mortality rate	19 per 100	19 per 100 (15 to 24)	OR 0.97 (0.73 to 1.29)	1329 (5 RCTs)	⊕⊕◯◯ Low	[a]
*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI). __CI:__ confidence interval; __OR:__ odds ratio						
__GRADE Working Group grades of evidence__ __High certainty:__ we are very confident that the true effect lies close to that of the estimate of the effect. __Moderate certainty:__ we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. __Low certainty:__ our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect. __Very low certainty:__ we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.						
__Explanations__ a. High risk due to contamination between groups was observed in two studies (Fretwell et al., 1990; Gillespie et al., 2009).						

2.3.11. Quality of life

Only one study discussed quality of life and reported that there were no statistically significant differences between the study groups (Basger et al., 2015).

2.3.12. Length of stay

The length of hospital stays did not significantly differ between control and experimental groups in one study (Fretwell et al., 1990). However, in Lenssen et al., it was found to be a risk factor for drug-related readmissions (HR = 5.76; *P* = .033) (Lenssen et al., 2018).

2.3.13. Cost

Four studies compared the cost of healthcare use between groups (Al-Rashed et al., 2002; Fretwell et al., 1990; Gillespie et al., 2009; Lipton & Bird, 1994). Lipton and Bird (1994) found a statistically significant reduction in hospital costs between the experimental and control groups upon readmission at one month ($p = 0.01$) and three months ($p = .03$) after discharge but not at six months ($p = .21$). According to Gillespie et al. (2009), their intervention saved 230 dollars per patient over nine months. Their results were significant for the cost of ED visits but not for total cost and readmission. Al-Rashed et al. (2002) reported that their intervention was cost-effective since it lowered readmission rates, whereas (Fretwell et al., 1990) reported no difference at hospital discharge between groups.

2.3.14. Prescribing quality

Three studies concluded that the pharmacist intervention was effective in improving prescribing appropriateness (Crotty et al., 2004; Lipton et al., 1992; Owens et al., 1990), whereas Basger et al. concluded that the intervention did not affect the quality of prescribing (Basger et al., 2015).

2.3.15. Patients' and providers' satisfaction

One study investigated patients' service satisfaction, finding no significant difference between the intervention and control groups after six months (47% vs 45%, respectively) (Nazareth et al., 2001). Another study surveyed general practitioners and pharmacists to explore their opinions about discharge summaries. Both agreed that the amount of information in the discharge summaries was adequate and included useful information to share with doctors, nurses, and pharmacists (Al-Rashed et al., 2002).

2.3.16. Acceptance of pharmacists' recommendations by doctors

The percentage of pharmacist's recommendations accepted by physicians was 42.4% of the total recommendations (Basger et al., 2015). The relationship between the rate of acceptance and healthcare use was reported by one study, which found that a higher acceptance rate was linked with a statistically significant reduction in healthcare use up to three months after discharge: a 52% acceptance rate was associated with a healthcare use rate ratio of 0.452 (95% CI [0.222, 0.923]), while a 27% acceptance rate was associated with a use ratio of 1.047 (95% CI [0.710, 1.544]) (Santolaya-Perrín et al., 2019). Moreover, a higher rate was reported for patients taking fewer medications (Alassaad et al., 2014).

2.3.17. Drug-related problems

Crotty et al. (2004) reported a lower risk of worsening pain for the intervention compared to the control group. There was no significant difference in number of falls between the groups. The intervention group in the study by Lenssen et al. (2018) reported fewer adverse effects than the control.

2.3.18. Patients' knowledge

The intervention improved patients' knowledge in two studies (Lipton & Bird, 1994; Nazareth et al., 2001). Nonetheless, in another study, it did not have an effect (Al-Rashed et al., 2002).

2.4. Discussion

2.4.1. Summary of the main results

Whether on their own or within a team, pharmacists' interventions at discharge enhanced some aspects of the quality of care for older adults. Their intervention improved patients' adherence to

the treatment regimen, the quality of prescribing, and healthcare costs. However, the quality of evidence was not high enough for a definitive conclusion. Moreover, there was no effect on the quality of life, mortality rate or healthcare use. The meta-analysis for readmission yielded an insignificant effect for the intervention on readmission rates and ED visits (OR 0.72, 95% CI [0.50, 1.06]). Furthermore, the effect of pharmacist interventions at discharge was not clear for the rest of the outcomes.

2.4.2. Overall completeness and applicability of evidence

In this review, interventions at admission and their outcomes were excluded. Treatment changes that usually happen during hospital stays can lead to medication discrepancies after discharge (Lehnbom et al., 2014). Such discrepancies occur in approximately 25%–80% of patients at discharge. Another study revealed that medication errors occurred in 43% of discharged patients and that medication discrepancies persisted up to two weeks post-discharge (Riordan et al., 2016). Adverse drug events (ADEs) were identified in 26% of emergency admissions in patients aged over 65 years, and 66.6% of these ADEs contributed to admission (Hamilton et al., 2011). According to Ceschi et al. (2021), medication reconciliation at hospital admission of frail older patients with polypharmacy did not affect healthcare use within 30 days after discharge (P = .93).

Emergency and hospital visit outcomes were reported differently across the studies as either individual or combined outcomes. In the meta-analysis, these were combined as a form of healthcare usage, which is part of the quality of care indicators (Joling et al., 2018). However, whether the reason for readmission was drug-related or something else was not always clarified.

Follow-up of short rather than long duration seems to be more effective. The effect of pharmacist intervention was not continued more than 30 days after discharge (Mekonnen et al., 2016; Rodrigues et al., 2017). In our review, the included studies with a follow-up duration of between 30 and 90 days showed more efficacy compared to studies that adopted a longer follow-up. This implies that the sustainability of the effect of the intervention was questionable. According to Delgado-Silveira et al. (2021), this might be attributable to the continuity of the intervention and the complexity of the older patients. Vinluan et al. (2015) suggested that collaborative work can help with providing continuous intervention.

Multidisciplinary team and multicomponent interventions might be more effective than simpler ones (Delgado-Silveira et al., 2021). Studies involving teams made up of, for example, pharmacists and physicians had positive results (Lipton et al., 1992; Owens et al., 1990). Similarly, complex interventions comprising more than one component, such as counselling, home visits, or phone follow-up, also yielded significant results (Al-Rashed et al., 2002; Crotty et al., 2004; Gillespie et al., 2009). In contrast, studies that involved a single component, such as discharge planning

(Nazareth et al., 2001), yielded nonsignificant results. Furthermore, based on the results of this review, interventions that involved patient-pharmacist interaction (e.g., face-to-face counselling sessions or phone follow-up) had better results than those that relied on surveys or record-tracking follow-up.

The time spent by pharmacists on interventions was reported to be more than one hour in some studies (section 2.3.6). There was not enough information regarding the feasibility of the implementation of these interventions in daily practice. The analysis of the implementation of medication safety measures, such as discharge medication lists and medication reconciliation, found that they were challenging and time consuming (Linden-Lahti et al., 2019).

The quality of prescribing was assessed differently across the studies. Each study used a different special instrument. However, one common tool, namely, the Medication Appropriate Index (MAI), was used in some studies. Others used their own internally validated tools. Thus, caution should be used when interpreting the effect of the interventions on the prescribing quality.
In this review, three studies reported the rate of acceptance of pharmacists' recommendations by doctors (section 2.3.16). The rate varied widely in other studies (Doellner et al., 2017; Romero-Ventosa et al., 2016; Somers et al., 2013), which might affect the results of these studies. The rate of acceptance can be affected by factors such as the severity of potential harm and the number of medications (Zaal et al., 2020). It might also depend on other factors, such as individual personality, the doctor-pharmacist relationship, or patients' treatment goals (Dalton et al., 2022).

2.4.3. Quality of the evidence

Studies included in this meta-analysis had a high risk of bias in some domains (Figure 2-2) as the nature of the interventions suggested that blinding would complicate the process or affect the validity of the results. Blinding was not possible in some cases where the same team cared for both the intervention and control groups, which might lead to other types of bias due to contamination. Other studies were at low risk for this type of bias due to the use of different staff members to carry on the intervention (Nazareth et al., 2001; Smith et al., 1997). Consequently, the risk of bias and small sample size lowered the level of certainty of evidence according to the GRADE scale.

2.4.4. Potential biases in the review process

One strength of this review is its extensive search. Seventeen databases were searched for published and unpublished literature. Besides including all possible types of interventions and

outcomes, there were no filters applied to any of the searches. This likely minimised the effect of publication bias.

The populations in the included trials were restricted to adults over 65 years except for one study, Roblek et al. (2016), which had one patient under 65 in the control group as confirmed by the main author. Hospitalisation rates are higher in older people than in any other population, and they are the most at risk of medication errors and harm during care transitions. Studies that included a more comprehensive age range were excluded. This may have led us to overlook some studies with a mixed population of middle-aged and older adults. Consequently, the results are limited to this population, and generalisation to other age groups is not viable.

Among the identified limitations of this review was the unfeasibility of performing a meta-analysis for most of the outcomes due to the variation of results reporting between studies (e.g., for medication adherence). Some studies were old; therefore, obtaining further information from the authors was not possible. In others, the reasons for readmission, whether drug- or disease-related, were not discussed. In addition, details about usual care were not reported in some studies (Al-Rashed et al., 2002; Owens et al., 1990). The protocol of this review was not published or registered before the data analysis. However, an abstract of the preliminary data was published in a peer-reviewed journal (Kalim et al., 2019), and there was no deviation from the original protocol.

2.4.5. Alignment with other studies or reviews

The results were consistent with previous reviews of older adults' discharge and pharmacist interventions (Delgado-Silveira et al., 2021; Holland et al., 2008; Kiesel & Hopf, 2018; Thomas et al., 2014; Van der Linden et al., 2020). Holland et al. (2008) found that the interventions did not affect readmission or mortality rates. This review was more than 10 years old, and multi-disciplinary team intervention studies were excluded. Thomas et al. (2014) had similar findings for older adults in general but different findings for the sub-population with heart failure, while (Van der Linden et al., 2020) found that post-discharge visits were decreased in patients older than 75 years only. Kiesel and Hopf (2018) concluded that pharmacist interventions improved medication safety and appropriateness. The most recent scoping review included various types of study designs and multiple point-of-care interventions (i.e., admission, inpatient, and discharge) (Delgado-Silveira et al., 2021). The authors concluded that the impact of interventions on mortality was non-existent, which is consistent with our meta-analysis.

The transition to residential care is challenging, and medication reconciliation by pharmacists was shown to enhance the related medication management (Fredrickson & Burkett, 2019). Based on

two reviews, the effect of interventions for nursing homes residents and heart failure patients were promising (Fredrickson & Burkett, 2019; Thomas et al., 2014).

Three protocols are awaiting publication. The first, by Loffler et al., concerns pharmacists performing a medication review and then sharing the results with the hospital and primary care doctors. Their primary outcome is the effectiveness of the intervention in improving both the quality of life of patients and the prescribing of chronic medications (Loffler et al., 2014). The author was contacted and confirmed that the study has not been published yet due to recruitment problems. The second, by Renaudin et al. (2017), examines the impact of pharmacist medication review on hospital readmission in both paediatric and older populations. Finally, the most recent, by Kindstedt et al. (2020), investigates the effect on drug-related readmissions.

2.5. Conclusion

2.5.1. Implications for practice

In this review, most pharmacist interventions at discharge enhanced patients' quality of care. The intervention mitigated adherence to medication regimens, and enhanced the quality of prescribing. The results for cost-effectiveness were promising as well. However, the interventions were not effective in terms of healthcare use, mortality rate and quality of life.

These findings might be useful for decision-makers when planning the improvement of discharge and post-discharge services (e.g., assigning pharmacists to work with multidisciplinary teams and help with discharge). Besides counselling patients before discharge, they should focus on reconciling and reviewing medications to ensure medication safety and following up with patients after discharge to improve adherence. The additional role of the pharmacist as discharge liaison was shown to be both feasible and effective.

2.5.2. Implications for research

Large, randomised studies examining the role of pharmacists in the hospital discharge of older adults are required. Future studies should further investigate the pharmacist's role in improving outcomes in areas such as quality of life, length of stay, drug-related problems, and patients' knowledge and satisfaction. Finally, none of the studies investigated the effect of technologies or the role of prescribing pharmacists, which need to be explored in new studies.

3. Deprescribing Fall Risk Increasing Drugs in Older People: Exploring Doctors' Perspectives

3.1. Introduction

3.1.1. Fall-Risk Increasing Drugs (FRIDs)

As mentioned in section 1.2.1.5, some medication classes have been found to be significantly linked to an increased risk of falls and have been classified as FRIDs. The level of association was determined by some recent systematic reviews which evaluated the association of some classes with falls (De Vries et al., 2018; Seppala et al., 2018a; Seppala et al., 2018b) (see pooled odds ratios in Table 3.1). Antipsychotics and antidepressants were intensely involved. Moreover, a consistent association between falls and long-term use of proton pump inhibitors and opioid initiation was observed (Seppala et al., 2018a).

A prospective study about medications and falls analysed the effect of FRIDs in older adults in four hospitals over one year. They found that of the total of 280 falls, a mean of 2.8 diagnoses with fall-related risk, 8.8 drugs, and 4.1 FRIDs per fall was identified (Maly et al., 2019). New users of FRIDs and continuing users were at increased risk, especially with higher numbers of FRIDs classes (four or more FRIDs (OR 3.26)) with a linear increase between the risk and the number of classes. Injurious falls (OR 3.85), and use of two or more classes of FRIDs were associated with risk fall (OR 1.57) (Musich et al., 2017). Continuous use of FRIDs increase the risk, especially when using more than one FRID (Musich et al., 2017).

Table 3.1 : Examples of common FRIDs (De Vries et al., 2018; Seppala et al., 2020; Seppala et al., 2018a; Seppala et al., 2018b)

Drug classes	Odds ratio[a]	95% Confidence interval
Drugs causing sedation, e.g.		
Opioids	1.60	(1.35-1.91)
Benzodiazepines	1.42	(1.22- 1.65)
Antipsychotics	1.54	(1.28-1.85)
Sedative antihistamines**	-	-
Drugs causing hypotension, e.g.		
Antihypertensives	1.38	(1.19-1.56)
Alpha-blockers for benign prostatic hyperplasia**	-	-
Loop diuretics	1.36	(1.17- 1.57)
Drugs with anticholinergic effects, e.g.		
Tricyclic antidepressants	1.41	(1.07- 1.86)
Overactive bladder and incontinence medications**	-	-
Drugs causing bradycardia/arrhythmias, e.g.		
Digoxin	2.06 *	(1.56, 2.74)

Drug classes	Odds ratio[a]	95% Confidence interval
Other associated classes, e.g.		
Antiepileptics	1.55	(1.25-1.92)
Oral hypoglycaemics **	-	-
[a] Pooled adjusted odds ratios (OR) from meta-analyses (De Vries et al., 2018; Seppala et al., 2018a; Seppala et al., 2018b) * Unadjusted pooled OR ** No OR was reported		

3.1.2. FRIDs and hospitalisation

Inappropriate prescribing around fall-related hospitalisation is common in Irish hospitals (Walsh et al., 2019). A before and after study in the emergency department of a hospital in Ireland found that 63% of fallers were on polypharmacy and PIP was detected in 44% to 53% of fallers aged 70 years or older (McMahon et al., 2014). Additionally, the use of psychotropic medication before falls, e.g. antidepressants and sedatives, was high. This necessitates interventions to lower the risk of falls and the effect of drugs that might lead to hospitalisation (McMahon et al., 2014).

The use of FRIDs has been linked to hospitalisation and length of stay. A cross-sectional study in a large hospital included 304 frail older patients and found that a relation between PIM-related admissions and a history of previous falls mainly involved overusing and misusing of benzodiazepines, aspirin and opiates (Dalleur et al., 2012). Moreover, a systematic review found that 65-93% of patients admitted with a fall-related injury were on FRIDs at the time of hospitalisation (Hart et al., 2020).

A case-control study by Laflamme et al. showed that persons with fall injuries were on more FRIDs and had longer stays in the hospital than the control group, which means the risk of injurious falls increased with an increasing number of FRIDs. Furthermore, the risk for harmful falls was higher in FRIDs users compared to non-users (Laflamme et al., 2015). The author emphasized the need to pay attention to the type and number of drugs older people consume (Laflamme et al., 2015).

3.1.3. Deprescribing FRIDs

Looking at the high prevalence of FRIDs use among older patients with a history of falls, there is a need for interventions to reduce the inappropriate use of these medication classes (Elias et al., 2020). Medication review and FRIDs withdrawal has been shown to be potentially effective as a fall prevention initiative in some studies (Campbell et al., 1999; Van Der Velde et al., 2007). For example, Campbell et al. found that stopping psychotropic medications reduces the rate of falls and improves cognition (Campbell et al., 1999): In this study, there were 17 falls in the medication withdrawal group versus 40 in the control group after 44 weeks of follow-up. Therefore FRIDs review has been included in many fall prevention guidelines worldwide (Montero-Odasso et al., 2021).

Deprescribing is a complex strategy, but focusing on deprescribing a few high risk medicines each time might be more feasible (Browne et al., 2014; Mlodinow et al., 2019). It may not be possible to stop all FRIDs the patient is using, but reducing the number by one or two could help reduce the risk of the patient having a fall (Early et al., 2019).

Medication review has been found to be the second highest cost saving intervention for falls prevention, and deprescribing has been found to reduce the number of repeat falls a patient may experience (Page et al., 2016a; Stevens & Lee, 2018). The evidence for deprescribing FRIDs as a solo intervention for falls prevention is limited (Lee et al., 2021). However, targeting multiple risk factors might reduce the rate of falls by 25% . Deprescribing FRIDs could be a possible preventive measure in older people and an important component of falls prevention programmes, along with other health and environmental safety measures (Mott et al., 2016). Such interventions might reduce the risk of falls injuries that require medical treatment (Xue et al., 2021).

Hospitals can be a good place to initiate the deprescribing process (Dalleur et al., 2014). There is an opportunity to review the patient's medications on admission, as Dalleur et al. et al (2014) stated in their randomised trial. They concluded that medication changes during the hospital stay continued after discharge (Dalleur et al., 2014).

Previous qualitative studies have focused on deprescribing inappropriate medications in general (Ailabouni et al., 2016a; D'Avanzo et al., 2020; Green et al., 2019; Scott et al., 2021; Wallis et al., 2017), or have focused on specific medication classes (Bell et al., 2015; Kouladjian et al., 2016; Nixon & Kousgaard, 2016; Van Middelaar et al., 2018). In this study, the aim is to review challenges and facilitators to deprescribing FRIDs in older people. There is currently limited evidence about the feasibility, effectiveness and safety of deprescribing in hospitals (Thillainadesan et al., 2018). Therefore, there is a need to investigate doctors' perspectives about the process of deprescribing FRIDs in a hospital setting, so that targeted interventions may be put in place to facilitate this process.

3.1.4. Aim of the study

The aim of this research study is to explore the factors that facilitate, influence or hinder doctors completing the process of deprescribing FRIDs in hospital practice.

3.1.5. Objectives

- Assess the knowledge and attitudes of prescribers about deprescribing FRIDS.
- Explore the challenges and facilitators of adopting the process.
- Investigate the feasibility of implementing the process in practice.

3.2. Methods

3.2.1. Ethics approval

The study was approved by *Tallaght University Hospital / St. James's Hospital Joint Research Ethics Committee* (JREC) on January 15th, 2020 (RCE: 2020-01 List 3 (5)). Written informed consent was obtained from participants before the start of the interview and a copy was given to each participant.

3.2.2. Participants and recruitment

The study was carried out at an academic teaching hospital with ~1,000 bed capacity in Dublin, Ireland. Consultant geriatricians and their medical team members, and general medicine consultants with a special interest in older people, were recruited via the hospital's Medicine for the Elderly (MedEl) directorate.

In Ireland, postgraduate medical training involves training as an intern (junior) (twelve months), followed by senior house officer (SHO) (minimum 2 years), and then higher specialist registrar training (4-6 years). Once this has been completed, doctors apply to join the Specialist Division of the Register with the Irish Medical Council, and this enables them to apply for consultant posts (RCPI, 2015). Consultants who participated in this study ranged in experience from 3 - 30 years.

A brief introduction about the study was presented by co-supervisor NM to doctors during the hospital's weekly Journal Club meeting. It was a ten-minute presentation about the importance of the topic and how to participate. At the end, a sign-up sheet was provided to potential candidates to provide contact information if they wish to participate. To avoid influencing participants' responses, the study introduction and documentation did not include education on deprescribing. An invitation email was sent to geriatricians and physicians with a special interest in gerontology, who were either working within the hospital's MedEl directorate or who attended the MedEl meeting at which the study was publicised (21 potential candidates). The invitation incorporated the study title, aim, brief information about the study methodology, and the interviewer's contact information. A more detailed participant information leaflet and consent form were attached. Appointments were scheduled according to the participants' availability.

3.2.3. Interview

Semi-structured individual interviews were conducted by a member of the research team (RK). The interviewer had no previous relationship with the interviewees. The process started on 7th February 2020 and continued until 6th March 2020 in accordance with the researcher's and participants' availability. Similar to the study documentation, the interviewer's opening remarks

did not provide education on deprescribing but emphasised the importance of learning each participant's own views. The interviews were audio recorded and transcribed verbatim. Additional demographic information, such as the doctor's registration level, gender and current training area, were collected after the interview. The interviewing process stopped when data saturation had been reached, as identified by the transcription and coding process undertaken in parallel with the interviews.

3.2.4. Interview guide

An interview guide was used for data collection (Appendix 3). It was developed by the research team using the Theoretical Domains Framework (TDF) Version II (Atkins et al., 2017). This validated tool groups theories of behaviour and behaviour change into fourteen domains, and thus it comprises a useful organisational framework and prompt when considering what types of factors may influence a behaviour of interest (here, deprescribing) and hence may warrant investigation. In this study the interview guide consisted of 19 questions associated with six TDF domains: *knowledge, skills, environmental context and resources, professional role, social influences,* and *emotions.* Domains were chosen through discussion within the research team. Questions under each domain were based on previous literature (Ailabouni et al., 2016b) and were focused on medications that increase the risk of falls in older patients. Prompt questions, such as 'Could you explain more about this?', **'**Could you give an example that illustrates this?', or ' Anything else?' were used to get more explicit answers when needed. Five pilot interviews were conducted with academic faculty staff members with a clinical background. Further adjustments to the questionnaire were made based on their feedback and discussion within the research team before the guide was finalised. No further changes were made after the interviews started. Data from the pilot interviews were solely used for interview guide refinement and were not included in the results.

3.2.5. Data processing

NVivo transcription (QSR International Limited, UK) was used for primary transcription of the voice recordings. Then, each transcript was manually reviewed and refined for accuracy. Transcript data were irrevocably anonymised and codes were used during data analysis. The code indicates the level of registration, gender and a number indicating the order the participant was interviewed. For example, Reg-M-20, means that the participant was a male registrar, number twenty. No code sheet linking identities to the codes was retained following transcription and accommodation of transcript checking. Files were kept confidentially at the university campus.

3.2.6. Data analysis

The data were initially coded according to the predetermined TDF themes using NVivo 12 software (QSR International Limited, UK). Grounded theory (GT) methodology was employed to generate further themes and subthemes from the data to facilitate interpretation (Noble & Mitchell, 2016). Coding was done by the student (RK), reviewed by a second researcher (SR) and further refined through multiple team discussions. Any conflicts were resolved through team discussion to reach consensus (RK, NM and SR). The study and its findings have been reported in accordance with the COnsolidated criteria for REporting Qualitative studies (COREQ): 32-item checklist (Appendix 6) (Tong et al., 2007).

3.3. Results

A total of eighteen hospital doctors participated in the research study. The duration of the interviews ranged between 11 and 30 minutes (median=16.2 minutes). Interviewees included consultants, registrars, senior house officers and intern doctors (Table 3.2). The majority were in ward-based geriatric medicine services.

Table 3.2 : Characteristics of hospital doctors who participated in the interview (n=18)

Characteristics	**Number of participants**
Gender	
• Male	10
• Female	8
Doctors' registration level	
• Intern (I.)	3
• Senior house officer (SHO)	3
• Registrar (Reg.)	10
• Consultant (C.)	2
Current training or working area	
• Geriatric medicine	12
• Emergency medicine	3
• Respiratory medicine	1
• Pharmacology and therapeutics	1
• Immunology	1

3.3.1. Hospital Setting (TDF domains: 'Environmental context and resources', 'Belief about capability', 'Emotion' and 'Social influence')

Deprescribing in a hospital setting has advantages and disadvantages. Most doctors identified time as a significant limitation to reviewing FRIDs or completing the deprescribing process (Table 3.3). Also, follow up of patients after discharge, lack of information about FRIDs in the patients' profiles (*e.g.* indication and duration), and uncertainty about patients' adherence to the

therapeutic plan can be challenging. Additional perceived challenges can be related to the patients themselves, e.g., perceived resistance to changing sedatives.

Table 3.3: Challenges to and facilitators of deprescribing FRIDs in a hospital setting from hospital doctors' point of view.

Themes	**Subthemes (n= number of participants)**	***Sample Quotes***
Challenges to deprescribing FRIDs in a hospital setting		
• **Site**	Limited time (n= 13)	*'If I am in the bone health clinic and I have twenty patients waiting to be seen I cannot, I do not have time to focus on these medications [FRIDs].' [Reg-M-2]*
	Incomplete medical records (n=8)	*'If you are seeing them for falls and you are motivated to deprescribe… you do not know enough about the patient and you do not know the reason why it was prescribed.' [SHO-F-14]*
	Limited follow up (n=5)	*'If they are having a problem with deprescribing particularly in the context of benzodiazepines it can be very difficult to have the facility to see someone every two weeks.' [Reg-F-8]*
	Slow and inefficient communication (n=3)	*'Everyone is busy, including GPs. When you phone them up only about 50 percent of the time can you actually get through to someone and talk to them about the medications.' [SHO-M-5]*
	Short admissions (n=1)	*'Somebody comes in with an acute issue, treat that issue and then get them home and let things be managed elsewhere.' [Reg-M-17]*
• **Patient factors**	Patients being acutely ill at presentation (n=2)	*'Suppose the second challenge would be when we see people that are acutely unwell. So, it's often not a time to start deprescribing benzodiazepines or other medications because you could make things worse if they're acutely unwell with delirium.' [Reg-F-8]*
	Symptoms due to stressful hospital environment (n=2)	*'Hospital isn't a great place for looking at people's blood pressure because it's a stressful environment and they have issues that can really impact on it.' [Reg-M-18]*
• **Doctors' factors**	Reviewing medication prescribed by other doctors (n=16)	*'Many doctors do not want to change other people's prescriptions and plus some specialists it's hard to change... It's very hard to change a psychiatrist's medication.' [C-M-4]*
	Patient safety (n=10)	*'Difficult balance like with hypertension patient, risk of falls versus risk of stroke with high blood pressure' [Reg-M-17]*
	Interns need supervision (n=3)	*'I suppose as a junior member of the team, if there wasn't senior support, I wouldn't feel comfortable deprescribing.' [I-M-13]*
	Staffing issues (n=4)	*'Reconciliation works well, but it's not available to all patients. It'd be great if it was, but that's due to manpower.' [C-M-4]*
	Adapting to changing location during training (staff turnover) (n=2)	*'Getting used to EPR [the hospital Electronic Patients' Records] … I prefer a physical Kardex in my hand that I can change doses on, that I can write stuff off.' [Reg-F-9]*

Themes	Subthemes (n= number of participants)	*Sample Quotes*
		'One week you might have an intern who's never worked with you before and they're gone the next week.' [Reg-F-8]
• **Communication between teams**	Contacting multiple teams (n=7)	*'Some of the patients have different medical backgrounds especially ischaemic heart diseases on a different variety of medications. Every single speciality has their own argument why the patient should be on this medication and some of these medications make people fall.' [Reg-M-11]*
Facilitators of deprescribing FRIDs in hospital setting		
• **Site**	Electronic medical records (EMR) (good for documentation) and discharge summaries are available through EMR system (n=10)	*'I think we're quite lucky … having EPR that we can check discharge summaries.' [SHO-M-5]*
	Medication reconciliation by clinical pharmacists (n=10)	*'The med recs are invaluable.' [I-M-13]*
	Monitoring during hospital stay (n=4)	*'I suppose it's easier for us as hospital doctors who are looking after inpatients and reviewing medications while they're in that we can trial patients, write them or we can wean them off but for GPs and doctors in the community, it's obviously going to be a lot more difficult.' [Reg-F-16]*
	The presence of other facilities where doctors can follow patients up (e.g., day hospital and outpatient clinics) (n=3)	*'Day hospitals where patients attend weekly for about six weeks and that's an excellent occasion to deprescribe because you want to be seeing the patient weekly for about six weeks.' [Reg-M-2]*
	Comprehensive medication review in geriatric ward (n=1)	*'Look through all their medications … I suppose if somebody ends up in general medicine or particularly a geriatric service, they're a lot more likely to get that. But that varies.' [Reg-M-17]*

According to our research findings, depending on the patient's situation or type of medication, deprescribing could happen at more than one point of care (n=7), such as at admission, during an inpatient stay or at discharge. However, participants selected admission or any point close to admission as the most appropriate time for reviewing medication and deprescribing (n=9).

3.3.2. Gap in the system (TDF domain: 'Environmental context and resources')

The communication between hospitals and primary care is mainly carried out through discharge summaries or letters to the general practitioners (GPs). Both written and electronic communication have their own challenges (Table 3.4).

Table 3.4: Subtheme and sample quotes relating to environmental context and resources challenges based on hospital doctors' opinions.

Subtheme (n= number of participants)	***Sample Quotes***
Challenges	
Inefficient communication at discharge by letter or discharge prescription (n=12)	*'So, you are very reliant on the patient giving the correct discharge summary to the GP, but also that I'm reliant on the hospital to send out a copy of the letter as well. And there are inherent errors in that as well…the opiate is quite different, there are some medications go on a different script … I've seen this in a couple of cases where that was forgotten.' [C-M-15]* *'I actually started writing on the prescription as well if we stopped something, because … although I've given it [the letter] to the GP, the pharmacy doesn't know.' [I-F-12]*

3.3.3. Hospital doctors' knowledge and skills (TDF domains: 'Knowledge' and 'Skills')

Most participants were familiar with the term deprescribing, what it means and its role in practice (Table 3.5). Many doctors thought it was a valuable intervention to reduce the risk of falls (n=13). There were concerns about some classes of medications that might increase the risk of falls more than other medications. Drug classes were selected by doctors mainly based on side effect profiles that could contribute to falling; for example, medicines which can cause orthostatic hypotension, drowsiness or dizziness. Medications most commonly identified as needing to be deprescribed in patients with a high risk of falls were *antihypertensives* (n=17), *sedative hypnotics* (n=11) (mainly benzodiazepines (n=9)) and *antidepressant* medications (n=8).

Doctors had different approaches to deprescribing FRIDs: The order and number of steps involved in the process varied widely between them. However, most doctors included four basic steps, which are:

(a) Gathering information about the patient's history and medications' indications.

(b) Finding medication-related problems such as unnecessary, missing, or potentially harmful medications.

(c) Stopping the inappropriate medications directly or discussing the plan with the patient.

(d) Arranging for monitoring and follow up.

Sixteen of the eighteen doctors were familiar with the common tools available such as the STOPP/START criteria (Gallagher et al., 2008) (Table 3.5). Other resources mentioned included the Medication Appropriate Index (MAI) (Hanlon et al., 1992), hospital guides, the deprescribing.org website ("Deprescribing guidelines and algorithms,"), and the OncPal Deprescribing Guideline (Lindsay et al., 2015). Despite awareness of such tools, half of the participants did not use any tools during their daily practice (n=9), especially registrars, who primarily depended on their experience or their colleagues' advice.

Table 3.5: Hospital doctors' skills and background themes and subthemes.

Themes	**Subthemes (n= number of participants)**	***Sample Quotes***
Facilitators		
Knowledge	Doctors were familiar with the term deprescribing (n=16)	*'It means stopping medications when they are no longer clinically indicated or when the benefit vs. risk ratio has changed with the patient as they get older, comorbidities changed, mainly, yeah, to reduce kind of polypharmacy.' [I-F-10]*
	Doctors' awareness (n=13)	*'A lot of them [the patients] might have come in … with falls … because of a medication that they are currently on. So, it is important to deprescribe it … like antihypertensives or SSRI … so it is important in that regard you can prevent future falls from occurring.' [I-F-12]*
Skills	Awareness of some deprescribing tools (n=16)	*' I'm aware of the* STOPP/ START *guidelines.' [Reg-F-16]*
Barriers		
Skills	Personal experience (n=6) and colleagues (n=6)	*'It would be more going with the clinical judgment and discussion with consultants for deprescribing.' [Reg-M-1]*

3.3.4. Other healthcare professionals' role (TDF domain: 'Professional role and identity')

In terms of professionals' role, half of the participants thought that the whole multidisciplinary team is responsible for reviewing FRIDs and deprescribing (Table 3.6), although some participants felt that prescribers have the main responsibility, specifically senior members of the medical team such as the registrar.

A small number of the hospital doctors in this study thought that medication review was the general practitioners' responsibility, assuming they would know more about their patients' past medical history due to their long relationship with the patient and being the connection point between healthcare providers (n=4).

The study participants also believed that other healthcare professionals such as pharmacists and nurses could support FRIDs' review and deprescribing. The clinical pharmacist service was described as helpful (n=10) but there was less agreement on how pharmacists' interventions might affect the doctors' workload. Four doctors stated that the presence of a clinical pharmacist would reduce their workload.

Table 3.6: Subthemes and sample quotes for responsibility of reviewing patients' medications from hospital doctors' point of view.

Subthemes (n= number of participants)	***Sample Quotes***
Facilitators	
The whole medical team is responsible (n=9)	*'Pharmacists and clinicians, nurses. I guess it's the idea of the Swiss cheese model where if something's missed by one healthcare professional, another one can pick it up. So, I think it's a group effort.' [SHO-F-14]*
Mainly doctors (n=5)	*'I think it should be a senior registrar and the team kind of as an inpatient.' [I-F-10]*
Doctors and pharmacist as a team (n=7)	*'It should be done by...the most senior doctor who sees them regularly which would be the most likely the registrar on the team so I think that would be important and input from the clinical pharmacist associated with the team would be helpful as well so kind of collaborative effort between the two I think would be the most appropriate.' [Reg-M-1]*
Pharmacists can assist with the process (n=7)	*'Pharmacist usually ... who could be approached and asked for advice with regard to stopping certain medications or otherwise.' [Reg-M-6]*
Reduce the workload (n=4)	*'Having them [pharmacists] on ward helps a lot and reduce the amount of work.' [Reg-M-11]*
Nurses (n=4)	*'Nursing staff have very thorough handovers. And they are the ideal cohort… if medications are ever commenced overnight.' [Reg-M-18]* *'Nursing staff … They're the ones who are administering the medicines every day. If they feel that there's an unsafe change out of the ordinary that isn't explained in the notes, they can flag that with the team.' [I-M-13]*
Barriers	
General practitioners (n=4)	*'I think everyone is responsible, but it really does fall on the GPs and pharmacists.' [C-M-15]*

3.3.5. Involving patients and carers (TDF domains: 'Skills' and 'Emotion')

Most doctors said that they usually involve patients and carers in the decision-making process (Table 3.7). From their experience, hospital doctors had noticed that the deprescribing decision is highly affected by the patient's response (n=8) and patients were usually open and rarely resisted stopping or reducing drugs (n=7). They also indicated that hesitation or resistance can be resolved by clarification and explanation.

Table 3.7: Subthemes and sample quotes for patients' involvement in deprescribing decision from hospital doctors' point of view.

Subthemes (n= number of participants)	**Sample Quotes**
Facilitators	
Doctors usually involve patients and carers in deprescribing decision (n=14)	*'Similar to prescribing medicines, deprescribing is all about risk-benefits. So, it is always good to include the patient in that discussion. Risk of falling outweighing the benefits they might be getting from this medicine' [I-M-13]*
Enhance adherence (n=3)	*'I think if you give them the option and explain why you're doing something, I think they're more likely to buy into it.' [Reg-F-3]*
Explanation can resolve resistance (n=15)	*'If they're not happy about it, then you'd certainly explain why that we're doing it. You know, explain the indication, the reason that it's being stopped.' [SHO-F-7]* *'I would definitely tell them … it might be the tablet that is causing the problem [light-headedness] as opposed to something wrong with themselves' [Reg-M-6]*

Table 3.8 : Barriers and facilitators of deprescribing FRIDs in hospitals based on TDF (Atkins et al., 2017).

TDF domains	**Barriers**	**Facilitators**
Knowledge	—	• Awareness of the risk of FRIDs (n=13) • Ability to identify some common FRID classes • Familiar with deprescribing concept (n=16) • Know some benefits of deprescribing (enhanced medication adherence, reduced drug burden) • Awareness that deprescribing could be a valuable and safe option for enhancing falls' prevention and reducing polypharmacy • Awareness of some of the common tools such as STOPP/START (n=16)
Skills	• Dependence on experience rather than resources (n=6)	• Doctors involve patients and carers in the decision (n=14) • Shared decision making about the proposed changes with the patient/carer can resolve resistance (n=15)
Environmental context and resources	• Limited time (n=13) • Incomplete documentation (n=8) • Inability to follow up (n=5) • Multiple teams caring for the same patients and working in silos (n=7) • Communication problems in hospital • Staff turnover or staffing issues • Lack of guidelines for medicines use in older adults • Tools are time consuming • Acute status of the patients	• Use of Electronic Medical Records (EMR) (good for enhanced documentation and access to information) and discharge summaries are available through EMR system (n=10) • Medication reconciliation by clinical pharmacists (n=10) • Ability to monitor patients during inpatient stay (n=4) • The presence of other facilities where doctors can follow patients up (e.g.

TDF domains	Barriers	Facilitators
	• Symptoms due to stressful hospital environment • Intern junior doctors need supervision • Short inpatient stay • Patients being acutely ill at presentation (n=2) • Symptoms due to stressful hospital environment (n=2) • Inefficient communication at discharge by letter or discharge prescription (n=12)	day hospital and outpatient clinics) (n=3) • The presence of other professions for referral
Social influence	• Reviewing medication prescribed by other doctors, without having the background to the prescribing decision (n=16) • Communication with multiple providers or other teams (n=7) • No previous relationship/interaction with patient • Expectation about patients' resistance to medicines changes (hypnotics) (n=4) • Patient resistant (n=5) • Patients' reaction influences the decision (n=8)	• Gaining the patients' trust and acceptance • Patients accept deprescribing (n=7) • Patient reaction does not affect the decision (n=2)
Professional role and identity	• Thinking that it is general practitioners' responsibility	• The whole medical team is responsible (n=9) • Belief that it is doctors' responsibility especially senior doctors (n=5) • Acknowledgment of the role of other professions in the deprescribing process (pharmacist and nurse)
Emotion	• Concerns about patients' safety or fear of causing harm to patients (n=9)	—
Belief about capability	• Difficulty balancing risks and benefits of medications (n=2) • Interns need supervision (n=3) • Ability to adapt to new site (staff turnover) (n=1)	—
Optimism	• —	• Positive views about deprescribing (n=5)
Intention	• No intention to deprescribe in hospital assumes the GP will manage the case (n=1)	• Willing to start deprescribing at hospital (n=2) • Not deprescribe if the risk of deprescribing is significant (n=1)

3.4. Discussion

Previous studies have discussed the views of hospital doctors about medication deprescribing in older adults (D'Avanzo et al., 2020; Green et al., 2019; Scott et al., 2021) but few studies have focused on FRIDs (Bell et al., 2015; Kouladjian et al., 2016). Scott et al. discussed deprescribing in general and developed a plan for implementation of deprescribing in the hospital setting (Scott et al., 2021), while Bell et al. involved primary care doctors and studied their perspectives about

prescribing FRIDs in older patients (Bell et al., 2015). This study provides an exploratory understanding of doctors' opinions towards deprescribing FRIDs in the hospital setting, as a part of falls prevention measures.

Variability was noted in the descriptions of deprescribing offered by the study participants, whose responses were based on their personal practice. This is not surprising in view of the global lack of standardisation concerning deprescribing. Multiple tools and guidelines are available that differ in the number and order of steps, many of which have not been validated clinically (Reeve, 2020). The results of this study Were consistent with the previous literature, with key issues raised by doctors including time constraints, and challenges in the continuity of care (Table 3.8) (Bell et al., 2015; Green et al., 2019; Kouladjian et al., 2016; Scott et al., 2021). Lack of guidelines was noted in other studies (D'Avanzo et al., 2020; Scott et al., 2021) but was not stressed by our participants, with only one doctor mentioning guidelines in this context. However, our participants raised the issue that using tools is time consuming.

3.4.1. Hospital setting

Finding the time to deprescribe FRIDs was challenging in a busy hospital environment, as most participants stated. Reviewing medications is a time consuming process (Browne et al., 2014). This might be overcome by focusing on high risk patients (e.g. frail patients), reviewing one medication at a time and/or using every patient visit as an opportunity to review medication (Scottish Government Polypharmacy Model of Care Group, 2018; Smith et al., 2019). Involving other team members such as clinical pharmacists or nurses, especially for tasks like medication reconciliation and patient education, might make deprescribing more feasible (Mlodinow et al., 2019).

Time is not the only barrier to deprescribing in hospitals. Doctors complained about not having enough information in patients' profiles to make deprescribing decisions although this was alleviated somewhat by the EMR system. Incomplete documentation is a common challenge (Boockvar et al., 2011). Ideally, a detailed explanation for initiating or changing medications should be documented in the patient's medical record, to facilitate decision making for all care providers. Gaining a complete history and accurate list of patients' medications at the outset is an important step. In addition, some information such as indication, duration and the patient's adherence is useful to evaluate the appropriateness of therapy (Scott et al., 2015).

Our participants favoured admission as the most suitable time for deprescribing. Reviewing medications at admission may additionally be useful in detecting medication-related falls admissions. Furthermore, medication deprescribing at admission potentially allows more time for close monitoring and follow-up of the patient during the inpatient stay. However, for unstable patients or acute cases, it is often not appropriate to start deprescribing and other settings such

as day hospitals (*i.e.* outpatient facilities where older patients attend for a full or near full day and receive multidisciplinary rehabilitation) or outpatient clinics might be more suitable for deprescribing medications in such patients when they are more stable (Naas General Hospital).

3.4.2. Gap in system

Improving communication between the hospital and the GP is necessary to promote continuity of care after hospital discharge (Dipanda et al., 2020). A secure closed emailing system for communication between healthcare professionals in Ireland (Healthmail) was introduced in 2014 and expanded in 2020, which has helped the transfer of clinical information (eHealth Ireland). Prior to its introduction there were potentially some delays in the preparation and delivery of paper discharge letters through the standard postal service. It is important to note that these interviews were held before the SARS-COV-2 pandemic and the efficiency of transferring information changed thereafter.

3.4.3. Knowledge and skills

Participants in this study felt that antihypertensive medications should have the highest priority for deprescribing (n=17), although other medication classes such as antipsychotics, opioids and benzodiazepines are highly associated with falls (see Table 3.5). The focus on antihypertensives may be due to the focus on falls prevention in people > 80 years old in the study hospital, which included consideration of antihypertensive use.

There are some useful tools and resources for deprescribing (Reeve, 2020). These include the AntiCholinergic Burden calculator (ACB) (King & Rabino), and web based resources such as www.deprescribing.org. The ACB calculator is only used for medications with anticholinergic burden, and gives a score from one to three, based on the magnitude of burden caused by each medication. It is possible to capture additive risk by combining drug scores for a single patient, and then following recommendations for management, tailored to the list of drugs. Involved (King & Rabino). It is important to point out that STOPPFall, which is a screening tool containing a comprehensive list of FRIDs, had not been published at the time of the interviews. The use of such a tool may enhance the process of deprescribing FRIDs but that is yet to be evaluated by randomised trials (Seppala et al., 2020). Our participants' perception that tools were helpful but time-consuming is consistent with previous research (Awad & Hanna, 2019; D'Avanzo et al., 2020; Reeve, 2020).

3.4.4. Other professionals

Deprescribing is complex and a multidisciplinary approach is recommended (Reeve et al., 2017). The appreciation of a clinical pharmacy service seen in this study is in keeping with literature

reports that pharmacist input is beneficial (Browne et al., 2014; Lee et al., 2015; Mott et al., 2016). Clinical pharmacists can offer many services to facilitate assessing and reducing falls risk (Fritsch & Shelton, 2019). For example pharmacists may conduct a comprehensive medication reconciliation and review as part of the falls risk assessment, educate patients about proper use of their medications, advise the medical team about controlling the use of FRIDs and recommend safer alternatives (Fritsch & Shelton, 2019).

In some countries, such as the United Kingdom (UK) and United States (US), pharmacists can also prescribe and deprescribe certain medications directly instead of recommending the changes (Garattini et al., 2021). A hospital in the US found that pharmacist intervention, including medication review and staff education about the use of FRIDs, led to a reduction in the number of falls in the geriatric unit from 57 to 27 in one year (Hoy, 2010).

Similarly, nurses can assist with the deprescribing process, as they work closely with patients, can easily notice specific patients' symptoms, and give detailed information about drug administration. They can also assist the patient with mobility, educate patients and family members, and communicate with health providers (Chu, 2017). Some nurses have gained an advanced role as nurse prescribers, potentially enabling them to play an active role in deprescribing as well (Wright et al., 2019).

There was some divergence of opinion about responsibilities in our study cohort, including a minority view that medication review was the general practitioners' responsibility. In a study conducted by Kouladjian et al., general practitioners thought that it was the geriatricians' or specialists' role to manage polypharmacy and deprescribe medications (Kouladjian et al., 2016). Defining the role and responsibilities of each healthcare provider and standardising the process of deprescribing across institutions, while retaining sufficient flexibility to accommodate individual patients' circumstances, should help to resolve this problem.

3.4.5. Shared decision

Deprescribing should be a shared decision with the patient, and prescribers acknowledge that patients' attitudes and preferences differ toward their medicines (Smith et al., 2019). Patients are experts in their own needs and have their own views and goals of treatment. Therefore, involving the patients in the decision is very important. Their willingness to adhere to the healthcare providers' recommendations is important for the success of the intervention (Smith et al., 2019) and this was acknowledged by our participants.

While their perception that patients were generally open to deprescribing recommendations from doctors was not objectively verified with patients in the current study, previous research has found that patients usually trust their doctors when it comes to treatment decisions and a high

percentage of older adults were willing to stop taking medicines based on doctors' recommendations: around 89% in one qualitative study (Galazzi et al., 2016) and 92% in another (Reeve et al., 2013), especially when educated about it (Martin & Tannenbaum, 2017). However, the optimal method and extent of patients' involvement in the deprescribing decision needs further clarification in future research.

In summary, common challenges for hospital doctors when reviewing FRIDs included time, missing patients' information and difficulty following up patients after discharge. Pharmacists and nurses can assist with the deprescribing process. In addition, the involvement of patients and their carers in the deprescribing decision is considered very important for the success of the deprescribing.

3.4.6. Recommendations for practice:

A UK project 'FallSafe' is a good example of falls prevention interventions. The project included medication review and reduction of sedative use in hospitalised older patients as part of the care bundle (a specific set of multifactorial assessments and interventions). Their interventions led to a reduction in the falls rate and proved that implementation of such interventions in a hospital setting is feasible (The Health Foundation).

TDF is commonly used in qualitative interviews to investigate the approach of implementing an intervention to change a specific behaviour by understanding what leads to that behaviour. In this study, the behaviour was the current practice of doctors regarding the management of older patients at risk of fall and who are using FRIDs, and the intervention was deprescribing FRIDs as part of falls prevention strategies.

Based on the study results, target TDF domains would be 'belief of capability', 'skills', 'environmental context and resources', 'social influence', and 'emotion'. Mapping the target domains that represent the barriers to Behaviour Change Techniques (BCTs) (Michie et al.) resulted in some suggestions for planning and implementation of FRIDs' deprescribing interventions as part of falls prevention programs in a hospital setting (Table 3.9).

To address the 'belief of capability' and 'skills' barriers, the European Geriatric Medicine Society (EuGMS) Task and Finish group on Fall-Risk-Increasing Drugs (FRIDs) recommends developing educational materials for healthcare professionals and older patients, e.g. brochures and web pages (Seppala et al., 2019). Explaining the 'pros and cons' of deprescribing inappropriate FRIDs will help resolve the doctors' expressed concerns about the patient's safety represented by the 'emotion' domain. Furthermore, 'habit formation' by documenting all FRIDs changes and updates would help improve documentation, reduce communication problems and hence aid decision making (e.g. prioritisation of inappropriate FRIDs for deprescribing).

Behavioural change through the environment restructuring technique could be used to overcome the common 'environmental context and resources' problems related to the hospital setting such as time pressures and follow up. For example, prioritising patients for a medication review (Seppala et al., 2019), by labelling or flagging the profile of the highest risk patients (via the electronic prescribing system where available). Also, it would be useful to have other decision-making resources readily accessible to staff such as the ACB calculator (King & Rabino), Drug Burden Index (DBI) (Kouladjian et al., 2016) and STOPPFall (Seppala et al., 2020). Engaging other professions in the process can also help: For example, having pharmacists involved in falls and fracture clinics, and referring patients with high risk to them (Fritsch & Shelton, 2019). In addition, having a patient-centred, structured deprescribing process in place which involves appropriate withdrawal of the medication and close monitoring of the outcomes might address any concerns about patients' safety issues (Reeve et al., 2018).

Table 3.9: Mapping barriers of deprescribing FRIDs in hospitals to BCTs (Michie et al.).

TDF domains	**Barriers**	***BCTs and suggested interventions**
Skills	• Dependence on experience rather than resources	Credible source and conserving mental resources: • Increasing awareness of tools e.g. STOPPFall and ACB calculator (Seppala et al., 2019) • Using a structured process of deprescribing in the hospital (Reeve et al., 2018)
Environmental context and resources	• Limited time • Incomplete documentation • Inability to follow up • Multiple teams caring for the same patients • Communication problems in hospital • Staff turnover or staffing issues • Lack of guidelines • Tools are time consuming • Acute status of the patients • Symptoms due to stressful hospital environment • Short admission • Patients being acutely ill at presentation (n=2) • Symptoms due to stressful hospital environment (n=2) • Inefficient communication at discharge by letter or discharge prescription (n=12) • Communication with multiple providers or other teams	Restructuring the social environment, adding objects to the environment, prompts and cues, and social support (practical) by: • Making resources accessible • Involving other professions e.g. pharmacists and nurses • Prioritising high risk patients/ use labels (*e.g.* 'medication review for all patients with an acute fall, recurrent falls in the past year, or problems with walking or balance') (Seppala et al., 2019) • Flagging FRIDs in the EMR **Behavioural practice or Habit formation by: • Assessing the risk of falls before prescribing a new medication (Seppala et al., 2019) • Establishing a habit of fully documenting all FRID changes and updates (Including the time of initiation, indication, duration etc.)

TDF domains	Barriers	*BCTs and suggested interventions
	• Communication across the interface	
Social influence	• Reviewing medication prescribed by other doctors • No previous relationship/interaction with patients • Expectation about patients' resistance to medicines changes (hypnotics) (n=4) • Patients resistant (n=5) • Patients' reaction influences the decision (n=8)	Social support: • A member of the team be responsible for reviewing the medications and contacting other providers Pros and cons; reduce negative emotions; comparative imaging of future outcome; social support (emotional); verbal persuasion about capability: • Patient education and motivational interviewing
Emotion	• Concerns about patients' safety or fear of causing harm to patients	Information about health consequences by: • Patients' education about the risk of inappropriate use of FRIDs Information about health and emotional consequences, salience of consequences and pros and cons by: • Raising prescribers' awareness about the benefits and safety of the process and addressing any concerns about harm
Belief about capability	• Difficulty balancing risks and benefits of medications (n=2) • Interns need supervision (n=3) • Ability to adapt to new site (staff turnover) (n=1)	Credible source, instructions on how to perform the behaviour, and information about health consequences: • European Geriatric Medicine Society (EuGMS) is developing educational materials for healthcare professional and older patients for knowledge dissemination by seminars, brochures, web pages, and apps (Seppala et al., 2019) Demonstration of the behaviour, social comparison, modelling by: • Senior doctors starting the process in anticipation that interns will follow
*This is not a comprehensive list of techniques. **Partial solution		

3.4.7. Strengths of the study

The qualitative methods employed were very useful for gaining a general overview of the topic and uncovering facilitators of and barriers to implementing a deprescribing process for FRIDs in routine practice. While time-consuming, individual interviewing is a very effective way of gathering in depth information compared to other methods. For example, group interviews could lead to bias in the expression of individuals' opinions under the influence of other participants in the same group and written surveys might not yield detailed answers.

The TDF is a validated tool developed by behavioural experts and is widely accepted as valuable in implementation science. It facilitated the development of the interview guide and initial coding of the data by providing a theoretical framework to explore challenges in practice. Also, when linked with BCTs, it helped identify target behaviours and potential solutions.

3.4.8. Limitations

Doctors from one hospital only were included, which might limit the generalisability of the results to other settings. While interviews were undertaken to data saturation, the small sample and the focus on geriatricians and doctors with geriatric interest may not be representative of all hospital doctors, and hence the work should be considered exploratory. However, it gives a general insight into the common challenges in a hospital setting. Questions in the interview were more explicit about challenges than enablers, which may explain why there were less obvious themes with enablers present. While questioning was not directly targeted at all TDF domains, comprehensive data analysis identified that factors associated with additional domains were mentioned by participants.

The interviewer was a pharmacist, therefore answers about pharmacist involvement in the deprescribing process and their influence on doctors' workload need to be interpreted with caution. However, the researcher had no prior relationship with the doctors.

3.5. Conclusion

Deprescribing FRIDs in the hospital setting can be a challenging process, but facilitators have been proposed which could assist the process. Nevertheless, full implementation of the process in practice is still challenging. It requires combined effort from stakeholders to tackle everyday work environment challenges such as time pressure and doctors' workload, incomplete documentation, difficulties in communication and sharing of patients' information between providers within and between healthcare institutions. Beginning the deprescribing process with the focus on FRIDs and greater collaboration with other members of the healthcare team might make it more feasible. The findings form the basis for future studies examining the clinical impact of the suggested interventions and exploring patients' involvement in deprescribing decisions.

4. A Qualitative Study Investigating General Practitioners' Attitudes and Perspectives on Deprescribing Medications that Increase the Risk of Fall

4.1. Introduction

Inappropriate prescribing of FRIDs is prevalent in community-dwelling older adults (Walsh et al., 2019). The adjustment or discontinuation of FRIDs should always be considered in older people who present with symptoms related to falls, such as dizziness (Stam et al., 2016a). The gradual withdrawal of FRIDs, with concurrent monitoring of symptoms, may be a useful technique for achieving fall prevention outcomes (Gray et al., 2021). In this context, deprescribing inappropriate medication by general practitioners (GPs) has been shown to reduce the number of falls that require medical attention (Mahlknecht et al., 2021).

Primary care doctors have access to medical and prescription information, and this facilitates the screening and coordinating of care (Duncan et al., 2017). GPs can screen and identify older adults at risk of falling and implement prevention strategies to reduce this risk (Mackenzie & McIntyre, 2019). The strategies to achieve this include medication optimisation, developing care plans and referral to other healthcare providers (Johnston et al., 2019; Mackenzie & McIntyre, 2019). GPs have an ongoing, continuous relationship with patients (The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life, 2008), and this relationship can facilitate individualising deprescribing decisions based on patient goals and values (Todd et al., 2018).

A cluster randomised controlled trial in 51 GP practices throughout the Republic of Ireland investigated the effect of the 'Supporting Prescribing in Older Adults with Multimorbidity in Irish Primary Care' (SPPiRE) intervention (McCarthy et al., 2022). The intervention included an educational session for GPs and a website to guide medication review, which was followed by medication review interventions carried out by GPs for older adults. After six months of follow-up, the results showed a significant reduction in the number of medicines in the study group compared with the control group (McCarthy et al., 2022). Another retrospective study, 'Stopping Elderly Accidents, Deaths, and Injuries' (STEADI), found that the implementation of a multifactorial prevention programme in a large academic primary care practice was feasible and successful. The intervention involved the implementation of the STEADI Falls prevention algorithm developed by the Centers for Disease Control and Prevention (CDC) (Casey et al., 2017). The same intervention reduced fall-related hospitalisations in older patients (Johnston et al., 2019).

A formal Chronic Disease Management (CDM) programme was first introduced in primary care in Ireland in 2020. The programme targeted people with chronic diseases—along with screening for

patients at risk of developing chronic diseases—with the aim of preventing the development of chronic diseases (HSE). Medication reviews were part of the programme.

There has been an ongoing effort to improve communication between healthcare settings. In 2014, the Health Executive Service (HSE) introduced a secure, closed emailing system called Healthmail. Healthcare providers can use it to share patients' information across settings (eHealth Ireland). Healthmail accounts are only available to approved healthcare practitioners and can only send and receive email to/from other Healthmail accounts. On a qualitative evaluation report by the Irish College of General Practitioners, a high percentage of respondents thought that it improved patient care and wished to continue using the service (Larkin et al., 2017).

Studies have shown that routine screening and an evaluation of the risk of falls do not occur frequently in primary care. Only 29.7% of GPs asked patients about their fall history or manage the symptoms associated with falls, such as dizziness (Mackenzie & McIntyre, 2019). An observational study found that adjustments or changes in FRIDs were made by GPs for 11.7% of older patients with dizziness, even though 87.2% had at least one FRIDs prescription (Stam et al., 2016a). Reviewing inappropriate polypharmacy in general does not always prevent falls. Therefore, reviewing FRIDs should take priority during medication review and deprescribing (Seppala et al., 2020).

Qualitative studies investigating fall prevention in primary care settings are few. Qualitative studies in Norway and the USA investigated prescribing FRIDs in general (Bell et al., 2015) and deprescribing potentially inappropriate medications after falling (Hahn et al., 2021). Other studies investigated the withdrawal of specific classes of medications, such as antihypertensives and antidepressants (Kelly et al., 2021; Van Middelaar et al., 2018).

Understanding GPs' attitudes towards deprescribing FRIDs might help in identifying additional factors influencing the process. In turn, this should inform the design of interventions, including deprescribing FRIDs, that aim to prevent or reduce the risk of falls by implementing those interventions in routine practice.

4.1.1. Aim

To explore GPs' views and the factors that influence the deprescribing of FRIDs in primary care settings in Ireland.

4.1.2. Objectives

- To assess the knowledge and attitudes of the GPs about deprescribing FRIDS.
- To explore the challenges and facilitators of adopting a FRIDs deprescribing process.
- To investigate the feasibility of deprescribing FRIDs in primary care.

4.2. Methods

4.2.1. Ethics approval

The School of Pharmacy and Pharmaceutical Science Research Ethics Committee (SoPPs REC) approved this study on 28/03/2022 (application number 20211203). Written, informed consent was obtained from all participants.

4.2.2. Participants and recruitment

The participants were GPs caring for older adults. A non-probability sample of GPs across Ireland was accessed through publicity on social media and email invitations sent by a gatekeeper. The gatekeeper's relationship with the contacts did not give rise to any sense of obligation to participate. Prospective participants voluntarily contacted the researcher to express their interest and were provided with the participant information leaflet and consent form for consideration.

4.2.3. Interviews

Semi-structured individual interviews were conducted online via Zoom. The discussion was guided by an interview guide developed by the research team using the TDF (Appendix 4). Two pilot interviews were conducted with GPs to trial the interview guide, followed by minor changes. After the interview, each study participant received a voucher worth 25 euros.

4.2.4. Data processing and analysis

The interviews were audio-recorded. Transcripts were generated by an external transcription service and reviewed for accuracy by the researchers. Only pseudonymised recordings were shared with this service, and the service had no access to the code sheet or overall list of participants. The answers were labelled and coded according to the process described in section 3.2.6. Similarly, the reporting of the results was based on the COREQ checklist (Appendix 6).

4.3. Results

Fifteen doctors participated in the interviews. All were registered GPs, except for one, who was a GP registrar (fourth year of GP specialist training) (Table 4.1). The duration of the interview ranged from 10.25 to 42.55 minutes (median = 21.53 minutes).

Table 4.1: Characteristics of general practitioners who participated in the interview (n=15)

	Number of participants
Gender	
• **Male**	7
• **Female**	8
Years of practice	
• **<10**	5
• **11–20**	5
• **21–30**	3
• **>30**	2

4.3.1. Theme 1: Communication with hospitals (TDF domain: 'Environmental context and recourses')

The doctors noted that, although communication has improved, it is still challenging. Patients' discharge summaries were received by the GPs in multiple ways. Letters or prescriptions can be received via post, fax or email from hospitals or pharmacies, or hard copies may be furnished by the patients (Table 4.2). They can be delayed for weeks or months, and sometimes, they contain incomplete medication information (for example, a missing indication or duration of medicine). As a result, the participants felt they had to deal with uncertainty when treating patients after hospital discharge because they may not have enough information about the reasons for changing medications and follow-up instructions may be unclear. In addition, it is often challenging for a GP to contact hospital doctors to clarify any of their queries about the discharge summary or prescription.

The doctors described electronic communication as beneficial, if used efficiently. For example, the national secure, closed email system for healthcare practitioners—Healthmail—was found to be useful for communication with pharmacies and laboratories. However, not all hospitals (or prescribers within a hospital) utilise or regularly check Healthmail, and therefore it is not always used for discharge communication.

Table 4.2: Subthemes and sample quotes for communication with hospitals theme based on GPs' interviews

TDF domain	Subthemes	***Sample Quotes***
Environmental context and resources		
Barriers	Delayed and incomplete discharge letters (n=13)	*'Often, there's no explanation as to why changes have been made'. [GP- M-9]* *'We get letters from hospitals, sometimes, but there's massive delays. We could be months and months and months and months waiting'. [GP- F-8]*

	Difficult to contact hospital doctors (n=9)	*'We don't have an adequate, direct access to discuss, if there was an abnormality, with the consultants because we may have to talk to a team member on bleep who may not answer. So we don't actually get to communicate the results directly back to the person who's prescribed it'. [GP-M-14]*
	Not all hospitals use Healthmail (n=5)	*'Most of my local hospital is inaccessible on Healthmail'. [GP-F-11]*
	Pharmacy receive prescription before GP review it (n=4)	*'Sometimes, the patient takes it to the pharmacy and then the pharmacy communicates with us. But there have been times when the script has gone to the pharmacy, and then, we issue the same medication that was there'. [GP-M-7]*
Facilitators	National electronic messaging system is helpful (n=6)	*'Oh yes, that [Healthmail] works very well, it's very clear'. [GP-F-12]*
	Receiving discharge prescriptions directly from hospitals by patients (n=4)	*'The patient actually getting the script from the hospital and bringing it in to us … that works. And then we get to update our records for what their actual current doses are'. [GP13]*

4.3.2. Theme 2: Patients' and carers' involvement (TDF domains: 'Skills' and 'Social influence')

There was a general agreement between the study participants that involving patients is important. The reasons were as follows:

- Obtain the patient's buy-in;
- Capture any missing details;
- Support the patient through the deprescribing process;
- Keep a good relationship with the patient;
- Maintain continuity of care;
- Ensure patient safety;
- Improve patient awareness of the reasons for changes to their medication.

Some doctors pointed out that patients are usually open to changes made by the GP, except if the medication was prescribed by another prescriber - for example, a hospital consultant (Table 4.3). Hypnotics and benzodiazepines (whether for hypnotic or other indications) were described as the most challenging classes of medication to deprescribe. The GPs indicated they found it difficult to convince patients and carers to stop these medications because of fear of withdrawal symptoms. However, they said that providing a detailed explanation and negotiation was important in this situation; for example, explaining the benefit of stopping the medicine and the risk of continuation

or reassurance by tapering and follow-up. One doctor also mentioned the benefit of having an addiction counsellor to whom referrals could be made.

One GP mentioned that there was a change in practice during the SARS-CoV-2 pandemic. Changes to legislation designed to facilitate medication access meant that repeat prescriptions were potentially valid for nine months for most medications, without being reviewed by the doctor (2020). Another GP discussed how the emergency supply policy led to undiscovered prescription errors, for example, undocumented allergies in the pharmacy system.

Table 4.3: Patients' and carers' involvement subthemes and sample quotes based on GPs' interviews

TDF domains	**Subthemes**	***Sample Quotes***
Social influence		
Barriers	Patients' resistance to changing medicines prescribed by other specialists (n=8)	*'If you are not the person's regular doctor if the medication started by somebody else perhaps like a consultant … reluctance from the patient, sometimes, they have been on something for years and years and Doctor X 20 years ago started this, and they have every faith in them'. [GP-M-4]*
	Not involving the patient as it may affect the relationship (n=4)	*'I guess sometimes you just do worry that people will get angry if you stop their medications, that you're denying them something that they feel is important … I think it's back to your concerns about potentially damaging the relationship that you have with the patient'. [GP-F-13]*
Facilitators	Belief it is important to involve the patient (n=15)	*'I'd say it's absolutely vital'. [Reg-M-5]*
	Desire to get buy-in and improve adherence to the new regimen (n=9)	*'If we don't involve them, the patients or the carers or both, they are probably going to be less engaged in the process … it may be unsuccessful'. [GP-F-2]*
	Long-term, good patient-doctor relationship (n=6)	*'I do find personally when I do engage with that, if there's a problem, I tend to hear sooner that there's a problem because the person figured, well, the GP wants to know. They do care. And I do'. [GP-F-1]*
	Get patients' views and information, to inform the process (n=4)	*'If it's well informed, response may then say that perhaps, you know, "Dr X stopped this a while ago; did not go well." Or this might cause more harm or more distress in stopping, or perhaps you might be more hesitant or take more time to explain it'. [GP-M-4]*
	Provision of support (n=3)	*'I think it's an anxious time for the individual and for their caregivers. Whether that be at home or in the hospital. And by having a plan, just like what we do with other types of behavioural changes, like the person stopping smoking or*

TDF domains	Subthemes	*Sample Quotes*
		engaging with so many different lifestyle changes. I think having that support at that time can be very useful'. [Gp-F-1]
Skills		
	Involving patients (n=7)	*'I would talk it through with the patient, asking them how they're feeling, how they feel about each medication'. [GP-M-10]*
	Hypnotics are the most challenging to deprescribe because of patients' reluctance (n=10)	*'If they're falling at night, and they're on sleeping tablets, that's going to be a very difficult scenario. And that's going to involve a lot of negotiation'. [G-F-11]*

4.3.3. Theme 3: Pharmacists role (TDF domains: 'Professional role and identity' and 'Social influence')

The majority of GPs believed that it was their responsibility to review medications (n=13) (Table 4.4). Eight mentioned that all prescribers were responsible for reviewing their prescriptions. In addition, two doctors acknowledged that pharmacists have a role in the process as collaborators, that is, the GP and pharmacist working as a team. Others said that involving pharmacists in primary care would be helpful (n=7). Pharmacists may decrease the GP's workload, save valuable time to spend on other patient-related activities and add an additional safety net for medication use. There was an opposing opinion on how the pharmacist would affect the workload; however, most GPs stated involvement of pharmacists would be helpful for the patient's safety and quality of care.

Table 4.4: Subthemes and sample quotes for the GPs' and pharmacists' role

TDF domains	Subthemes	Sample quotes
Professional role and identity		
Facilitators	The GP is responsible (n=13)	*'I'm 100% responsible'. [GP-M-7](*
	All prescribers are responsible (n=8)	*'Whoever is prescribing it'. [GP-F-13]*
Social influence		
Facilitators	Clinical pharmacists' involvement is helpful (n=7)	*'Pharmacist in the GP setting, I think that would be helpful'. [GP-F-15]*
	Decrease the workload (n=4)	*'It would be great, it will be less workload'. [GP-F-3]*
	Pharmacists provide ideas (n=5)	*'They might just give you ideas. You know, they* [the patient] *probably do not need that. The interactions yeah, that will be great'. [GP-F-3]*
	Improve patient safety (n=3)	*'I suppose they're another safety line as well, or a safety net when it comes to patients' medications'. [GP-M-6]*
Barrier	Increase the workload (n=4)	*'I think to be honest it would probably increase the workload … but it would be better for the patients'. [GP-M-9]*

4.3.4. Theme 4: Reinforcement

The doctors suggested many ways to support them in undertaking FRIDs deprescribing (Table 4.5). They thought that the CDM programme encouraged them to review medication and increase the opportunities to deprescribe.

Other encouraging factors noted that could trigger a medication review included the following:

- Prompts from community pharmacists
- Prompts from practice nurses
- Patient or family complaint about side effects or polypharmacy
- Patient's condition deteriorating
- Patients presenting with falls and fractures
- Updates through professional meetings, awareness campaigns and continuous education, drawing their attention to critical issues (e.g., risk of FRIDs)
- Medication review when issuing a new or repeated prescription
- Electronic reminders
- Audits and research

Table 4.5: Subthemes and sample quotes for the GPs' reinforcement theme

TDF domain	Subthemes	*Sample Quotes*
Reinforcement		
Facilitators	CDM and similar programmes (n=8)	*'I think the chronic disease management programme is good … you have this kind of structure and system and the whole practice is involved, like your reception staff and your nursing staff as well, in the review process. And I guess if you had a deprescribing one, it would be good'. [GP-F-13]*
	A patient's condition (n=6)	*'Definitely, a negative outcome. I think, oftentimes, you would have an unfortunate case where something would've happened, and that would encourage you to start doing it, which is quite sad'. [Reg-M-5]*
	Prompts from patients, pharmacists or nurses (n=7)	*'I may be prompted by the medication use review done by the pharmacists'. [GP-M-4]* *'If they [the patients] ever did say, "Oh, I'm on too many tablets", I would absolutely jump at the opportunity'. [GP-F-8]*
	Patients present with falls (n=5)	*'If they have had a fall'. [GP-F-3]*
	Awareness and education (n=5)	*'More awareness I suppose'. [GP-F-11]*
	E-reminders (n=3)	*'Perhaps if there was a nudge from the software to say, this patient is on certain medications. Certainly, directing medications would you like to reconsider? That could be helpful'. [GP-M-10]*
	Audit and research (n=3)	*'The practice I was working in if they were doing an audit. I think would also be a strong reason to engage in a deprescribing process as well'. [GP-M-6]*
	When repeating or renewing prescriptions (n=3)	*'Anytime I'm issuing a repeat prescription I will always look at the medications'. [GP-M-9]*

Table 4.6: Barriers to and facilitators of deprescribing FRIDs in primary care based on TDF.

TDF domains	Barriers	Facilitators
Knowledge	• Lack of knowledge (n=4) • Not aware of any tools (n=3)	• Familiarity with deprescribing concept (n=15) • Identifying some common FRID classes • Knowing some benefits of deprescribing and reducing inappropriate polypharmacy (n=8) • Belief that deprescribing could be valuable and safe for fall prevention (n=14) • Awareness of some of the common tools, such as STOPP/ START (n=10)

TDF domains	Barriers	Facilitators
Skills	• Hypnotics are the most challenging to deprescribe because of patients' reluctance (n=11) • Depend on experience (n=5)	• Involving the patients in medication review (n=7)
Environmental context and resources	• Limited time (n=14) • Delayed or incomplete discharge letters (written/electronic) (n=13) • Incomplete patient medication history (n=6) • Difficulty in contacting hospital doctors (n=9) • Not all hospitals use the national secure emailing system (n=5) • Prescriptions written by other doctors without sufficient details (n=4) • Pharmacy receives the prescription first (n=4) [patients get the medications before the GP reviews the list] • Changes in practice during the SARS-COV-2 pandemic (n=2) • Lack of alternatives (n=2) • Community pharmacists have no access to medical records (n=1)	• The national emailing system (Healthmail and Healthlink) is useful for communication (n=6) • Receiving discharge prescription directly from hospitals by patients (n=4)
Intention	• GP reluctance (n=4)	—
Social influence	• Patients' resistance to changing medicines prescribed by other specialists (n=8). • Reviewing medication prescribed by other doctors is challenging (n=8) • Not involving the patients as it may affect the relationship with patients (n=4) • Working with pharmacists may increase the workload (n=4) • Belief that carers do not want to be involved (n=1) • Community pharmacists not reporting medication not collected (n=1) [when patients are not	• Belief that patients' and carers' involvement is important (n=15) • Collaboration between GPs in the same practice (e.g., reviewing and issuing repeat prescriptions) (n=1) • Belief that reviewing other doctors' prescriptions should not be problematic (n=3) • Long-term, good relationship with patients (n=6) • Discussion and explanation (n=8) and change of the GP approach if required (n=5) (e.g., delaying conversation to next visit) in case of a patient's resistance • Perception that patients usually accept deprescribing decisions (n=5)

TDF domains	Barriers	Facilitators
	adhering to their medication, although the doctor is issuing repeat prescriptions]	• Collaboration with other providers to manage treatment, e.g., pain specialist (n=1) • Liaising with hospital pharmacists (n=1) • Acknowledging the role of pharmacists (n=6) • Having clinical pharmacists in the clinic would decrease the workload (n=4), save time (n=3), add an additional safety net (n=3) and be cost effective (n=1)
Professional role and identity	—	• Perceiving it to be GPs' responsibility as prescribers (n=13) • Prescribing doctor should be responsible (n=8)
Reinforcement	• Triggers for deprescribing include deterioration of the patient's condition (n=7) and falls (n=5)	• Chronic disease management programme (n=7) • Prompts from patients (n=4), nurse (n=1) or pharmacists (n=3) • Education (n=5) • Medication review when issuing a new or repeated prescription (n=4) • Electronic reminders (n=3) • Audits and research (n=3)
Emotion	• Fear of causing harm to patients (n=11) • GP anxiety (n=4)	—
Optimism	—	• Doctors have been positive about benefits of deprescribing (n=8)
Belief about capability	• Difficult conversations (n=1) • Challenging (n=1)	• Ability to deprescribe (n=2)
Belief about consequences	• Expected patients and family reluctance (n=11) • Legal liability (n=4)	—
Memory, attention and decision process	• Not remembering or focusing on FRIDs when reviewing the patients' medications (n=2)	—
Goals	—	• Quality and safety for patients and doctors (n=1)

4.4. Discussion

In the present study, the views of GPs regarding deprescribing FRIDs in older patients who are at risk of falling were investigated. Four main themes were identified from the interviews: communication with hospitals, patients' and family members' involvement, pharmacists' role and reinforcement. Sharing information across the interface seemed like an ongoing problem that

needed to be addressed. There can be pros and cons to patient involvement. Pharmacists were viewed as collaborators in increasing patient safety and quality of care. Reinforcement elements raised by the participants, for example, the CDM programme, could enhance the implementation of the process in primary care (Table 4.6).

Under the main themes, the current study identified some additional facilitators and challenges compared to what had been identified in previous studies. Doctors' familiarity with the deprescribing concept and its benefits, positivity towards the process, GPs' awareness of the risks of commonly prescribed FRIDs and belief that deprescribing could be valuable and safe for fall prevention represented enablers of the process. Participants acknowledged the role of clinical pharmacists and how it can be beneficial to have them working in primary care clinics because it would enhance collaboration.

Patients' resistance to changing medicines prescribed by other specialists, hospitals not using Healthmail and patients receiving discharge medications before attending their GP for a consultation were identified as challenging for GPs. Some themes in the previous FRID qualitative studies were echoed by GPs in this study (Hahn et al., 2021; Kelly et al., 2021; Van Middelaar et al., 2018). Limitedtime, concerns about drugs' withdrawal symptoms, and reviewing medications initiated by other prescribers were some examples.

4.4.1. Communication gap

Good communication and coordination of care between healthcare settings are essential for deprescribing in multimorbid patients (Duncan et al., 2017). In this study, the doctors reported that the reason for the medication change was not always explained in the discharge letters. This left the doctors uncertain about the reason for the change. The GPs expressed a view that using Healthmail for communication with hospitals was useful. Unfortunately, not all hospitals (or doctors within hospitals) are accessible via Healthmail, according to five participants. It should be noted that hospital participation and having a Healthmail account are voluntary. In addition, the evaluation study showed that 24% of account holders rarely checked their emails (Larkin et al., 2017).

An audit of three general practices in Ireland showed that the discharge summaries did not meet the Irish Health Information and Quality Authority (HIQA) standards. There was some missing information, such as missing a list of stopped medications, in 40% of the letters (O'Connor et al., 2019). Some of the reasons for incomplete letters were highlighted by Yemm et al. (2014), including time constraints and junior doctors' lack of experience (Yemm et al., 2014). In Northern

Ireland, a small study showed that education sessions for junior doctors given by GPs on how to complete the letters efficiently increased quality and reduced the time spent completing the letters (Johnston et al., 2018).

In Ireland, at discharge, patients are sometimes given a prescription to get emergency supplies from the pharmacy to use until they visit the GP (Pharmaceutical Society of Ireland, 2020). In such circumstances, if there is a change in prescription, the GP may not know about it unless the pharmacists contact the GP surgery. Therefore, some participants found receiving a copy of the discharge prescription directly brought by patients was efficient (n=4). This could allow the doctor to review the list and make the necessary change before the patient receives the medication, for example, in the case of an undocumented allergy.

The perceived hierarchy between GPs and specialists working in secondary care may lead to reservation from the GPs and reluctance to question the prescribing decisions of other specialists (Sawan et al., 2020). Nevertheless, a few participants felt that it should not be a problem for a GP to change the medication (n=3) if they effectively communicated the reasons with the specialist.

4.4.2. Patients' and carers' involvement

It has been suggested that the most needed change in geriatric healthcare is to shift from disease-centred treatment to patient-centred care and collaborative decision making (Beuscart et al., 2021). Six of the participants pointed out that a trusted relationship with patients should facilitate this transformation towards shared decision making. The participants also felt that not involving the patients may make the patient feel disrespected, resulting in a loss of trust or the patient going to a different doctor (n=4).

The GPs also found it difficult to deprescribe drugs associated with dependence upon long-term use and that an explanation of the reasons for stopping is critical. Turnham et al. discovered that understanding improved the patient's drive to discontinue, hence addressing their concerns about the medicine's continued use (Tannenbaum et al., 2014); they emphasised that the success of deprescribing was greatly dependent on the patient's desire and support from GPs or pharmacists. The informative pamphlet utilised in the intervention also assisted in the start of the deprescribing conversion and encouraged engagement in the treatment plan (Turner et al., 2018).

4.4.3. Pharmacists' involvement

Doctors' answers about working with pharmacists in the primary clinics were mainly positive, except for a few who thought it might increase their workload; they attributed this to the additional communication and more frequent reviews. These doctors had more than 10 years of

practice experience. Alternatively, doctors with fewer than 10 years of experience were more open to collaboration with pharmacists. However, they all confirmed that collaboration would benefit the patient.

Having a clinical pharmacist in general practice means GPs can focus on where they are the most needed, for example, on diagnosing and treating patients with complex conditions. This helps GPs manage the demands of their time (O'Dowd et al., 2017). Pharmacist intervention within general practices is feasible and has the potential to improve prescribing quality (Cardwell et al., 2020). Moreover, medication reviews, when conducted by pharmacists in primary care, can lead to positive results, and when performed by both physicians and pharmacists, will result in a significant reduction in the mean number of PIMs per patient (O'Ciardha et al., 2022; Rodrigues et al., 2021).

4.4.4. Reinforcement

A survey about the prevention of falls practice by Mackenzie et al. reported that the primary prevention practice for falls is low among GPs in the UK. Only 11 out of 37 GPs asked about the history of falls in older patients (Mackenzie & McIntyre, 2019). A proactive role towards prevention rather than reacting to the consequences of falls should be advocated. There is currently no contractual arrangement for falls prevention care, including deprescribing FRIDs in primary care. Such an arrangement may increase involvement in this practice. For this, the Integrated Care Programme for Older People seems promising .

The allocated time to assess patients in the CDM programme helped GPs review patients' medications, which sometimes led to deprescribing. Participation in the CDM programme is voluntary. However, one of the doctors suggested that, if it was mandatory, it would increase the chance of involvement in medication review and deprescribing.

Audits and clinical practice research that included medication reviews were mentioned as facilitators of deprescribing. Research such as the iSIMPATHY project, which sought to increase medication reviews with the involvement of a multidisciplinary team, and focused on older adults, is a great example (McIntosh et al., 2018).

4.4.5. Strengths and limitations

The present research involved exploratory individual interviewing of one of the key stakeholder groups in deprescribing, namely GPs. A theory-based analysis (TDF) was used to present the

barriers and facilitators of the process. Mapping aided identification of possible techniques to influence the current FRIDs deprescribing behaviours, as well as to suggest some components of a future intervention's design and implementation in practice. A limitation was that the sample was small and may not be representative of all GPs. However, interviews were undertaken until data saturation was reached.

4.4.6. Implementation in practice

A systematic review of BCTs used in primary care intervention studies concluded that the most effective combinations of BCTs for deprescribing are unknown (Isenor et al., 2021). However, the authors found that the most used BCTs were social support, restructuring the environment and shaping knowledge (Isenor et al., 2021). After mapping the results of the present study to the BCTs described by Michie et al. (2014), possible techniques were listed and examples of potential intervention strategies have been provided in Table 4.7. This should inform the design of interventions for implementation studies (Michie et al., 2014). A combination of techniques can be used to target one or more behaviours (Isenor et al., 2021).

Doctors have the knowledge and training to prescribe and deprescribe. However, four participants indicated a need for more detailed information on deprescribing FRIDs. Although guidance about deprescribing (including potentially deprescribing FRIDs) is available and accessible, a few participants reported lack of awareness of the available tools and instead relied on their previous experience and knowledge. Tools such as STOPPFalls, a comprehensive list of FRIDs-containing deprescribing algorithms for each drug class, might help physicians with FRIDs management and should help with the skills and knowledge gap (Seppala et al., 2020). It is worth mentioning that the information about FRIDs in local resources and updates for GPs at the time of interviews were scarce, and the Irish College of General Practitioners did not have specific resources for fall prevention in older adults on their website.

Intervention strategies have pros and cons that must be considered when designing an intervention. For example, alerts can be sound and improve prescribing; however, too many clinically unrelated alerts may result in alert fatigue (Wilson et al., 2021). For this reason, it is recommended to use the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side effects/safety, equity) when choosing the intervention components. These criteria test the appropriateness of each intervention strategy before implementation (Michie et al., 2008).

The doctors expressed motivation to review medications for patients with a high risk - for example, patients presenting with falls. Therefore, prioritising such an intervention for high-risk

patients might make it more practical. Screening for fall risk with tools such as STEDI might help prioritise care for those most in need (Stevens et al., 2020).

Table 4.7: Barriers to deprescribing FRIDs in primary care linked to BCTs (Michie et al., 2014).

TDF domains	Barriers	BCT and examples of practical interventions
Knowledge	• Lack of knowledge (n=4) • Not aware of any tools (n=3)	Credible source, instructions on how to perform the behaviour, information about antecedents and conserving mental resources by: • Education and training: providing information about the risk of FRIDs and the benefits of deprescribing via seminars, professional meetings, conferences, clinical bulletins and reports (Seppala et al., 2019) • Increasing awareness of the available tools, e.g., STOPPFalls and ACB calculator (Seppala et al., 2019)
Skills	• Depend on experience (n=5) • Hypnotics are the most challenging to deprescribe because of patients' reluctance (n=11)	
Environmental context and resources	• Limited time (n=14) • Incomplete patient's medication history (n=6) • Prescriptions written by other doctors without sufficient details (n=4) • Changes in practice during the SARS-CoV-2 pandemic (n=2) • Not all hospitals use a national emailing system (n=5) • Lack of alternatives (n=2) • Delayed or incomplete discharge letters (written/electronic) (n=13) • Difficult to contact hospital doctors (n=9) • Pharmacy receives the prescription first (n=4) [patients get the medications before the GP reviews the list]	Restructuring the physical and social environment; adding objects to the environment; prompts and cues; and action planning by: • Develop programmes for fall prevention in primary care • Involving other professions in the process, e.g., pharmacists assess by reviewing medications and liaising with hospital and community pharmacy (Cardwell et al., 2020; Cossette et al., 2019; O'Ciardha et al., 2022) • Prioritising high-risk patients (Seppala et al., 2019), e.g., previous fallers • Computerised order entry systems suggest safer alternatives (Peterson et al., 2005) **Behavioural practice or habit formation by: • Assessing the risk of falls before prescribing new FRIDs (Seppala et al., 2019) • Incorporate FRIDs review in routine practice Social support (practical) • Enhance communication between healthcare providers, e.g., encouraging the use of Healthmail • Mandate completing the medication section on discharge letters from hospitals • Assign a member of the team for communication with primary care, e.g., a care coordinator after discharge (Parsons et al., 2012)

TDF domains	Barriers	BCT and examples of practical interventions
Social influence	• Patients' resistance to change medicines prescribed by other specialists (n=8) • Not involving the patients as it may affect the relationship with patients (n=4) • Reviewing medication prescribed by other doctors is challenging (n=8) • Patients' and families' reluctance (n=12)	Information about health and emotional consequences; salience of consequences; monitoring emotional consequences; anticipated regret; pros and cons; reduce negative emotions; comparative imaging of future outcome; social support (emotional); and verbal persuasion about capability by: • Patients' education about the risk of inappropriate use of FRIDs and the benefit of deprescribing • Provide information about the tapering process to the patients if needed (Martin & Tannenbaum, 2017) • Support and reassurance through monitoring and follow-up • Referral to support services if needed, e.g., addiction service
Intention	• GP reluctance (n=4)	Information about health and emotional consequences, salience of consequences and pros and cons by: • Raise prescribers' awareness about the benefits and safety of the process and address any concerns about harm
Emotion	• Fear of causing harm to patients (n=11) • GP anxiety	
Reinforcement	• Triggers for deprescribing include deterioration of the patient's condition (n=6) and falls (n=5)	Prompts and cues; incentives; cue signalling; associative learning; reward (outcome); material reward (behaviour); material incentive; nonspecific rewards; nonspecific incentive; reward; and restriction: • Policies to restrict renewal without monitoring, e.g., PPI use (Isenor et al., 2021) • Programmes that offer reward for service similar to the CDM programme • Advocate proactive role in fall prevention
Belief about consequences	• Expected patients and family reluctance (n=11) • Legal liability (n=4)	Instructions on how to perform the behaviour and information about health and emotional consequences: • Education • Shared decision training
Belief about capability	• Believed that the conversation about deprescribing is difficult (n=1) • Challenging process (n=1)	
Memory, attention and decision process	• Not remembering or focusing on FRIDs when reviewing the patients' medications (n=2)	Cue signalling, prompts and cues: • Electronic reminders or alerts to review FRIDs in patients at risk of falls (Cossette et al., 2019)
**Partial solution		

4.5. Conclusion

GPs have the knowledge and motivation to undertake FRIDs deprescribing. They declared that it was their responsibility to review the prescribed medications and preserve patient safety. They

welcomed pharmacists' assistance with deprescribing in primary care settings. However, some barriers to deprescribing are still ongoing, such as communication difficulties between primary and secondary care and patients' resistance to changing some medicines. Shared decision making could promote deprescribing initiatives and facilitate discussion with the patients.

A structured approach to deprescribing FRIDs is currently not part of routine practice. Nevertheless, it can be embedded in structured fall prevention programmes that include FRIDs review and deprescribing. Future work should involve introducing interventions based on the proposed BCTs and investigating the feasibility and efficacy of those interventions in practice.

5. A Qualitative Study Investigating Pharmacists' Attitudes and Perspectives on Deprescribing Medications that Increase the Risk of Falls in Older People

5.1. Introduction

Clinical pharmacists are highly trained in medication management and safety (Lee et al., 2015). They are valuable members of geriatric teams, as care in geriatric medicine mainly involves chronic diseases and polypharmacy management (Lee et al., 2015). Pharmaceutical care in such a setting includes ensuring prescribing appropriateness and preventing polypharmacy and its clinical consequences, such as nonadherence and adverse drug events (Lee et al., 2015).

There are a substantial number of published studies describing the role of pharmacists in improving care for older patients across various healthcare settings, including primary care, nursing homes and hospitals (Delgado-Silveira et al., 2021; Lee et al., 2015). For example, in a community setting, a comprehensive medication review by pharmacists may potentially reduce inappropriate medication use (Lenander et al., 2014; O'Ciardha et al., 2022) and mortality (Bloomfield et al., 2020).

In a randomised study conducted in a nursing home, pharmacist intervention significantly reduced the anticholinergic burden among residents (Kersten et al., 2012). In a recent systematic review of deprescribing interventions in nursing homes, the authors found that medication reviews reduced inappropriate drug use. In a subgroup analysis, they also found that deprescribing reduced the number of falls by 24% (Kua et al., 2019).

Similarly, in a hospital setting, pharmacists can participate in the entire care process and their interventions have been shown to be effective - for example, in the emergency department, upon admission, during inpatient stay, at discharge and after discharge (Falconer et al., 2021). MAI and STOPP/START, when applied by pharmacists upon admission and at discharge, resulted in improvements in prescribing appropriateness (Gillespie et al., 2013). Furthermore, during transitions between healthcare settings, clinical pharmacist services might prevent significant medication discrepancies in hospitalised patients (Elamin et al., 2021).

Multidisciplinary collaboration between physicians, nurses and pharmacists is essential to minimise the risk of falls in healthcare facilities (Maly et al., 2019). The clinical pharmacist's role includes medication review and reconciliation, communication with other healthcare professionals in the team about treatment plans, providing recommendations and suggesting safer alternatives to harmful medications when available (Smith et al., 2019; Walsh et al., 2016).

Pharmacists play a role in FRID review and fall prevention. Studies have shown that involving pharmacists in FRID reviews enhances the rate of deprescribing (Browne et al., 2014; Marvin et al., 2017). In a small randomised trial, Mott et al. (2016) found that pharmacist intervention led to

stopping FRID use in 16.9% of the intervention group (38 patients) compared to 27% of the control group (41 patients) (Mott et al., 2016).

Previous qualitative studies have explored the opinions of pharmacists regarding general deprescribing in hospitals (Cunningham et al., 2021; Langford et al., 2021; Scott et al., 2019), community pharmacies (Abou et al., 2022; Kouladjian et al., 2016) and nursing homes (Pruskowski & Handler, 2017; Turner et al., 2016). However, few studies have discussed FRID management. These include Akande-Sholabi et al. (2020) who surveyed hospital pharmacists in Nigeria about the topic; Langford et al. (2021) who interviewed pharmacists in Australia about opioid deprescribing; and Cunningham et al. (2021) who discussed deprescribing medications with anticholinergic properties in the United Kingdom.

5.1.1. Aim

To explore the factors that prevent or influence the process of deprescribing FRIDs in older adults from clinical pharmacists' points of view.

5.1.2. Objectives

- To assess the knowledge and attitudes of the clinical pharmacists about deprescribing FRIDS.
- To explore the challenges and facilitators of adopting a FRIDs deprescribing process.
- To investigate the feasibility of deprescribing FRIDs in hospitals.

5.2. Methods

5.2.1. Ethics approval

The SoPPs REC approved this study on July 6, 2022 (application number 2022-04-01). Informed consent forms were signed by all participants before the interviews. The study design was compliant with GDPR and national data protection legislation; the collected data were limited to the minimum data necessary and were permanently anonymised before analysis.

5.2.2. Participants and recruitment

The participants in this study were clinical pharmacists who work with older adults**.** An invitation email was sent to members of the Care of the Older Persons Special Interest Group at the Hospital Pharmacists Association, Ireland (HPAI), through a gatekeeper. Recruitment started on July 14, 2022. The research team did not have access to the names or contact details of the invited HPAI members. Interested pharmacists proactively contacted the researcher to obtain further details of the study and to agree to participate, if willing. The interviews and data analysis were conducted

based on the previously described methodology in Section 4.2.4 and the interview guide presented in (Appendix 4).

5.3. Results

Twelve senior clinical pharmacists (CPs) participated in the study (Table 5.1). The interviews lasted between 19.53 and 54.02 min (median = 28.63 min).

Table 5.1: Characteristics of clinical pharmacists who participated in the interview (n=12)

	Number of participants
Gender	
• **Female**	11
• **Male**	1
Years of practice	
• **0–10**	5
• **11–20**	3
• **21–30**	4

5.3.1. Theme 1: Challenges in hospital setting (TDF domain: 'Environmental and resource context', 'Social influence' and 'Skills')

Ten pharmacists believed that time was a significant barrier to reviewing FRIDs and deprescribing recommendations in hospital settings (Table 5.2). They attributed this to a lengthy process involving multiple steps, such as medication reconciliation, review and communication with the medical team and patients or carers.

The lack of resources in hospitals in general and the lack of specific resources for fall prevention were also mentioned by the participants as barriers. Three participants discussed staff shortages as a common issue in hospitals. Some of them thought that comprehensive medication reviews were time consuming and that they could not offer them to all admitted older patients. Additionally, six pharmacists stated that there were falls committees in their hospitals; however, four mentioned that these committees did not involve pharmacists.

According to the participants, fall prevention or deprescribing FRIDs are not priorities of care in hospital settings unless a patient presents with a fall. Symptoms that result in admission are usually the focus of the care team. One pharmacist thought that discussing fall risk would be inappropriate when patients present with complex acute issues, such as heart attacks. Discussing fall risk also depends on the department, whether the patient is in the ED or surgical ward and whether there is a geriatrician or a senior doctor on the team to make the needed change.

Pharmacists felt that there was reluctance from doctors to initiate the process in the hospital, especially regarding medications prescribed for long-term use, missing background information or initiated by GPs. Participants always referred to the original prescriber, such as a consultant or GP, before making recommendations.

The participants found that admission to the geriatric ward presented an opportunity to review and deprescribe FRIDs. Although there are other referrals and follow-up facilities in some hospitals, such as deprescribing or fall clinics, opportunities to follow up with patients after discharge are limited.

Table 5.2: Hospital work environment barriers and facilitators from CPs' point of view

TDF domains	Subthemes	Sample quotes
Environmental context and resources		
Barriers	Time (n=10)	'So the time that needs to be invested in the process is the major challenge.' [P-F-7]
	Follow up (n=7)	'Monitoring and follow up as well, because I don't get to do a lot of that, and I don't get to see the outcome of it.' [P-F-3]
	Doctors' reluctance (n=5)	'Doctors can be cautious I suppose about making changes to long-term medicines.' [P-F-5]
	No pharmacists on falls committees (n=4)	'I don't think there's anyone from [the] pharmacy on the falls committee. No.' [P-F-10]
	Lack of resources (n=4)	'We don't have the resources and the capacity to do enough of it.' [P-F-10]
	Patients' health status (n=3)	'It can be quite difficult in practice to make changes to those in the acute setting because the patient might be in for a completely different reason.' [P-F-5]
	Staffing issues (n=3)	'The biggest challenge we face is staffing levels… we're so short-staffed, I am spending a lot of time in [the] dispensary, so we're not operating with clinical service at an optimum level.' [P-F-11]
	Incomplete patient history (n=3)	'Maybe access to a full medication history to know exactly what a patient is taking.' [P-F-2]
	No specific resource for fall prevention in the hospital (n=4)	'There aren't specific resources [for fall prevention].' [P-F-4]
	Recommendations might not be actioned by GPs (n=3)	'Recommendations aren't actioned by the GP.' [P-F-6]
	Falls are not a priority of care (n=5)	'In the inpatient setting the time is not given to it [fall prevention] because there's other more acute issues that the patients and their team have so they focus on those and maybe don't look at fall prevention as often as they should.' [P-F-2]
Facilitators	Good team relationships (n=5)	'If the consultant or medical personnel are familiar with the value a pharmacist can bring to care, and the pharmacist presents their information coherently and in a logical manner, it's probably likely

TDF domains	Subthemes	Sample quotes
		that the advice the pharmacist is giving would be listened to more.' [P-F-4] 'Good working relationships with the rest of the team can help to make any changes.' [P-F-2]
	Connection with community pharmacy and GPs (n=3)	'Something that I'm looking to do is to write up a report form that I would send out to GPs for issues.' [P-F-3]
	Presence of other facilities for referral and follow up (n=4)	'There is another place that I can recommend that a patient goes to, and it's called an ambulatory hub, it's on-site. But if somebody was being sent home and they needed a more disciplined intervention, so if they needed OT or physio, I can actually send them there for a review of their medication and their condition as well.' [P-F-3]
	FRIDs review is part of regular medication review (n= 4)	'It's [falls risk] encompassed into every medication review. If you're called to a person at a risk of falls, of course you would address their fall risk, so yes, it's built into the seven-step approach.' [P-F-7]
	Optimal time for deprescribing in hospital is during inpatient stay (n= 7)	'I would say during the inpatient stay to allow for monitoring for adverse withdrawal events.' [P-F-7]

5.3.2. Theme 2: Pharmacists' personal factors (TDF domains: 'Knowledge', 'Skills' and 'Belief about consequences')

Pharmacists were familiar with the deprescribing concept and believed that deprescribing could be valuable and safe for reducing polypharmacy and the risk of falls (Table 5.3). They identified some common medication classes strongly associated with falls, such as benzodiazepines and Z-drugs, anticholinergics and antihypertensives. The commonly used tools among pharmacists were STOPP/START (Gallagher et al., 2008), Beers criteria (Beers, 1997) and the Polypharmacy Guidance Realistic Prescribing (the 7 Steps) (Scottish Government Polypharmacy Model of Care Group, 2018).

Table 5.3: CPs' knowledge and skills barriers and facilitators

TDF domains	Subthemes	Sample quotes
Knowledge		
Facilitators	Aware of deprescribing concept (n= 12)	'Deprescribing is just stopping medications that are no longer necessary.' [P-F-10] 'It means removing a prescribed medication from a list of medications that a person is taking. It could also mean reducing the dose of medication. It usually occurs for particular reasons.' [P-F-4]
	Perception of deprescribing as valuable and safe (n=8)	'Deprescribing is very valuable and it's a very safe initiative.' [P-F-10]

TDF domains	Subthemes	Sample quotes
	Medication classes with highest priority during medication review: • Hypnotics (n=9) • Benzodiazepine (n=7)	'Zolpidem and benzodiazepines.' [P-F-6]
	• Anticholinergic medications • (n=6)	'Drugs that affect the anticholinergic burden.' [P-F-3]
	• Antihypertensive (n=6)	'Blood pressure lowering meds, your diuretics, your ACE inhibitors, ARBs, alpha-blockers.' [P-M-1]
	• Antidepressants (n=5)	'I see so many tricyclic antidepressants.' [P-F-11]
	Awareness of common tools: • STOPP/START (n= 10)	'The STOPP/START medication review I'm familiar with, the Beers criteria.' [P-F-2]
	• Beer's criteria (n=5)	'STOPP/START, Beer's. Those would be the ones.' [P-F-4]
	• The 7-Steps (n=5)	'The seven-step SYMPATHY, I find it's more patient-focused than a lot of other models.' [P-M-1]
Skills		
Facilitator	Reviewing FRIDs is part of everyday medication reviews for pharmacists (n=9)	'Every single time I review a patient, I review falls risk because I am working now always in [the] care of the elderly.' [P-F-11]
Barrier	Lack of experience with deprescribing (n=1)	'Often pharmacists don't work in specialist areas, we probably have less experience of the process of safely stopping them.' [P-F-9]
Belief about consequences		
Barriers	Legal issues (n=1)	'I would have a concern in relation to the legal situation… I do think pharmacists are legally vulnerable to some extent.' [P-F-4]
	Deprescribing might not be safe (n=3)	'It may decrease the risk of falls by taking them off but it could increase the risk for other difficulties.' [P-F-4]

5.3.3. Theme 3: Pharmacists' role in deprescribing FRIDs (TDF domain: 'Professional role and identity' 'Skills' and 'Environmental context and resources')

CPs thought that medication reviews should be the responsibility of every member of the medical team, and other healthcare professionals with medication knowledge (e.g. pharmacists and nurses) (Table 5.4). The limited availability of pharmacists in some hospital wards and their ability

to prescribe or deprescribe medications necessitate the involvement of prescribers in the deprescribing process.

Some participants indicated that good, trusted relationships among clinical teams and connections with GPs and community pharmacies might facilitate deprescribing FRIDs. Regarding this, one pharmacist thought it was their role to introduce themselves, inform the team about their role and responsibilities and gain trust. Some participants discussed how working in multidisciplinary teams facilitates this type of relationship and streamlines workflow.

Pharmacists stated that medication reviews form a large percentage of their daily workload. FRID reviews could be part of regular medication reviews that CPs conduct for patients in geriatric wards.

Table 5.4: Pharmacists' role barrier and facilitators

TDF domains	Subthemes	Sample quotes
Professional role and identity		
Facilitators	Everyone is responsible for medication review (n= 9)	'Nearly all healthcare professionals… pharmacists and nurses, doctors.' [P-F-8]
	Most of the clinical pharmacist's workload is a medication review (n=5)	'It [medication review] is my overall workload currently.' [P-F-7]
Environmental context and resources		
Facilitator	Multidisciplinary teamwork (n=4)	'I suppose if we were part of the team, it might work more seamlessly and easier.' [P-F-10]
Barrier	Medication review is time consuming (n=8)	'Because it's quite time consuming, it's very in-depth. Just to get a medication list for a patient, you could be talking half an hour, 40 minutes.' [P-M-1]
Optimism		
Facilitator	Positive attitude (n=3)	'Reducing a tablet burden can be a very positive thing.' [P-F-5]
Emotion		
Barriers	Concerns about side effects and withdrawal symptoms (n=6)	'We don't want the patient to feel a withdrawal.' [P-M-1]
	It can be frustrating (n=1)	'The PPIs, the things not being reviewed, no stop dates, those kinds of things, they are a bit frustrating for patients and for the rest of us.' [P-F-8]

5.3.4. Theme 4: Patients' involvement (TDF domain: 'Social influence' and 'Belief about capability')

Most CPs expressed that involving patients and carers is essential (Table 5.5). During medication reconciliation, they involve patients in obtaining information about the patient's medication history. However, in some cases, pharmacists are less likely to be involved in patient discussions about deprescribing in inpatient settings.

Participants attributed this to the following reasons:

- Limited time.
- Inappropriate time, e.g. acute care.
- Lack of awareness of the medical staff that pharmacists have the skills required to discuss medication issues and deprescribing with the patients.
- Thinking that the doctor must explain it to the patients to avoid conflicting messages.
- Having one opportunity to speak to the patient or carers before discharge, pharmacists leave that to the doctor.
- Patient counselling is not the role of pharmacists in some hospitals.
- When a patient is admitted for a short period.
- When patients have cognitive impairment.

The resistance of patients and families to changing some medications was an additional concern of the participants. Participants explained that this may be due to dependence on insomnia medications, anxiety about changing therapy, being attached to the medicine or linking consequences to the changes, such as the appearance of new symptoms or side effects. Nevertheless, one participant mentioned that some patients might be more willing to accept medication changes.

Table 5.5: Subthemes and sample quotes for pharmacists and patients' involvement theme

TDF domains	Subthemes	Sample quotes
Social influence		
Barriers	Patients' resistance (n=4)	'If they've been taking medication for a long time, they can be a little bit resistant to change.' [P-F-8]
	Pharmacists less likely to be involved in patients' discussions about deprescribing (n=4)	'I'm less likely to speak to the patient and their carers.' [P-F-9] 'The reason why I would not discuss it with the patients or their carers every time is sometimes I feel that you can get one opportunity to discuss it with them. And so in certain situations, if I feel that it would be more appropriate that the doctor make the plan with them because they're the ones who are going to be making the changes, I will let them have that discussion.' [P-F-2]
Facilitator	Involving the patient is important (n= 10)	'Yes, I always discuss it with the patient anyway, and sometimes the carer.' [P-F-6]
Belief about capability		
Barrier	Getting patients buy-in requires effort and support (n=5)	'You do need to make yourself quite available to patients to reassure them that the changes that they agreed to… that you've since enacted, are still in their interests, and that it might take time to adjust, and you may have to reintroduce the medication for a period to, I suppose, reassure them that you're still acting in their interest… A concern I have is that it should never be done lightly,

TDF domains	Subthemes	Sample quotes
		and there should always be someone there to, I suppose, hold the hand of the patient through the process. And so, the time that needs to be invested in the process is the major challenge.' [P-F-7]

5.3.5. Theme 5: Reinforcement (TDF domain: 'Reinforcement')

The primary driver for reviewing FRIDs was the patient's health situation (Table 5.6). For example, advanced age or being admitted after having experienced a fall, adverse medication effects or fractures. Additionally, participants mentioned that they usually prioritise patients in different ways based on comorbidities, inappropriate polypharmacy, FRID use, living alone or lacking support, being at the end of life or when the risk of the medication outweighs the benefits.

Another factor that encouraged pharmacists was having evidence. Evidence is needed to support their deprescribing recommendations. Proper guidance was also mentioned to help guide pharmacists through the process.

Furthermore, support from hospitals, such as having a structured process, was reinforcing. One pharmacist mentioned incentives by setting goals for the hospital staff, for example, pharmacists reviewing a certain number or percentage of FRIDs.

Table 5.6: Subthemes and sample quotes for the CPs' reinforcement theme

TDF domains	Subthemes	Sample quotes
Reinforcement		
Facilitators	Patient's health, e.g. falls, polypharmacy or end of life (n=9)	'A fall that would be a prompt to cast an eye over their medications and see if there is anything that can be optimised.' [P-F-1]
	Evidence and guides (n=3)	'It would be really good to have evidence to show medications that reduce the risk of falls.' [P-F-6]
	Support from hospital (n=3)	'If there was more time, more resources, more people and a system that better supports it, in terms of like an infrastructure not just the paper but dedicated time to review FRIDs and to be, I suppose, more actively involved in the falls risk assessment for patients that might encourage me to be more proactive in recommending deprescribing or making recommendations and reviewing them proactively.' [P-F-12]

Table 5.7: Pharmacists' barriers and facilitators to deprescribing FRIDs based on TDF

TDF domains	Barriers	Facilitators
Knowledge	• Staff knowledge, e.g. medical and nursing staff (n=3)	• Familiar with deprescribing concept (n=12) • Identified some common FRID classes • Believe that deprescribing could be valuable and safe for reducing polypharmacy and risk of fall (n=8) • Awareness of some of the common tools, such as STOPP/START (n= 10), Beer's criteria (n=5), and the Polypharmacy Guidance (the 7 Steps) (n=5)
Skills	• Lack of experience with deprescribing (n=1)	• Reviewing FRIDs is part of everyday medication review for older patients (n=9) • Involving the patient is important (n=10) • Communicate with doctors (n=5) and patients (n=3) during medication reconciliation and review
Environment context and resources	• Limited time (n=10) • Medication review is time consuming (not able to review all patients) (n=8) • Difficulty following up on patients after discharge (n=7) • Written notes not always read (n=6) • Falls are not a priority of care (n=5) • Lack of resources, e.g. educational resources (n=4) • Pharmacists not involved in the falls committee (n=4) • No specific fall prevention resources (n=4) • Lack of full medication history (n=3) • Patient's health status, e.g. heart attack (n=3) • Staffing issues (n=3) • Pharmacists less likely to be involved in patients' discussion about deprescribing (n=4) • CPs do not usually contact GPs (n=4) • Contacting GP is time consuming (n=2)	• Connection with GP and community pharmacies (n=3) • Presence of other facilities for referral and follow up (deprescribing clinic or falls clinic) (n=4) • Opportunity to review medication during inpatient (n=7) • Verbal communication is the most effective process (n=5)
Professional role and identity	• Pharmacists do not deprescribe (n=2)	• Everyone is responsible for medication review, e.g. the medical team and the pharmacist (n=9) • Medication review is the main part of CPs' workload (n=5)
Social influence	• Patient and family resistance (n=4) Doctor's reluctance (n=5) Recommendations might not be actioned (n=4)	• Good team relationships (n=5) • Doctors accept the recommendation (n=2)
Reinforcement	—	• Patient's health, e.g. falls and polypharmacy (n=9) • Evidence and guides (n=3)

TDF domains	Barriers	Facilitators
		• Support from hospitals (n=3) • Education (n=2)
Emotion	• Concerns about side effect and withdrawal symptoms (n=6) • It can be frustrating (n=1)	—
Belief about capability	• Getting patients buy-in needs effort and support (n=5)	—
Optimism	—	• Positive attitude toward deprescribing (n = 3)
Memory, attention and decision making	—	• Conscious about optimising FRIDs in older adults (n=2)
Belief about consequences	• Deprescribing might not be safe (n = 3) • Legal issues (n=1)	—

5.4. Discussion

This study explored pharmacists' opinions regarding the barriers and facilitators of deprescribing FRIDs in hospitals. Five themes emerged from the analysis of the interviews: challenges in the hospital setting, pharmacists' personal factors, pharmacists' roles in deprescribing FRIDs, patients' involvement and reinforcement.

Some barriers from previous work were confirmed by our participants, such as limited time, fear of adverse events and communication problems (Abou et al., 2022; Cunningham et al., 2021; Langford et al., 2021) (Table 5.7). Other barriers were unique to Irish health systems, such as the absence of specific resources for FRIDs, pharmacists' nonparticipation in falls committees and a lack of communication with patients and GPs regarding deprescribing.

5.4.1. Challenges in hospital setting

The study participants agreed that a comprehensive medication review was a time-consuming task. The time to complete a full review might range from 30 minutes to an hour, depending on the medication regimen's complexity and the time needed for documentation and communication with patients and other members of the healthcare team (Stranges et al., 2020). Prioritising the need for a comprehensive medication review and identifying high-risk patients might help with limited time and resources (Mongaret et al., 2018; Stranges et al., 2020). Using pharmacy support personnel (e.g., pharmacy technicians or students) appears to be effective for completing medication reconciliation and might have benefits for minimising the effect of staff shortages (Petrov et al., 2018).

Some participants mentioned that they were not involved in fall prevention committees. Besides their role in medication reviews and patient counselling, when involved in fall prevention committees, pharmacists can develop a comprehensive list of FRIDs based on the hospital's local formulary. This list can be used during the medication review for patients with a high risk of falls.

They can also determine the appropriate resources and tools for risk assessment and medication review.

5.4.2. Pharmacists' knowledge and skills

Pharmacists are clinically trained to ensure the safe use of medicines (PSI, 2013). They have the skills to review patient prescriptions and manage and identify medication safety issues (PSI, 2013). The participants in this study were aware of the deprescribing concept and the risk of FRID use. They believed that deprescribing could be valuable in fall prevention; however, they were concerned about the consequences of deprescribing. Reeve et al. (2018) reviewed the evidence for the safety of deprescribing and concluded that the process might carry some risk of harm (*e.g*. adverse effects or return of symptoms). However, the authors mentioned that this harm could be overcome using a patient-centred approach coupled with close monitoring.

5.4.3. Pharmacists' role in deprescribing FRIDs

In this study, pharmacists thought that medication reviews should be a shared responsibility between the medical team and allied healthcare professionals. They appreciated the impact of trusted interpersonal relationships within teams on the success of the process. Relationships within teams grow over time, enhancing collaboration and understanding of the role of pharmacists. A Swedish study investigated healthcare professionals' (HCPs') opinions about collaboration (Lindqvist et al., 2019). The participants confirmed that pharmacists were a great addition to the team and benefited patients (Lindqvist et al., 2019). Grimes et al. (2014) investigated the collaboration between physicians and pharmacists to review patients' medications. They found that the intervention reduced medication errors and improved MAI scores.

Another barrier to pharmacists deprescribing FRIDs is that pharmacist interventions depend on implementation by doctors. This is especially true in Ireland, where pharmacists have no prescriptive authority and therefore are not in a position to substitute a safer alternative or reduce a dose. The participants mentioned that doctors were sometimes reluctant to change medications and that their recommendations might not be actioned. As discussed in Sections 2.3.16 and 2.4.2, the acceptance rate varied between randomised studies, which may have affected healthcare outcomes (Basger et al., 2015; Santolaya-Perrín et al., 2019). Acceptance may depend on multiple factors, including type of recommendation, patient resistance and way of communication. This necessitates teamwork between pharmacists, doctors and patients (Doellner et al., 2017).

Pharmacists indicated that follow-up after discharge is not optimal. In addition to medication reconciliation upon admission, it is recommended that CPs assist with the transition of care to

improve patient outcomes (Elamin et al., 2021). Their involvement in discharge entails medication reconciliation, comprehensive medication review, counselling patients about the proper use of medications and care coordination (Stranges et al., 2020). Pharmacists' interventions at discharge enhance adherence and prescribing quality, as discussed in Chapter 2.

5.4.4. Patients' involvement

In a patient survey about fall prevention programmes in community pharmacies, Gemmeke et al. (2021) reported that patients were willing to be counselled by pharmacists about medication and fall risk when they fill new prescriptions. Additionally, they expected such information to be included in the medication's information leaflets**.** In another survey by Lukacena et al. (2022), patients expressed that communication about medications with their clinician or pharmacist was effective (n = 69 of 103). Nevertheless, our participants indicated that they were not involved in the patient discussions about deprescribing, either because of staff shortages, limited time or acute patient status at admission. Additionally, as pharmacists in Ireland do not have the right to prescribe, they usually discuss the issues with doctors, who decide whether to bring changes forward to patients.

5.4.5. Reinforcement

Finding evidence to support their recommendations was mentioned by a few participants as a form of reinforcement. The body of evidence is constantly evolving and supports FRID management. For example, Salonoja et al. (2012) indicated that a reduction in psychotropics reduced the risk of falls that required medical treatment. Martin et al. (2018) suggested that pharmacist-led interventions were effective in deprescribing potentially inappropriate medications, such as benzodiazepines.

5.4.6. Strengths and limitations

The semi-structured interviews allowed for the exploration of pharmacists' opinions about the topic. All participants were senior pharmacists based mainly in inpatient geriatric wards. They therefore were the pharmacists most likely to be involved in any initiative to deprescribe FRIDs in older patients, and to have gained greater experience of the associated barriers and facilitators compared with more junior colleagues. Other work areas included emergency departments, day hospitals, outpatient clinics and rehabilitation facilities. Rooting analysis of the data in the TDF lays a useful foundation for progressing from a theoretical understanding to the design and implementation of initiatives to address the factors identified.

Limitations of the study include the fact that the information was restricted to Irish hospitals, which affects generalisability to other healthcare systems. Although the sample was small, data

saturation appeared to have been reached. There was a gender imbalance among the participants. However, it should be noted that female pharmacists represent 65% of the total registered pharmacists in Ireland (PSI, 2023), so a majority of females is not unexpected although the proportion in this study is higher.

5.4.7. Recommendations for practice

As in previous studies within this thesis, barriers were mapped to appropriate BCTs (Table 5.8). Some potential interventions were suggested for each technique.

Table 5.8 : Linking pharmacists' barriers to deprescribing FRIDs in hospitals to BCTs (Michie et al., 2014)

TDF domains	Barriers	BCTs	Examples of possible intervention
Knowledge	• Staff knowledge, e.g. medical and nursing staff (n=3)	Credible source, information about the consequences and instructions about how to perform the behaviour	• Share information about deprescribing FRIDs with the staff
Environmental context and resources	• Limited time • Medication review is time consuming (not able to review all patients) (n=8) • Difficulty following up on patients after discharge • Patient's health status, e.g. heart attack • Staffing issues • Falls are not a priority of care	Restructuring the social environment, habit formation and behavioural practice	• Prioritise high-risk patients for comprehensive review • Start the review process by reviewing FRIDs (Browne et al., 2014) • Work in multidisciplinary teams (Maly et al., 2019) • Involve pharmacy students and technicians to assist with medication reconciliation (Petrov et al., 2018)
	• Pharmacists less likely to be involved in patients' discussion about deprescribing (n=4) • Doctor's reluctance • Lack of resources, e.g. educational resources • No specific fall prevention resources	Credible source, information about health consequences, information about social and environmental consequences, instructions on how to perform the behaviour, information about antecedents, generalisation of the target behaviour and conserving mental resources	• Education and training • Structured process of deprescribing to involve pharmacists
	• Lack of full medication history	**Behavioural practice or habit formation	• Improve the quality of documentation • Collaboration with community pharmacists and GP practices

TDF domains	Barriers	BCTs	Examples of possible intervention
	• Pharmacists not involved in falls committee	Restructuring the social environment	• Involving pharmacists in falls committee
	• Written notes not always read (n=6) • CPs do not usually contact GPs (n=4) • Contacting GP is time consuming (n= 2)	Social support (practical), restructuring the social and physical environment	• Encourage verbal communication (Browne et al., 2014) • Enhance communication between healthcare providers, e.g. encouraging pharmacists to use Healthmail for communication with GPs • Involve pharmacists in the preparation of medication part of the discharge letter • Assign a member responsible for communication with primary care (e.g. a care coordinator after discharge) (Koehler et al., 2009)
Social influence	• Patient and family resistance • Doctor's reluctance (n=5)	Information about health and emotional consequences, salience of consequences, monitoring emotional consequences, anticipated regret, pros and cons, reducing negative emotions, comparative imaging of future outcome, social support (emotional), verbal persuasion about capability	• Patients' education about the risk of inappropriate use of FRIDs and benefit of deprescribing (Morris et al., 2022) • Support and reassurance that the plan can be adjusted as tolerated (Ng et al., 2018) • Referral to support services if needed, e.g. addiction service
Reinforcement	Patient's health, e.g. falls and polypharmacy (n=9)	Goal setting (behaviour), action planning, behavioural practice or habit formation, prompts and cues, incentives, cue signalling, associative learning, reward (outcome), material reward (behaviour), material incentive, nonspecific rewards, nonspecific incentive, reward and restriction	• Regular review for all older adults with risk of falls, e.g. once a year (Seppala et al., 2019) • Advocate for a proactive role in fall prevention • Incentive or reward for action
Emotion	• Concerns about side effect and withdrawal symptoms • It can be frustrating (n=1)	Information about health and emotional consequences, salience of consequences, pros and cons	• Increase staff awareness about the benefits and safety of the process; address any concerns about harm
Belief about capability	• Hard to get patients buy-in (n=5)	See social influence	• See social influence

TDF domains	Barriers	BCTs	Examples of possible intervention
	• (Page et al., 2016b)Lack of experience with deprescribing (n=1)		
Belief about consequences	• Deprescribing might not be safe (n=3) • Legal issues (n=1)	Information about health consequences and information about antecedents	• Education and training
**Partial solution			

5.5. Conclusion

Pharmacists are highly competent (Page et al., 2016b; Somers et al., 2013) and understand the appropriate use of FRIDs. Participants were knowledgeable and open to collaboration and stated that deprescribing should be a shared responsibility. Work environment challenges and concerns about safety after discharge were considered significant barriers to implementing the process in hospitals. The suggested BCTs should guide care improvement by designing interventions to target common barriers. Future studies should investigate the role of pharmacists in fall prevention committees.

6. Older Patients' and Carers' Perspectives about Deprescribing Potentially Inappropriate Medication and Older Patients' Representatives Collaboration in the Research

6.1. Part I: literature review

6.1.1. Introduction

It is recommended that deprescribing is a shared decision. Therefore, healthcare professionals should involve patients and carers in the decision (Starkey & Omorinoye, 2013). It is essential to listen to their concerns, inform them about any proposed treatment change and discuss it with them (Holmes & Todd, 2017).

The carers of frail older patients can usually provide useful history about the patient's health, medications and adherence. Moreover, they may play an essential role in medication management during transitions of care when medication changes and reconciliation take place (Holmes & Todd, 2017; Manias et al., 2019).

Patients' attitudes toward deprescribing have been reported extensively in the literature. Some researchers have explored patients' opinions about deprescribing inappropriate medications in general (Weir et al., 2022; Wu et al., 2021), while recent systematic reviews have investigated some FRID classes such as benzodiazepines (Evrard et al., 2022; Rasmussen et al., 2021), opioids (Cross et al., 2022) antidepressants (Maund et al., 2019), antipsychotics (Walsh et al., 2017). Besides including patients, these reviews included healthcare professionals (e.g. GPs and pharmacists). Older adults' data were not separated in most of these reviews. The current review was intended to analyse the qualitative studies that explored older patients' and/or their carers' opinions about deprescribing FRIDs.

6.1.1.1. Aim

To analyse the qualitative studies that explored older patients' and/or their carers' opinions about deprescribing FRIDs.

6.1.1.2. Objectives

- To assess the knowledge and attitude of older patients and/or their carers about deprescribing FRIDs based on data from previous literature.
- To explore the challenges and facilitators of implementing a FRIDs deprescribing process in practice from their point of view.

6.1.2. Methods

Three databases (PubMed, Embase, Google Scholar) were searched systematically. The search had no limitations. The key concepts used in the search were older adults, attitude, barriers, facilitators,

deprescribing, and fall risk increasing drugs. Synonyms aligned to the key concepts were combined to build an appropriate search strategy for each database (Appendix 7).

6.1.2.1. Inclusion and exclusion criteria:

Studies that explored the perspectives of older patients and/ or carers of older patients about deprescribing FRIDs as a group, or deprescribing individual classes of medication known to increase the risk of falls, were included (Table 6.1). Qualitative data collection and any type of analysis were eligible. Only studies that reported older adults' views or older adults' data were reported separate from other age population.

Table 6.1: Inclusion and exclusion criteria for qualitative studies including patients and carers

Inclusion	• Participants were older adults. • Discussing the deprescribing or withdrawal of FRIDs or one or more of FRIDs classes as a primary or secondary aim • FRIDs classes include: cardiovascular drugs, vasodilators, antidepressants, opioid analgesics, anticonvulsants, diuretics, alpha-blockers, benzodiazepines, Z-drugs and sedating antihistamines. • Qualitative data collection and analysis (interview, focus groups,..) or mixed method where qualitative data was reported separately. • Qualitative or qualitative analysis describing the perspective s of older adults on the themes above.
Exclusion	• Involved adult participants and results reporting older adults were not reported separately. • Quantitative studies. • Secondary sources e.g. reviews.

6.1.2.2. Data analysis:

The data extracted from the included studies were the country, method of data collection, medication class(es) in question, participants (number and age), setting, and the theory used in analysis. Other data collected included: aim of the study, main themes, intervention (for mixed method studies), and interview questions. Barriers to and facilitators of deprescribing FRIDs were extracted as well. The TDF was used as the primary framework to code and report the data. NVivo 12 software (QRS limited, UK) was used to code the data. Relevant domains were selected based on the frequency of the belief, presence of conflicting beliefs and perceived importance of the belief, as listed in the TDF guide (Atkins et al., 2017). The quality of the included studies was assessed using the Critical Appraisal Skills Programme (CASP) (Critical Appraisal Skills Programme, 2022).

6.1.3. Results

The systematic search resulted in 2,287 articles (Figure 6-1). Nine additional articles were identified by searching other systematic reviews. Seventeen studies were included in this review. Most studies investigated BDZ and were conducted in different settings, mainly community settings. Individual studies' characteristics are illustrated in Table 6.2. The total number of participants in included studies was 981. All studies included men and women except one which included only women (Canham et al., 2014). Besides interviewing patients, four studies included HCPs and none of the studies included carers. Most studies investigated deprescribing as the only or primary aim (Chen et al., 2010; Choi & Vordenberg, 2021; Cook et al., 2007a; Crutzen et al., 2021; Gnjidic et al., 2019; Iliffe et al., 2004; Kuntz et al., 2018; Martin & Tannenbaum, 2017; Tannenbaum et al., 2014; Williams et al., 2016); the rest investigated deprescribing or withdrawal of FRIDs in conjunction with exploration of chronic use (Barter & Cormack, 1996; Bell et al., 2017; Dickinson et al., 2010; Lambson, 2003; Walsh et al., 2018), with one being focused on dependence in addition to medication withdrawal (Canham et al., 2014).

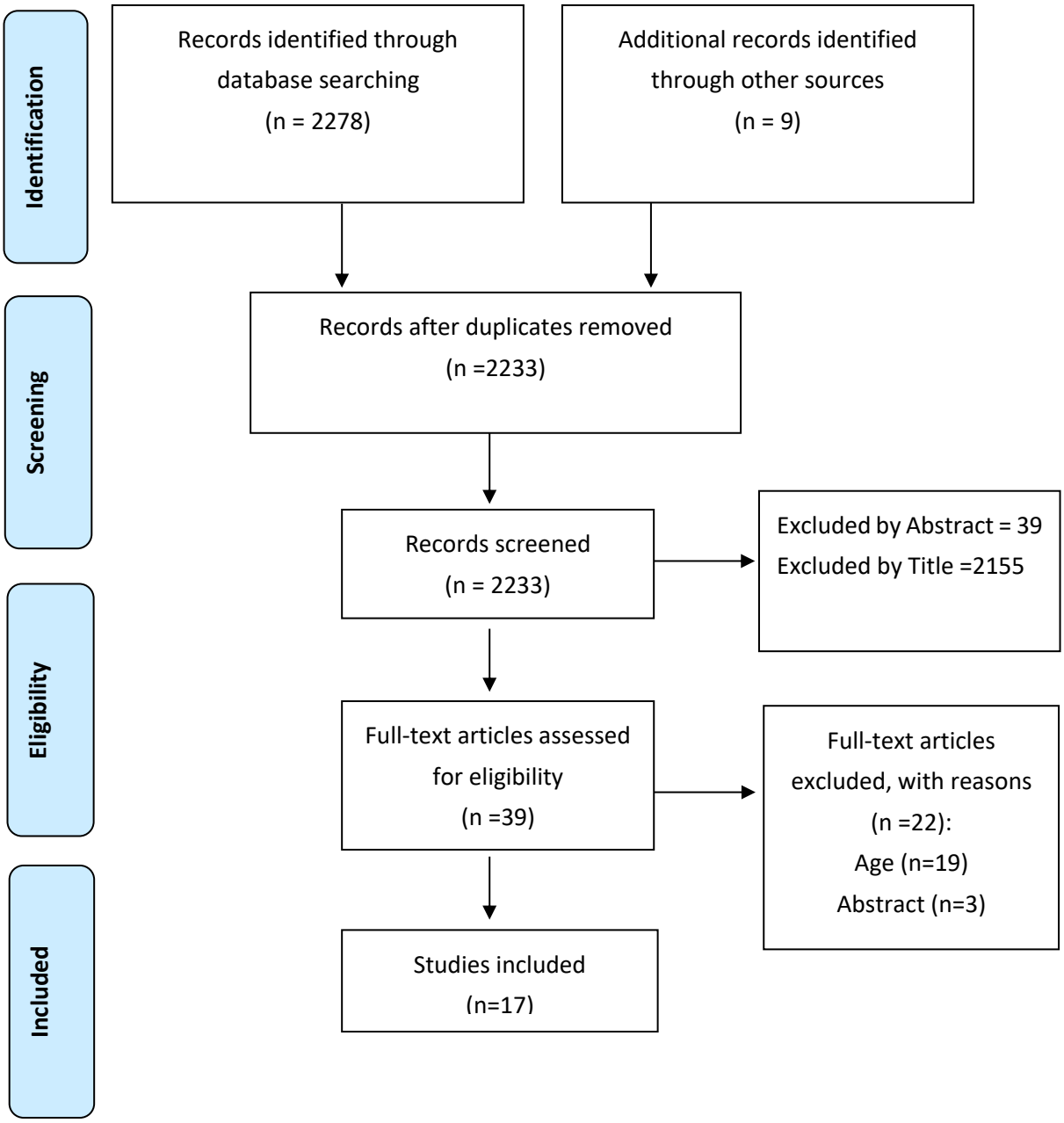


Figure 6-1: PRISMA chart of systematic review of studies including patients and carers

6.1.3.1. Main domains identified

Most coded domains were 'knowledge', 'intention', 'social influence' and 'emotion.' Other domains were less frequently coded: 'environmental context and resources', 'belief about capabilities', 'belief about consequences' and 'reinforcement' (Figure 6-2). These are discussed in detail in the following sections.

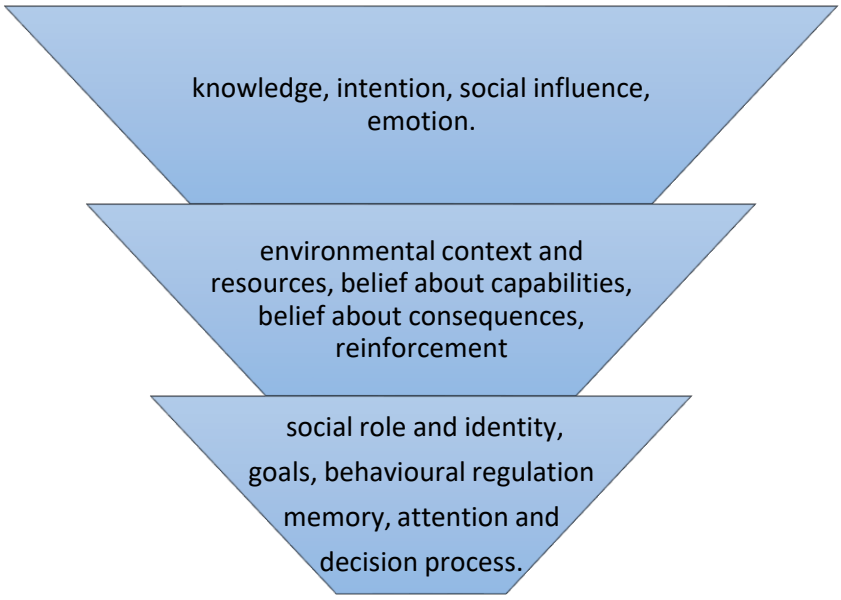


Figure 6-2: Variation in coding frequency among domains. Upper levels of figure show the domains coded most frequently.

The least frequent domains were 'social role and identity', 'goals', 'behavioural regulation' and 'memory, attention and decision process.' Only one study reported that some patients thought it was their role to ask the doctor. Patients' main goals were the stability of symptoms and the ability to sleep. In 'behavioural regulation' domains, three studies reported self-dose adjustment and adaptation on the basis of the symptoms experienced. The 'memory and attention and decision process' domain included high percentages of participants who did not remember talking to their prescribers about their sedative use in one study (Lambson, 2003). Another study reported people who used to take a BZD with other chronic medications as a habit (Barter & Cormack, 1996).

Additionally, the optimism domain was not expressed in the included studies except for the benefits after successful withdrawal of medications. This was coded in the reinforcement domain as a facilitator. The skills domain was not coded to patients as they do not have the skills to deprescribe their medication unless training for self-tapering, which was investigated in Tannenbaum et al. (2014).

Table 6.2: Characteristics of included studies

Study (author /year)	Country	Data collection method	Medication type	Participants	Setting	Theory
Barter et al. 1996	UK	Semi-structured interview	BZD	11 long-term users 20 non-users Aged > 60 years	Community	GT
Bell et al. 2017	Norway	Semi-structured interview	FRIDs	14 older adults > 65 years	Community	Systematic text condensation
Canham et al. 2014	USA	Semi-structured interview	BZD	12 Older women > 65 years	Community	Descriptive phenomenology
Chen et al. 2010	Canada	Semi-structured interviews	BZD	5 older adults > 65 years 13 HCPs	Day hospital	—
Choi 2021	USA	Semi-structured interviews	BZD	21 older adults > 60 years	Community	Thematic analysis
Cook et al. 2007 A	USA	Semi-structured interview	BZD	50 older adults > 60 years	Community	Thematic content analysis
Cook et al. 2007 B	USA	Semi-structured interview	BZD	46 older adults > 60 years	Primary care	—
Crutzen et al. 2021	Netherlands	revised Patients' Attitudes Towards Deprescribing (rPATD) Survey	cardiometabolic medication groups (sulfonylureas, insulins, antihypertensive medication and statins)	314 older adults >70 Years	Community	Descriptive statistics
Dickinson et al. 2010	UK	Semi-structured interviews	Antidepressants	36 older adults > 75 years 10 GPs	Primary care	Framework analysis
Ginjdij et al. 2019	Australia	Phone interview	BZD	42 older adults > 65 years	Community	Quantitative
Iliffe et al. 2004	UK	Semi-structured interviews	BZD	192 older adults > 65 years 83 HCP	Primary care	—
Kuntz et al. 2018	USA	Semi-structured interviews	Z-drugs	10 older adults > 64 years 6 GPs	Primary care	Content analysis

Study (author /year)	Country	Data collection method	Medication type	Participants	Setting	Theory
Lambson et al. 2003	UK	interviews	BZD	44 Older adults > 67 years	Nursing home	—
Martin et al. 2017	Canada	Semi-structured interviews	BZD	21 older adults > 65 years	Community	Thematic analysis
Tannenbaum et al. 2014	Canada	Phone interview	BZD	123 older adults > 65 years	Community	Content analysis
Walsh et al. 2018	Ireland	Semi-structured interviews	Antipsychotics	3 carers 24 HCPs	Nursing homes	TDF
Williams et al. 2016	Australia	Semi-structured interview	BZD	17 older adults > 65 years	Primary care	Constant comparative analysis framework

6.1.3.2. Quality assessment of included studies

Most studies met the quality requirement for qualitative studies (Table 6.3). Some studies did not report data about the researcher's relationship with the participants during the data collection or the information provided was not enough to establish a view on that relationship. A small number of studies did not include sufficient information about the data-analysis process or did not use quotes to support their findings.

Table 6.3: Appraisal of included studies using CASP

CASP criteria	Barter et al. 1996	Bell et al. 2015	Canham et al. 2014	Chen et al. 2010	Choi et al. 2021	Cook et al. 2007	Cook et al. b 2007	Crutzen et al. 2021	Dickinson et al., 2010	Gnjidic et al. 2019	Iliffe et al. 2004	Kuntz et al. 2018	Lambson (2003)	Martin et al. 2017	Tannenbaum et al. 2014	Walsh et al. 2003	Williams et al. 2016
Was there a clear statement of the aims of the research?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CASP criteria	Barter et al. 1996	Bell et al. 2015	Canham et al. 2014	Chen et al. 2010	Choi et al. 2021	Cook et al. 2007	Cook et al. b 2007	Crutzen et al. 2021	Dickinson et al., 2010	Gnjidic et al. 2019	Iliffe et al. 2004	Kuntz et al. 2018	Lambson (2003)	Martin et al. 2017	Tannenbaum et al. 2014	Walsh et al. 2003	Williams et al. 2016
Is a qualitative methodology appropriate?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was the research design appropriate to address the aims of the research?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was the recruitment strategy appropriate to the aims of the research?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was the data collected in a way that addressed the research issue?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Has the relationship between researcher and participants been adequately considered?	Y	Y	Y	Y	Y	Y	Y	N	Y	?	Y	Y	?	N	N	Y	Y

CASP criteria	Barter et al. 1996	Bell et al. 2015	Canham et al. 2014	Chen et al. 2010	Choi et al. 2021	Cook et al. 2007	Cook et al. b 2007	Crutzen et al. 2021	Dickinson et al., 2010	Grijdic et al. 2019	Iliffe et al. 2004	Kuntz et al. 2018	Lambson (2003)	Martin et al. 2017	Tannenbaum et al. 2014	Walsh et al. 2003	Williams et al. 2016
7. Have ethical issues been taken into consideration?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was the data analysis sufficiently rigorous?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	?	Y	Y
9. Is there a clear statement of findings?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y
10. Was the research valuable?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Key: yes (Y), no (N) or unclear (?).																	

6.1.3.3. Knowledge

Barriers

Four studies reported unawareness of the harmful effects of the medicines, including falls (Chen et al., 2010; Cook et al., 2007a; Iliffe et al., 2004; Williams et al., 2016) (Table 6.4). Patients who continued to use BZD were unaware of deprescribing benefits (Iliffe et al., 2004). Receiving information from the prescriber by reading the PIL, or information on the internet increased awareness of the relationship between falls and medicines (Bell et al., 2017). Those who experienced deprescribing of BZDs noticed some benefits, e.g. improved memory and thinking process (Iliffe et al., 2004).

In the study that investigated dependence, some participants were confused about the meaning of dependence (Canham et al., 2014). The use of BZD was confused with the chronic use of other

chronic medications such as antihypertensives, while other patients expressed a view that it was different from drug addiction.

Other knowledge subthemes included lack of awareness of availability of alternatives and thinking that small pills mean small doses.

Table 6.4: Knowledge domains' subthemes and sample quotes

Subthemes	*Sample Quotes*
Barriers	
Unaware of the side effect	*'The patients were unaware of potential side effects apart from sedation.' (BZD (Williams et al., 2016)*
Confused about the meaning of dependence	*'I take them because I was told to…I don't think that's being dependent on them.' (P-F-BZD (Canham et al., 2014))*
Unaware of indication	*'I am not sure if it is for my heart – is it?' (P-F- FRIDs study (Bell et al., 2017))*
Thought there was no alternative therapy	*'Many either expressed that they did not know what an alternative to the medication would be or that they would be too afraid to try something different.' (BZD study (Cook et al., 2007a)*
Assume it is for chronic use	*'It's a part of my life really and I've just got to cope with it.' (P-20- Antidepressants study (Dickinson et al., 2010))*
Thinking small pill means small dose	*'Tiny white pill. It's the lowest dose.' (P- BZD (Cook et al., 2007a))*
Facilitator	
Linking side effects to medications	*'A few others acknowledged that they had noticeable side effects, which they attributed to the benzodiazepine.' (BZD study (Cook et al., 2007a)*
Linking medications to fall	*'One informant described two scary fall episodes two nights in a row when heading for the toilet which made him anxious and unwilling to continue taking sleeping pills.' (P-FRIDs (Bell et al., 2017))*

6.1.3.4. Beliefs about capabilities

Patients on BZDs believed they were unable to fully stop using the medicines in four studies (Canham et al., 2014; Chen et al., 2010; Choi & Vordenberg, 2021; Gnjidic et al., 2019). They attributed this to an unsuccessful experience with deprescribing, dependence or old age. Nevertheless, two studies reported successful deprescribing with rates of 54% and 59.1% (Gnjidic et al., 2019; Tannenbaum et al., 2014). One study stated that people who could successfully stop taking BZD demonstrated high beliefs of capability (Martin & Tannenbaum, 2017).

6.1.3.5. Environmental context and resources

Barriers

Repeat prescriptions without seeing the doctor were a major barrier to deprescribing (Table 6.5) (Barter & Cormack, 1996; Cook et al., 2007a; Kuntz et al., 2018; Lambson, 2003). People stated

that the refill was easy by phone (Cook et al., 2007a). In rare cases, issuing of repeat prescriptions continued even after the patients stopped (Barter & Cormack, 1996).

Another environmental barrier was life stressors. Patients living with stress tend to continue using BZD as long as the cause is unresolved e.g. anxiety due to the disease or death of a family member (Williams et al., 2016). One participant in (Barter & Cormack, 1996) stated that support through social programs was unsustainable due to lack of funds or volunteers.

Facilitators

The availability of educational resources was helpful. For example, two studies that provided educational materials reported improved knowledge, which led to improved motivation (Gnjidic et al., 2019; Tannenbaum et al., 2014). Ninety-eight of the participants in Dickinson et al. (2010) were satisfied with the information received. They started discussing deprescribing with their doctor and used a self-tapering tool for BZD. In (Gnjidic et al., 2019; Tannenbaum et al., 2014) participants stated they always read the Patient Information Leaflet (PIL). It helped them link the side effects (e.g. dizziness) to medications.

Table 6.5: Environmental context and resources themes and sample quotes

Subthemes	***Sample Quotes***
Barriers	
Repeat prescriptions	*' Most patients' (72%) benzodiazepine prescriptions were on long-term (6-12 months) renewal' (BZD study (Lambson, 2003))*
Life stress	*'I say I have got a bad neighbour and they give me what I ask for.'(BZD study (Barter & Cormack, 1996))*
Facilitator	
Information leaflets	*'Of the 123 participants, 120 (98%) acknowledged satisfaction with receiving medication risk information.' (BZD study (Tannenbaum et al., 2014))*

1.1.1.1 Beliefs about consequences

Expecting bad consequences, such as being unable to cut the tablets in smaller doses or that deprescribing would not be effective, was highlighted in two studies (Choi & Vordenberg, 2021; Cook et al., 2007a). In other studies, people thought alternatives might not work for them even without trying (Cook et al., 2007a; Williams et al., 2016). Most BZD users in one study refused to try behavioural therapy because they thought it might not work (Cook et al., 2007a).

6.1.3.1. Social influence

Barriers

Patients were found to assume that their doctors approved of the long-term use in seven studies (Barter & Cormack, 1996; Canham et al., 2014; Dickinson et al., 2010; Lambson, 2003; Martin &

Tannenbaum, 2017; Williams et al., 2016) (Table 6.6). Reasons for this assumption were doctors supporting adherence to these medications, not reviewing the prescription, and continuing prescribing.

In addition, patients trust their doctors, which prevents them from asking about their medications, and thinking that they are safe to use for a long time (Bell et al., 2017). Some patients feel that it is better not to mention side effects to avoid bothering the doctor (Bell et al., 2017) or wait for the doctor to tell them if they are at risk (Barter & Cormack, 1996). This is not always the case, as participants in five studies stated their doctors did not tell them about the harmful effect of the medication (Bell et al., 2017; Choi & Vordenberg, 2021; Cook et al., 2007a; Iliffe et al., 2004; Kuntz et al., 2018). Similarly, two studies pointed out that failed deprescribing attempts were related to lack of support from the HCP (Martin & Tannenbaum, 2017; Williams et al., 2016). Another three studies reported that deprescribing was not approved by the physicians (Choi & Vordenberg, 2021; Martin & Tannenbaum, 2017; Tannenbaum et al., 2014).

Facilitator

In contrast, doctors' support and agreement were mentioned as a facilitator of deprescribing. Also, receiving information from the doctor or pharmacists about the risk improved awareness and carefulness regarding the side effects—for example, information about dependence or dizziness.

Table 6.6: Social influence domain's subthemes and sample quotes

Subthemes	***Sample Quotes***
Barriers	
Assuming the doctor approves the use of the medicine	*'Well she doesn't say anything. It didn't worry her, she just wrote the script.' (P-F-BZD study (Williams et al., 2016))*
Trust in the doctor	*'I have just accepted it, because I fully trust my GP.' (P-F- FRIDs study (Bell et al., 2017))*
Patients were not informed by HCPs	*'My provider hasn't really brought it up [tapering].' (P-BZD (Kuntz et al., 2018))*
Facilitator	
Support by HCPs	*'21% felt that their doctor would like them to stop taking their benzodiazepine.' (BZD study (Lambson, 2003)*
Instruction by HCPs	*'[pharmacist] said it was a very dangerous drug, 'I wish you'd be off it,' and I said, 'All right.' (BZD study (Chen et al., 2010))*

6.1.3.2. Emotion

Barriers

Patients were not concerned about the side effects of long-term use of BZDs, especially their effect upon sleep (Table 6.7). The percentage of unconcerned people was high among all groups, including people who stopped using the medicine, e.g. 86% among the control and 53% among the intervention group in one study (Gnjidic et al., 2019). Even with side effects, some people were concerned about losing the medicines' benefits. Other participants were afraid of withdrawal symptoms (Choi & Vordenberg, 2021; Iliffe et al., 2004; Kuntz et al., 2018; Tannenbaum et al., 2014; Williams et al., 2016).

One infrequent yet critical emotional barrier was the feeling of being uncared for by the doctors (Barter & Cormack, 1996; Bell et al., 2017). People explained how they could not get the doctor's attention for the side effects from which they were suffering. This led to disappointment and wrong assumptions about the source of the problem (Bell et al., 2017).

Facilitators

Eight studies reported concerns about side effects (Barter & Cormack, 1996; Canham et al., 2014; Choi & Vordenberg, 2021; Gnjidic et al., 2019; Iliffe et al., 2004; Kuntz et al., 2018; Martin & Tannenbaum, 2017; Walsh et al., 2018). Worrisome side effects potentially encouraged some people to stop using the medicine. Taking the medicines was seen as a burden by some participants in two BZD studies (Barter & Cormack, 1996; Crutzen et al., 2021).

Table 6.7: Emotion domain's subthemes and sample quotes

Subthemes	***Sample Quotes***
Barriers	
Not concerned about side effects	*'I recall that he (my doctor) told me that in the long-term my benzodiazepine could affect my memory. But my memory is fantastic.' (P-M- BZD (Martin & Tannenbaum, 2017))*
Fear of withdrawal symptoms	*'I had extreme insomnia, and even cutting down from 10 mg to 5 mg has definitely made my sleep much harder.' (P-BZD(Kuntz et al., 2018))*
Feeling uncared for	*'I asked my GP once 'Can you please explain to me why I get this stinging feeling in my legs? It feels like there is something walking around in my veins.' He could not give me an answer and then he did not talk more about it. It might just be aging.' (P-F- FRIDs (Bell et al., 2017))*
Concerns about losing benefits	*'36% would be worried about missing out on future benefits if one of their medicines was stopped.' (Cardiometabolic drugs (Crutzen et al., 2021))*
Facilitators	
Concerned about side effects	*'I don't think I'm immune to dependency problems.'(P-F-BZD (Choi & Vordenberg, 2021))*

6.1.3.3. Beliefs about consequences

Expecting bad consequences, such as being unable to cut the tablets in smaller doses or that deprescribing would not be effective, was highlighted in two studies (Choi & Vordenberg, 2021; Cook et al., 2007a). In other studies, people thought alternatives might not work for them even without trying (Cook et al., 2007a; Williams et al., 2016). Most BZD users in one study refused to try behavioural therapy because they thought it might not work (Cook et al., 2007a).

6.1.3.4. Reinforcement

Barriers

Six studies reported the benefits of BZD use (Barter & Cormack, 1996; Choi & Vordenberg, 2021; Cook et al., 2007a; Iliffe et al., 2004; Kuntz et al., 2018; Lambson, 2003) (Table 6.8). Some patients were long-term users, while others were dependent. Many people in these studies found them helpful for anxiety and sleep. In other studies patients found the drugs essential to handle stress and to live a normal life (Chen et al., 2010; Cook et al., 2007a; Dickinson et al., 2010; Martin & Tannenbaum, 2017; Williams et al., 2016). Carers of patients with dementia also thought that antipsychotics were effective (Walsh et al., 2018).

Facilitators

Receiving limited benefits from BZD use encouraged people to stop using them. (Barter & Cormack, 1996; Iliffe et al., 2004; Williams et al., 2016). Patients mentioned limited effect of BZD on sleep quality and the need for it to be coupled with nonpharmacological strategies to enhance efficacy.

Table 6.8: Reinforcement domain's subthemes and sample quotes

Subthemes	***Sample Quotes***
Barriers	
Use the drug as stress coping strategy	*'I don't mentally think I would have survived without it.' (P-BZD (Cook et al., 2007a)*
Benefits of BZD use	*'Usually I go to sleep within 10 minutes of taking the tablet.' (P-BZD (Barter & Cormack, 1996))*
Facilitators	
Limited benefits of BZD	'I don't get a full night's sleep with them.' (P-F-BZD (Williams et al., 2016))
Reporting benefits of deprescribing	'withdrawers were more likely to mention specific benefits such as 'clearer thinking', 'being more in control' and 'better memory.' (BZD (Iliffe et al., 2004))

6.1.3.5. Intentions

Barriers

Some people were resistant to deprescribing in eight studies (Barter & Cormack, 1996; Chen et al., 2010; Choi & Vordenberg, 2021; Cook et al., 2007a; Cook et al., 2007b; Crutzen et al., 2021; Dickinson et al., 2010; Martin & Tannenbaum, 2017) (Table 6.9). Authors reported a low percentage of people who expressed resistance or reluctance, e.g. 5% vs 88%, willing to stop their cardiometabolic medications (Crutzen et al., 2021); except two studies reported the opposite (Choi & Vordenberg, 2021; Cook et al., 2007b). People in two studies opposed non-pharmacological therapy, e.g. behavioural counselling (Cook et al., 2007a; Dickinson et al., 2010).

Facilitators

Conversely, thirteen studies reported that patients were willing to stop their medications, especially if the doctor approved it (Barter & Cormack, 1996; Canham et al., 2014; Chen et al., 2010; Choi & Vordenberg, 2021; Cook et al., 2007b; Crutzen et al., 2021; Dickinson et al., 2010; Gnjidic et al., 2019; Iliffe et al., 2004; Kuntz et al., 2018; Lambson, 2003; Tannenbaum et al., 2014; Williams et al., 2016). Studies that used quantitative measurements reported high percentages of participants willing to deprescribe their BZD, up to 90 % (Gnjidic et al., 2019). Even in studies that surveyed the control group, a high percentage were willing to try deprescribing.

Table 6.9: Intention domain's subthemes and sample quotes

Subthemes	***Sample Quotes***
Barriers	
Unwilling to try deprescribing	*'I just can't do it. Are you trying to tell me that I should stop or not take it? I'd be miserable.' (P-BZD (Cook et al., 2007a))*
Unwilling to try alternatives	*' just don't want to. I'm not one of those people who can sit around and talk about my problems with strangers.' (P-BZD (Cook et al., 2007a))*
Facilitators	
Willing to stop	*'I really would like to be off of it.' (P-F-BZD (Canham et al., 2014))*

Factors affecting willingness to attempt deprescribing

There are factors affecting patients' willingness to change medications either positively or negatively. Factors that facilitate willingness are mainly knowledge (Barter & Cormack, 1996; Chen et al., 2010; Choi & Vordenberg, 2021; Gnjidic et al., 2019; Kuntz et al., 2018; Martin & Tannenbaum, 2017; Tannenbaum et al., 2014) and support from healthcare professionals (Barter & Cormack, 1996; Martin & Tannenbaum, 2017). Other factors include relieved stressors (Barter & Cormack, 1996), no acute health issues or symptoms are mild (Martin & Tannenbaum, 2017), feeling the drug is unnecessary (Martin & Tannenbaum, 2017) or not appropriately prescribed(Crutzen et al., 2021), higher educational level, and low-frequency dosing (Choi & Vordenberg, 2021; Cook et al., 2007b). Additionally, patients' rating of the appropriateness of prescribed medications was considered a factor affecting their intention to deprescribe, as they tend to stop medicines that they think are inappropriate (Crutzen et al., 2021).

Factors with a negative influence include extremely old age(Cook et al., 2007a; Dickinson et al., 2010; Martin & Tannenbaum, 2017), lack of knowledge about the medicine or disease(Bell et al., 2017; Martin & Tannenbaum, 2017), the patient not being concerned about side effects (Kuntz et al., 2018; Martin & Tannenbaum, 2017; Williams et al., 2016), taking multiple or as-needed doses (Barter & Cormack, 1996; Choi & Vordenberg, 2021; Cook et al., 2007b) and anxiety toward deprescribing (Cook et al., 2007b).

6.1.4. Discussion

In this review, the results of the studies investigated people's opinions about the withdrawal of some FRIDs classes were analysed. Most studies investigated BZDs in community settings. The results were coded to TDF domains, and main domains were identified. Patients were unaware of the harmful effect of used medications and the presence of alternatives. They have also had a strong psychological attachment to medicines to manage stress and were unconcerned about the side effects. The major environmental barrier was the repeat prescription system. In many studies,

people assumed that the doctor approved the use of these medications and waited to speak about it. The number of people willing to stop the medicines exceeded the number of people unwilling to stop with only one study reported 55% reluctant to stop long-term treatments.

Knowledge was mentioned as a key barrier to deprescribing in qualitative literature. Studies that tested patients' knowledge about fall factors, mentioned patients always think about other factors like home hazards and physical strength problems but not medications (Bell et al., 2017; Gemmeke et al., 2021; Shankar et al., 2017).

The role of pharmacists was mentioned very briefly by patients in included studies. (Gemmeke et al., 2021) investigated people's opinions about the role of pharmacists in fall prevention. Participants mentioned that they did not know pharmacists have a role in fall prevention.

6.1.4.1. Comparison with other FRIDs reviews:

Compared to other FRIDs reviews, this review involved older patients only, while all other reviews involved HCPs and patients. Two reviews used TDF for analysis (Cross et al., 2022; Evrard et al., 2022), and only one linked the behaviours to BCTs (Evrard et al., 2022). Regarding BZD reviews (Evrard et al., 2022; Rasmussen et al., 2021), there were some similarities with this review, such as a lack of knowledge and concerns about withdrawal. This was due to the shared BZD studies between the reviews. Furthermore, this review included additional patient studies, which led to the identification of additional barriers (such as repeat prescription problems and concerns about losing benefits), and facilitators (such as admitting it may be their responsibility to ask, noticing benefits after deprescribing, and having the ability to learn self-tapering).

6.1.4.2. Comparison with general deprescribing studies and reviews:

Some subthemes were echoed in general deprescribing reviews. For example, (Weir et al., 2022) and (Seewoodharry et al., 2022) mentioned willingness to deprescribe when recommended by a physician, in addition to the effect of trusted relationships and inconvenience about side effects.

Similar to results regarding factors affecting willingness, studies for deprescribing general medications found that patients were highly willing to stop (88%), especially patients with low concerns about deprescribing (Reeve et al., 2019). However, the percentage was lower than the general deprescribing studies that reported percentages of 98 or 100 % for patients' willingness to stop (Weir et al., 2022).The effect of the doctor-patient trusted relationship on willingness was confirmed by an Irish study (Clyne et al., 2017). In this review, no difference was found in trusting doctors and following their instructions without questioning between old and new studies.

Studies providing carers' perspectives, within the narrow focus of the current review, only one study was identified. However, these stakeholders are represented in reviews of deprescribing more generally, and it may be anticipated that some of the issues raised in that context are applicable to the deprescribing of FRIDs also. For example, (Peat et al., 2022) included three informal carers in their qualitative study of patients undergoing deprescribing and reported both barriers to and facilitators of deprescribing linked to TDF domains:

- Social Influences (social support) [barrier, with carer as facilitator]: *'She can't always take in what's being said. If I had known that they were going to have her in to take her medication away I'd have gone with her, so that I could listen to the explanations that were being given to her to allay her worries.'*
- Environmental context and resources (Roger et al.): *'They haven't got time you see; you go into the surgery and you've only 10 minutes (to see the GP).'*
- Emotion (Roger et al.): *'Because she (Quality & Directorate) panics. And she's been on them such long-term and it becomes habit. And I think when you stop something that you've been doing for a long time you think 'oh', you panic straight away, you think 'oh, it's all going to go wrong, it's all going to go wrong.'*

6.1.4.3. Strengths

There are some strength points in this review. The use of the TDF to classify barriers and facilitators facilitates comparison with the views of other stakeholders, as well as facilitating linkage between the patients' perspectives and potential behaviour change techniques that might be used to bring about improvements. The inclusion criteria limited the review to studies that included older adults. This helped identify the barriers that are specific to this population, e.g. blaming old age for causing diseases or resisting change in medicines or trying alternative therapies due to age. Furthermore, the focus was on FRIDs withdrawal. The included studies focused on FRIDs classes strongly associated with falls, e.g. BZD and antidepressants.

6.1.4.4. Limitations

Limitations to this review include the underrepresentation of some FRIDs classes, such as anticholinergics and antiepileptic, making them a niche research area, and the over-representation of the benzodiazepine class. Also, studies did not specifically ask about falls, except for Bell et al. (2015). Another limitation was that none of the studies included carers of older adults although, as mentioned above, lessons from the broader deprescribing literature may also be relevant to the deprescribing of FRIDs. The included studies were from six countries which may

limit the generalizability of the findings. The reliance on published rather than original data means that any publication bias in the existing literature has potential implications for the current review.

6.1.4.5. Recommendation for practice

Possible target behaviours in this study are the communication gap between patients and doctors, lack of patients' knowledge, concerns about consequences, and willingness to deprescribe (Table 6.10). Providing resources for the benefits of deprescribing, the available alternatives or tapering information, may help with the knowledge barrier and enhance the deprescribing of sedatives (Burry et al., 2021). Education might also enhance other barriers such as communication with the doctors and concerns about consequences.

One of the challenging environmental barriers was the repeat prescription. For that, a suggestion of a more strict scheduling of BZD to a stricter law might be useful (Shaw et al., 2019). For example, the current classification of most BZDs in Ireland is 'schedule 4 part 1'. If they were 'schedule 3' instead, there would be no repeat prescriptions and the duration of a single prescription could be for no more than two months, facilitating more regular review (HSE, 2021). A review of interventions targeting BZD showed that tapering, when combined with behavioural therapy, was effective (Ng et al., 2018). Dependence and habitual use of BZD were important factors affecting patients' willingness to change or try alternatives. Although not all FRIDs cause dependence, which limits the generalisability of BZD findings to other classes, many classes need to be tapered and monitored during and after discontinuation. The multidisciplinary team was found to be helpful for support and monitoring through the gradual withdrawal (Chen et al., 2010). Also, education about sleep hygiene and benefit of withdrawal led to deprescribing clonazepam had benefits (Da Silva et al., 2022).

Table 6.10: Linking patients' deprescribing barriers to BCTs (Michie et al., 2014)

TDF domains	Barriers	BCTs and examples of practical interventions
Knowledge	• BZD perceived as effective for sleep • Lack of awareness of the side effects • Confusion about the meaning of dependence • Lack of awareness of indication, duration or dosages	Information about antecedents, Information about health and emotional consequences; salience of consequences, pros and cons by: • Written materials or multimedia educational materials; or face to face teaching about the risk of continuous use of FRIDs and benefits of deprescribing (Da Silva et al., 2022) • Increase the awareness about the use of alternative therapy

TDF domains	Barriers	BCTs and examples of practical interventions
	• Thought there was no alternative therapy • Assumption it is for chronic use	
Environmental context and resources	Repeat prescriptions	Remove access to the reward: • No repeat prescription without seeing the doctor (Isenor et al., 2021)
	Life stress	Pharmacological substitution • Try a safer alternative • Share non-pharmacological coping strategies
Reinforcement	Use of the drug as stress coping strategy	
Social influence	Assumption the doctor approves the use of the medicine	Social support (practical): • Shared decision making (NICE)
	Patients were not informed by HCPs	
Beliefs about capabilities	Unable to fully stop	Social support (practical and emotional), verbal persuasion about capability, monitoring emotional consequences and comparative imaging of future outcome, pharmacological substitution: • Continuous monitoring and reassurance by multidisciplinary team members (Chen et al., 2010) • Substitute BZD with melatonin for sleep (Garzón et al., 2009) • Refer to addiction service if needed
Emotion	• Not concerned about side effects • Feeling uncared for • Concerns about losing benefits	Information about health and emotional consequences; salience of consequences; monitoring emotional consequences; pros and cons; reduce negative emotions; comparative imaging of future outcome; social support (emotional) by: • Information leaflet or a video about risk and benefits of chronic consumption of FRIDs • Explain to the patients the pros and cons of deprescribing
Beliefs about consequences	Expecting bad consequences	
Memory, attention and decision process	Habitual use of medicines	Social support (practical): • Motivational interviewing • 4Es approach to address concerns and empower the patients during consultations (Barnett & Sanghani, 2013)
Intention	Unwilling to try deprescribing	
	Unwilling to try alternatives	Credible source • Increase awareness of the benefits of using a safer alternative
Goals	Stability of symptoms	Goal setting and action planning: • Consider patients preferences and goals when developing therapeutic plan
	Healthy sleep	

6.1.5. Conclusion

From the presented data, we can conclude that there was a knowledge and communication gap between patients and their doctors. Patients need education to understand the risk of these medications before starting therapy. They also need to be informed about the availability of alternatives, the duration of the treatment and the process of stopping the drug for successful discontinuation. Policies for repeat prescriptions and long-term use of BZDs should be reviewed and changed wherever possible.

In addition, information regarding patients' willingness to have their medication deprescribed based on the doctor advice illustrated that; for that, doctors need to start this conversation because there are more people willing than unwilling. Therefore, when planning for deprescribing, doctors should involve the patients and provide support. Plans that are individualised to each patient are recommended and should be flexible based on the patient's needs during follow-up. They should include information about returning to the deprescribed FRID or other suitable alternatives if necessary.

Future studies should more fully explore the intentions and beliefs of patients and their carers about their capacity to undergo FRIDs deprescribing, including their views of unsuccessful withdrawals and the effect of such experiences on their behaviours. A wider range of FRIDs needs to be investigated, including the use of FRIDs that are available without prescription, such as sedating antihistamines.

6.2. Part II: Collaboration with patients' representatives

6.2.1. Introduction

Patients are expert in their own health and hence came the idea of involving them in research. Patient and public involvement (PPI) was defined by the National Institute for Health Research, UK as:

"research being carried out 'with' or 'by' members of the public rather than 'to', 'about' or 'for' them.' (INVOLVE, 2012)

The involvement of patients and their carers in health research has been gaining increased attention of late, and a framework has been developed to guide researchers when working with the public (2018). When involving them, researchers can benefit from their experiences of living with the condition or using the health services in the study. This way, researchers can have a deeper insight into the issue under investigation and more focused research can be co-produced, with results that benefit the public, and transforming the role of people from receiving interventions to playing an active role in shaping the health service and choosing the care they need (Turk et al., 2016).

An expected advantage of involving public or patients' representatives is an increase in the results' relevance to people's healthcare needs. It involves patients in research work as experts in their life and experience. It helps improve research outcomes, makes them more relevant to patients or service users and improves healthcare to something relevant and beneficial to the patient (2018).

According to the framework, PPI has levels and stages of involvement. Patients can be involved in many ways and at different levels of the research. For example, they can only be informed of the results, be asked for their opinion, or collaborate with the research team in the planning and data analysis phases. Diversity among the included participants is encouraged, as is their involvement from the earliest phases of the research (2018).

6.2.1.1. Aim

In the current study a core aim was to involve older people from an early stage in the development of a potential future initiative to reduce the risk of falls.

6.2.1.2. Objectives

- To explore the results of previous research from the point of view of older patients' representatives.
- To gather patient representatives' thoughts and ideas about how older people feel about FRIDs deprescribing to reduce the risk of falls.

- To initiate the co-design of an intervention to improve the implementation of FRIDs deprescribing in practice for older adults with polypharmacy and a history of falls.

6.2.2. Method

6.2.2.1. Ethics approval

The Faculty of Health Sciences Research Ethics Committee approved this study on 22/07/2022 (application number 210207).

6.2.2.2. Recruitment and focus group of older patients' representatives

Members of a previously established panel of older patients' representatives from the PPI Ignite network program at Trinity College Dublin were invited to participate in the research. They contributed through a focus group interview of older adults facilitated by the research and evaluation manager at Age and Opportunity, a national organisation focused on championing older people and representing their needs and interests. Brief background about the proposed study with the aim and objectives was provided to the group in advance (Appendix 8).

Panel members engaged in discussion and interpretation of the results from the previous work presented in this thesis (doctors' and pharmacists' interviews). They shared some experiences and opinions during the meeting. The meeting was online via Zoom, .it was recorded, and field notes were taken.

6.2.3. Results

Four representatives participated in the focus group and the discussion lasted for 39 minutes. The panel members shared their thoughts and interpreted the results from their points of view. All views were captured. One member could not join the meeting and subsequently shared views by email. Below is a summary of points raised during the focus group.

6.2.3.1. Willingness to change

The panel members differed in their perceptions of willingness to change and spoke of their own feelings. Some did not mind changing their medications based on a doctor's advice, while others are afraid of change and loss of autonomy if they do. Statements ranged from '*I am fine with the change'* to *'We fear change'* and *'We do not feel in control.'*

6.2.3.2. Reasons for not speaking to the doctor about medication issues

The factors raised by the panel about people not always sharing their views or concerns with their doctors included forgetfulness ('*I forget what I went for, and remember later after leaving the clinic*'), lack of self-confidence, trusting doctors and thinking that doctors know everything. It was felt that this attitude might be different from younger patients' approach: '*We trusted hospitals*

and doctors completely. Now the attitude is to question and google and to get a second opinion. That is alien to my generation.'

6.2.3.3. Knowledge

Participants believed that people may know little about their medicines and there is no information about the consequences of stopping the medicines. When asked about whether provision of information as part of a future intervention might be helpful, and the form this might take if so, they described medication leaflets (package inserts) as unclear, though packed with information. ('*Nobody reads the leaflet. There is too much information.')* The importance of any future intervention presenting information in an appropriate manner was stressed: *'What matters is how you give the information and how they* [patients] *have been treated while given it.'*

They stated that they expected community pharmacists to communicate any harmful effects of the medications when dispensing medications. In addition, they complained that older adults might not always be trusted with health information or perceived as able to understand it. ('*There is ageism. When they give us the information, they think about what you are going to do with it*.' *'Once you reach a certain age, society thinks you are stupid and not going to understand.'*). They stressed that older people are aware of their health problems and should be trusted and respected when given health information. ('*Older people know what is wrong with them. They are able to function normally like when they were younger. Unless you have dementia or something*.') They felt that older people can take responsibility for medications that give them dizziness and increase their risk of falls. However, some attributed falls to other factors such as clumsiness, muscle strength or participation in some forms of exercise, not specifically to medications. ('*I had four falls because of clumsiness, not taking medications*.' '*Yoga classes caused me fractures*.')

6.2.3.4. Doctors

Doctors were described as kind but busy. Participants felt that they may not have time to listen to older people's concerns. They indicated that doctors sometimes do not explain the exact diagnosis or the cause of the problem, e.g. side effects. They acknowledged that they needed to communicate their needs and proactively ask for a change of medicine when required. However, they felt that some doctors feel the urge to prescribe to demonstrate their care. ('*Doctors feel they need to prescribe, otherwise the patient is not getting enough attention*.') They also reported what were perceived as scare tactics, such as doctors telling people that they are going to die if they do not take medicine, to ensure adherence.

6.2.3.5. Loneliness/isolation

One member highlighted the issue of isolation and lack of awareness and advertisement of local organisations and groups for socialisation or exercise. They perceived that there is no emphasis on exercise as a factor in improving resistance to falls, and no facilities to do it.

6.2.3.6. Pharmacies and Pharmacists

Community pharmacists' role was recognised by the participants, with particular emphasis on their role during the SARS-CoV-2 pandemic. It was felt that during this time pharmacists were more visibly concerned about medicines and were discussing issues and giving advice. The pharmacy was perceived as a friendly environment and participants considered that it is easy to approach the pharmacist directly when going to the pharmacy. They believed that people can develop a relationship with their pharmacists and chat about their medicines, unlike the doctor's office, where there is limited time to see the doctor. *('They know us very well.' 'It is a friendly environment in the pharmacy. You develop relations and chat, which is a normal social thing. unlike the doctor's office - you have ten minutes.'*) There was general agreement that pharmacists should be available in primary care clinics to have more input into medicine prescribing and deprescribing.

6.2.3.7. Lack of continuity and satisfaction with service

The participants had noticed a lack of continuity as regards communication between clinics and hospitals. They questioned the absence of universal patient medical records accessible to all HCPs involved in their care. They also were not particularly in favour of patients carrying a list of their medication around to hand to the doctors, feeling that it is impractical and there should be a better solution for this. ('*Healthcare does not speak to itself. They should be able to login into the computer and see what medications exactly you are on.*')

6.2.3.8. Suggestion for integrated care

As one means of addressing disjointed care, participants proposed the establishment of social centres for full fall prevention programs (e.g. exercise, medication review, etc.). It was felt that such centres could also facilitate socialisation and thus address the isolation that was perceived as a potential problem for older people.

6.2.4. Discussion

The patients' representatives shared their opinions about the previous research findings described in this thesis and how these might be built upon in developing an integrated intervention to reduce the risk of medication-related falls. Mixed willingness to change medications, incomplete knowledge about medications, and some reluctance to start

conversations with doctors regarding medication issues were confirmed, in keeping with previous research. Additional points were raised by the group such as the loneliness and certain concerns around change. In agreement with the HCPs from the previous chapters, the patients' representatives commented on the inefficient communication at the interface which is a serious problem that needs to be addressed.

According to the participants in this study, lack of knowledge among patients is a problem that could usefully be addressed in a future intervention. They described PILs as unclear and lengthy. Studies in the literature have reported some older adults found PILs scary due to detailed cautionary information and others found it essential to link the side effects of medication and falls (Bell et al., 2017). Other types of written materials, such as brochures or online information, were found to be useful (Choi & Vordenberg, 2021; Gnjidic et al., 2019; Martin & Tannenbaum, 2017). While readable to most people, educational materials about deprescribing are still unsuitable for people with low literacy (Fajardo et al., 2019). Adequate health literacy is essential for patients' involvement. Previous researchers have suggested there is a need for more lay-term, comprehensive but personalised educational materials to improve shared decisions (Bekker et al., 2020).

Participants in this focus group felt that older people could take responsibility and be involved in the decision to deprescribe. Such acceptance of accountability should facilitate engagement in shared decision-making with doctors. A study found that patients using multiple medications are willing to discuss side effects and deprescribing (Fabricius et al., 2022). However, patients need to be informed and empowered to participate actively in the process. Based on the focus group discussion, it was envisaged that using relatively concise documentation to highlight the main issues relating to the deprescribing of FRIDs would be a useful means of broaching the subject but that comprehensive educational materials would carry a risk of overwhelming patients. Instead, empowering patients to participate in discussion with their healthcare team should be a priority.

One participant suggested a community facility designated for falls prevention programs. This could be in the form of a local centre that includes a complete fall prevention program, where older people can get medication review, falls risk assessment and exercise, as well as socializing. During the focus group discussion, this was felt to have the potential to resolve many of the issues raised during the meeting. However, this would require significant resources and institutional change to implement, so is likely to be impractical in an environment where the health system remains under pressure. Hence, the other suggestions and commentary about the ways in which older people could be better equipped for, and more accepting of, deprescribing were the

concepts brought forward in designing a future potential intervention for use in the short to medium term.

6.2.5. Reflection

Involving patients' representatives as key stakeholders at an early stage of intervention design enriched the discussion and clarified some of the barriers and facilitators from the general public point of view. They confirmed and commented on the data from the previous literature and findings from the HCP in this thesis.

The focus group was a useful format to share ideas and to get broad agreement on key concepts between the participants, with valuable discussion of each other statements providing rich insights. While not all members of the group had previously experienced falls, those who had were able to contribute insights arising from this. Members of the focus group also had personal experience of polypharmacy and multimorbidity. Consequently, they reflected on their personal real-life experiences and shared personal stories.

Limitations include the meeting being online via Zoom. While this was necessary for reasons of availability and infection control, it did affect participation as some interested individuals could not join the discussion due to technical problems. Some members needed help setting up an internet connection and accessing the link. A further limitation was the duration of the meeting, as it was limited to around half an hour, when a longer time slot would have been preferable.

6.2.6. Conclusion

The panel confirmed the results from the previous literature-based study (section 6.1) about willingness to engage in deprescribing. They also clarified additional reasons that prevent people from initiating conversations with their doctors about medication problems such as forgetfulness, lack of confidence and cultural views. Their insights and suggestions comprise the basis for the patient component of the future intervention described in Chapter 7.

7. FRIDs Deprescribing: A Proposed Intervention

7.1. Part I: Comparison of the results from previous chapters:

This section includes a comparison of the results from qualitative interviews of professional stakeholders (hospital doctors (HDrs), general practitioners (GPs) and clinical pharmacists (CPs)), for whom data have previously been presented individually in chapters 3, 4, and 5. Differences and similarities in their responses will be highlighted with a view to identifying the common barriers and facilitators across healthcare settings. Selecting the target behaviours will help to choose the intervention suitable for changing these behaviours. The selection will be based on the possibility of being implemented in practice within the remaining short time frame of this thesis.

7.1.1. Aim

To initiate design of a multifaceted intervention to improve the deprescribing of FRIDs in primary care clinics and hospitals.

7.1.2. Objectives

- To compare results from HCPs interviews to facilitate selecting the target behaviours.
- To review the literature for common fall prevention interventions to select appropriate components for multifaceted intervention design.
- To develop a draft protocol and preliminary materials for the proposed intervention.

7.1.3. Knowledge and skills

All groups defined deprescribing as withdrawal, stopping or tapering (Table7.1). This definition is common in the literature (Reeve et al., 2015; Scott et al., 2015; Scottish Government Polypharmacy Model of Care Group, 2018). However, reducing the dose or replacing PIMs with a safer alternative was mentioned as an approach before complete cessation (Seppala et al., 2019). The majority of participants were aware of the concept and benefits of deprescribing FRIDs. Only four GPs mentioned lack of knowledge as a barrier and three CPs thought there was a knowledge gap among hospital medical and nursing staff. Previous qualitative studies that involved GPs identified a knowledge gap as a barrier to deprescribing (Gillespie et al., 2018b). However, studies involved geriatricians reported confidence in knowledge and skills to deprescribe and this was considered as an enabler (Scott et al., 2019; Van Poelgeest et al., 2022).

When asked about priortising medications for deprescribing in older patients with polypharmacy, doctors (GPs and HDrs) chose antihypertensives more frequently. This was attributed to the focus on managing antihypertensive as part of the fall prevention initiatives in the study hospital as mentioned in section 3.4.3. Note that this should be interpreted cautiously as the question for HDrs was limited to only three classes. All participants mentioned sedative-hypnotics which are

strongly associated with falls. Few doctors mentioned anticholinergics, although they are also strongly associated with falls. It is important to note that the question about FRIDs classes in the HDrs questionnaire was about the top three classes. This was changed for GPs and CPs to a more open question with no limitation, which influenced the results. The 7-Steps deprescribing documentation stratifies the medications associated with falls into categories ranging from the highest to the lowest falls risk, to help choose the appropriate medication(s) to prioritise for deprescribing (Scottish Government Polypharmacy Model of Care Group, 2018).

Doctors and pharmacists were familiar with STOPP/START (Gallagher et al., 2008). Pharmacists identified more standard tools, such as the 7-Steps (Scottish Government Polypharmacy Model of Care Group, 2018), Deprescribing.org ("Deprescribing guidelines and algorithms," 2015) and MedStopper (BETA). None of the participants knew about STOPPFall (Seppala et al., 2020) except one pharmacist. A possible explanation is that it was published relatively recently, in 2020 during the SARS-CoV-2 pandemic. Doctors depend on their clinical experience rather than guidelines, and pharmacists do not widely have experience applying these guidelines.

Table7.1 : Comparison of knowledge and skills barriers and facilitators

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Knowledge			
Barriers	Knowledge gap (n=4)	—	• Staff knowledge e.g. medical and nursing staff (n=3)
Awareness of tools	Not aware of any tools (n=3)	Not aware of any tools (n=2)	—
	STOPP/START (n=10) Beer's (n=2) The 7-steps (n=1) ACB (n=1) STOPPFrail (n=2) BNF (n=2)	STOPP/START (n=15) Beer's (n=3) STOPPFrail (n=3) Deprescribing.org (n=1) BNF (n=1)	STOPP/START (n=10) Beer's (n=5) The 7-steps (n=5) Deprescribing.org (n=4) ACB/DBI (n=3) MedStopper (n=2) STOPPFrail (n=1) STOPPFALL (n=1)

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Medication classes' priority for deprescribing	Antihypertensive (n=12) Sedative-Hypnotics (n=10) Antipsychotic (n=8)	Antihypertensives (n=17) Sedative-hypnotics (n=11) Antidepressants (n=8) Antipsychotics (n=6)	Sedative-hypnotics (n=10) Anticholinergic (n=6) Antihypertensive (n=6) Antidepressants (n=5) Antipsychotics (n=4)
Skills			
Barriers	Depend on experience rather than resources (n=5)	Dependence on experience rather than resources (n=6)	Limited experience in applying guidance (n=1)

GPs = general practitioners

HDrs= hospital doctors

CP= clinical pharmacists

7.1.4. Environment context and resources

Time is a common barrier, regardless of the role or the site (Table 7.2). This was consistent with the literature internationally (Abou et al., 2022; Gillespie et al., 2018a). Participants explained how some factors such as limited clinic time, a high number of patients, and having other tasks may reduce the time for deprescribing.

The time needed to complete a medication review depend on the type of the review. Pharmaceutical Care Network Europe has recognized three different classes of medication review: simple, intermediate and advanced. Advanced review is likely to need more time compared to simple medication review as it mandates the involvement of patients and potentially other HCPs (PCNE, 2013). In a previous descriptive study the time needed for FRIDs review by pharmacists reached up to seventy minutes for complex patients with polypharmacy (Browne et al., 2014).

Furthermore, the type of medications may increase the time period over which the deprescribing process will take place. For example, deprescribing Z-drugs can be time consuming due to additional steps involved tapering and monitoring (Kuntz et al., 2018). Similarly, deprescribing benzodiazepines can last from four to twenty-one weeks, and reassurance and support are needed (Ng et al., 2018).

In a European survey about deprescribing steps, Van Poelgeest et al. (2022) discovered that their proposed final step, which includes monitoring, follow up and documentation, was the least addressed step by geriatricians. Although they pointed out that there are other facilities to follow up, some HDrs and CPs complained about the limited follow up after discharge from the hospital. It may be because not all patients would be referred to day hospitals or outpatient clinics, and

mainly would be followed by the GPs. This is linked to another barrier which is the communication difficulties across the interface, which might complicate the follow up process.

HDrs and CPs agreed that the hospital stay period allows for monitoring and close observation of the symptoms. They held a similar view that the point of discharge from hospital is an unsuitable time for FRIDs deprescribing. However, there was disagreement about the optimal time for deprescribing in hospitals. HDrs agreed that admission might be good for reviewing the patient's medications and management. In contrast, most CPs stated that the inpatient stay period (later than admission time) might be preferable for deprescribing. The difference in opinions may be related to the professional role of each group. For example, pharmacists may not be available in all hospital wards, or they may not be involved in admission. Moreover, pharmacists cannot change patients' medications and rely on the medical team. In some cases, e.g. in ED, if the patient is in an acute state or there is no geriatrician or senior doctor to deprescribe, pharmacists would wait until the patient is admitted to the ward.

Table 7.2: Comparing environmental context and resources barriers and facilitators

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Environment context and resources			
Barriers	• Limited time (n=14)	• Limited time (n=13) • Tools are time consuming (n=2)	• Limited time (n=10) • Medication review is time consuming (n=8)
	• Incomplete patient's medication history (n=6) • Prescriptions written by other doctors without sufficient details (n=4)	• Incomplete patient's medication history (n=8)	• Incomplete patient's medication history (n=3)
	—	• Difficulty following up patients after discharge (n=5)	• Difficulty following up patients after discharge (n=7)
	—	• Patient's health (acute status) (n=2)	• Patient's health (acute status)
	• Difficult to contact hospital doctors (n=9) • Delayed or incomplete discharge letters (written/electronic) (n=13)	• Inefficient communication at discharge by letter or discharge prescription (n=12)	• Contacting GP is time consuming(n=2) • Written notes not always read (n=6)

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
	• Not all hospitals use national e- mailing system (n=5)	• Communication with multiple providers or other teams (n=7)	
Facilitators	• The national emailing system (Healthmail and Healthlink) is useful for communication (n=6)	• Opportunity to review medication during inpatient (n=4)	• Opportunity to review medication during inpatient (n=7)
	—	• The presence of other facilities where doctors can follow patients up (e.g. day hospital and outpatient clinics) (n=3)	• The presence of other facilities for referral and follow up (e.g. deprescribing clinic or falls clinic) (n=4)

7.1.5. Social influence:

All healthcare professional stakeholder groups considered patients' involvement in the FRIDs prescribing process to be essential (Table 7.3). Fourteen hospital doctors mentioned discussing deprescribing with patients and carers (Table 3.7) Furthermore, GPs highlighted the importance of involving patients and how it influences the relationship and the decision (section 4.3.2). Both GPs and HDrs confirmed that involvement keeps the patient informed and facilitates decision-making.

We found that doctors and pharmacists held a belief that people are sometimes reluctant to change their medicines, especially when they have been using them for a long time or when another doctor (e.g. a hospital specialist) has prescribed them. However, as mentioned in the previous chapter, there is evidence to suggest that this is not less problematic in practice than might be anticipated (Reeve et al., 2019).

Sedative hypnotics were considered the most problematic drug class. Fear of side effects of deprescribing, such as the return or worsening of symptoms and withdrawal symptoms, was a shared concern among participants. Other consequences discussed during the interviews included legal issues, prescribing the stopped medication again in the community, and influence in the doctor-patients relationship.

Some participants were motivated to deprescribe FRIDs. They thought it was beneficial and potentially essential and did not see a difficulty in prescribing a medicine again if deprescribing was found not to work well. They felt they could educate the patients and get their buy-in.

Patients usually ask for medical help, resulting in the prescription of benzodiazepines or Z-drugs, when they perceive their condition as severe or alternative therapies have not worked (Sirdifield

et al., 2017) and hence they may be expected to be reluctant about giving up what they perceive as the necessary level of treatment. Nevertheless, this is not a reason for not initiating a conversation and explaining the seriousness of the long-term use of such medications.

Table 7.3: Comparing social influence barriers and facilitators.

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Social influence			
Barriers	• Reviewing medication prescribed by other doctors is challenging (n=8)	• Reviewing medication prescribed by other doctors is challenging (n=12)	—
	• Patients' and families' reluctance to medicine changes (n=12) • Not involving the patients for fear that discussion may affect the doctor-patients' relationship (n=4)	• Patients' and families' reluctance to medicine changes (n=5)	• Patients' and families' reluctance to medicine changes • Hard to get patients' buy-in (n=5)
	Patients' reluctance to stop hypnotics (n=11)	Patients' reluctance to stop hypnotics (n=2)	Patients' reluctance to stop hypnotics (n=2)
Facilitators			
	• Patients usually accept deprescribing decision (n=5)	• Patients usually accept deprescribing decision (n=7)	• Patients usually accept deprescribing decision (n=1)
	• Patients' involvement is important (n=15)	• Patients' involvement is important (n=15)	• Patients' involvement is important (n=10)

7.1.6. Professional role and social environment

GPs and HDrs agreed that pharmacists' input is valuable, and pharmacists acknowledged that working in multidisciplinary teams facilitates the deprescribing process (Table 7.4). A study found that pharmacists detected more FRIDs classes than physicians when conducting a medication review for patients admitted to the hospital with falls (Maly et al., 2019). Interventions that involve collaboration across the health care team were found to improve the quality of patients' lives (OR 0.58, 95% CI 0.47-0.69) and to decrease readmission to hospitals ((OR) 0.74, 95%, CI 0.62-0.89)

(Ruiz-Ramos et al., 2021). A Swedish study suggested that HCPs' collaboration may also enhance their understanding of the roles of other professions within the team (Lindqvist et al., 2019).

Pharmacists have a unique set of skills regarding medication management. With their knowledge of pharmacokinetics, they become experts in the therapeutic monitoring of medicines (Alhameed et al., 2019). The latter service was effective in calculating and adjusting doses of narrow therapeutic index drugs. Additionally, pharmacists may provide information about the availability of medicines, hospital formularies, extemporaneous formulations and cost-effectiveness of medications, and may suggest alternatives to inappropriate therapy (Fritsch & Shelton, 2019; Kaboli et al., 2006). They are therefore a valuable resource within the team and they are willing to collaborate with other HCPs to improve healthcare as discussed in chapter 5.

Nurses' role was not emphasized by our participants. Only a few doctors mentioned them helping with medication review. This could be because of the interview question related to the pharmacists' role. However, besides medication administration and patient mobilisation, nurses can notice drug-related problems or difficulties taking the medication, such as difficulty swallowing large tablets, which was mentioned as a reinforcement for deprescribing by nurses (Foley et al., 2020). In a qualitative study about deprescribing BZDs in nursing homes, nurses mentioned a barrier to deprescribing, which is the need to calm irritated patients (Moth et al., 2021). They also shared some common HCPs' concerns, such as time, lack of guidelines and fear of consequences. For the limited subset of registered nurse prescribers, this role brings additional opportunities and there is the potential for such nurses to proactively discuss and initiate deprescribing with patients (section3.4.4). Limited access to nursing homes to recruit nurse prescribers hindered the investigation of their role in this thesis.

Table 7.4: Comparing professional role barrier and facilitators.

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Professional role and identity			
• **Barriers**			
	—	• Thinking that it is general practitioners' responsibility (n=4)	• Pharmacists do not deprescribe (n=2).
Facilitators			
	• GPs are responsible for medication review (n=13)	• Every healthcare professional with medication knowledge is responsible (n=9)	• Every healthcare professional with medication knowledge is responsible (n=9)

Social influence			
Facilitators	• Acknowledge the role of pharmacists (n=6) • Having clinical pharmacists in clinic would decrease the workload (n=4), save time (n=3), add additional safety net (n=3) and be cost effective (n=1)	• Acknowledgment of the role of other professions in the deprescribing process (pharmacist and nurse) and understanding that it is a multidisciplinary team responsibility • Pharmacists can assist with the process (n=7) • Working with pharmacists may reduce the workload (n=4)	• Multidisciplinary team facilitate the process (n=4)

7.1.7. Emotion, optimism and belief about consequences

Fear of side effects of deprescribing, such as the return or worsening of symptoms and withdrawal symptoms, was a shared concern among participants (Table 7.5). Other consequences discussed during the interviews included legal issues (e.g. legal liability in case of patients' harm), prescribing the stopped medication again in the community, and influence on the doctor-patient relationship. Some participants were motivated to deprescribe FRIDs. They thought it was beneficial and potentially essential, and did not see a difficulty in prescribing a medicine again if deprescribing was found not to work well. They felt they could educate the patients and get their buy-in.

Table 7.5: Comparing emotion, optimism and belief about consequences

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Emotion			
Barriers	• Concerns about patients' safety or fear of causing harm to patients (n=11)	• Concerns about patients' safety or fear of causing harm to patients (n=10)	• Concerns about patients' safety (n=6)
	• GP anxiety/reluctance (n=7)	• Intern reluctance (n=3)	• Doctors' reluctance (n=5)
Belief about consequences			
	• Legal issues (n=4)	• Legal issues (n=1)	• Legal issues (n=1)
Optimism			

TDF domains	GPs (n=15)	HDrs (n=18)	CPs (n=12)
Facilitators	• Doctors' positive feeling about benefits of deprescribing (n=7)	• Doctors' positive feeling about benefits of deprescribing (n=2)	• Pharmacists' positive feeling about benefits of deprescribing (n=3)

7.1.8. Reinforcement

Similar to GPs, pharmacists may be more likely to review FRIDs when patients present with falls or fall risk factors such as polypharmacy (Table 7.6). This could be considered a facilitator, as GPs and CPs can prioritise and focus on high-risk patients for medication review and deprescribing based on the level of risk. A prioritisation strategy becomes useful when there is a staff shortage or extra work load (Stranges et al., 2020). For example, reviewing the medication list for older patients admitted with fractures to identify potential candidate FRIDs for deprescribing (Cox et al., 2022). Comparison with HDrs was not feasible as the question about reinforcement was not included in the hospital doctors' questionnaire.

Table 7.6: GPs' and CPs' reinforcement

TDF domains	GPs (n=15)	CP (n=12)
Reinforcement		
	Triggers for deprescribing include deterioration of the patient's condition (n=6) and falls (n=5).	Patient's health e.g. falls and polypharmacy (n=9)

7.1.9. Summary

Overall, comparing themes from healthcare professionals' interviews revealed some common barriers and facilitators. Doctors and pharmacists have the knowledge and motivation to deprescribe FRIDs. Pharmacists appeared to have more knowledge of the available medication review tools. Barriers were mainly under the environmental, social and emotional domains. Participants expressed similar concerns about time, follow up, communication across the interface, inadequate documentation and medication history. In addition, participants shared concerns about undesirable consequences and about patients' reluctance, especially toward deprescribing hypnotics.

Common facilitators were awareness of the importance of patient engagement, positive perceptions of patients' willingness to accept the deprescribing decision, prioritizing patients with falls or high risk of falls, and acknowledging collaborative work. As noted above, both GPs and HDrs agreed that pharmacists are valuable members of the care team and were open to collaborating with them.

7.2. Part II: Intervention to deprescribe FRIDs in patients with risk of falls

7.2.1. The target behaviours

From the previous section and from chapter 6, there were common behaviours stressed by all groups. The behaviours with higher frequency or agreement and the ones with higher importance can be potential targets. Some BCTs were highlighted in the previous chapters. Here the potentially applicable BCTs were listed (Michie et al., 2014) (Figure 7-1 Figure 7-2) and tested against the APEASE criteria (Table 7.7).

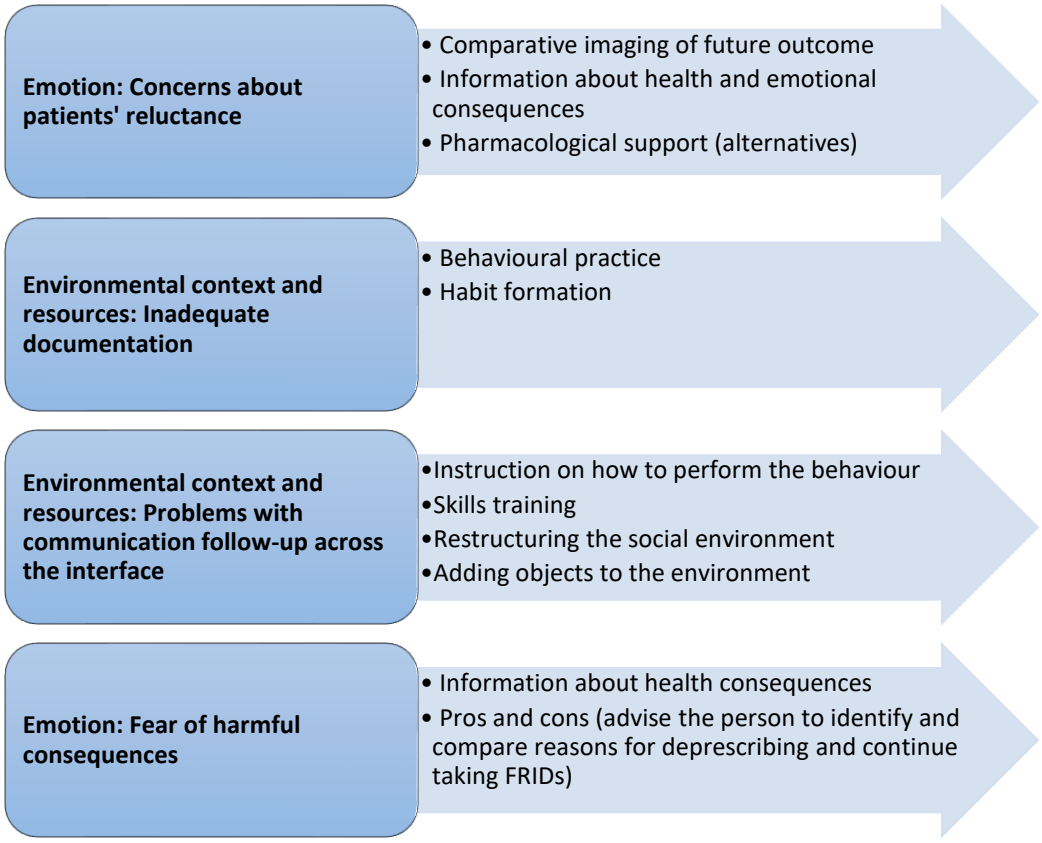


Figure 7-1: Target behavioural barriers and appropriate BCTs

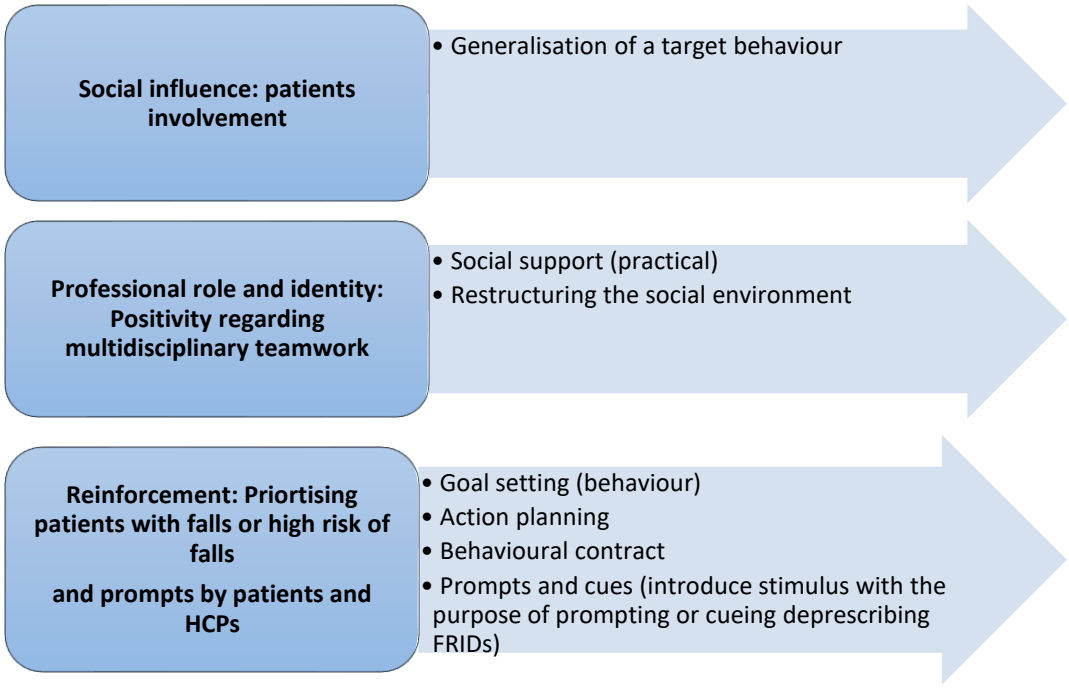


Figure 7-2: Target facilitators and the appropriate BCTs

Targeting the limited staff time, some suggestions include adding personnel, increasing the time for each clinic, and reducing the number of patients per doctor. A recent article suggested using the concept of 'time needed to treat' instead of a fixed clinic time for everyone. The author argued that more time should be allocated for complex patients and that we should not give the same clinic time to everyone (Johansson et al., 2023). However, the concept is relatively new and needs to be further studied. All of these suggestions were unfeasible to implement within the limited time of a PhD program and with limited access to healthcare settings during the SARS-CoV-2 pandemic.

Doctors expressed the need for prompts and reminders. There was some evidence about the efficacy of electronic system reminders however alert fatigue may limit their use (Agostini et al., 2007; Cossette et al., 2019). Mouse mat have been used for advertisement in industry. Studies using this type of reminder have not been identified in the literature, but the underlying principle is similar to the use of such materials in advertising where it was used as a memory provoking tool. In addition it is affordable and practical (McCall & Ginis, 2004; Sasaki et al., 2021).

It is recommended that healthcare providers use tools to assess the risk and review FRIDs (Cox et al., 2022). Health institutions should increase access to the available tools and algorithms to encourage prescribers to use them rather than depending on their experience. This may lead to

more structured deprescribing. There are some tools available: Those that are online with easy free access were mentioned in (section 1.3.2). Also, hospitals should develop a local list of FRIDs based on their formularies. Nevertheless, the time span for implementing these tools should be taken into consideration.

As suggested previously, the challenge of reviewing medication prescribed by other prescribers might be solved by a detailed structured process (Reeve et al., 2014). Chen et al. defined the role of each healthcare provider in the process of tapering BZDs. They described a detailed role for every HCP and allied personnel in a day hospital setting. For example, the physician was responsible for medical care, referral and monitoring, while pharmacists did the medication history and review, patient and family education, and liaised with GPs and the care team (Chen et al., 2010).

Table 7.7: Target behaviours can be chosen based on APEASE criteria (Michie et al., 2014) (suggestions that fits the criteria are highlighted in blue).

Target behaviours	**BCT**	**Intervention**	**Affordability**	**Practicality**	**Effectiveness and cost-effectiveness**	**Acceptability**	**Side-effects and safety**	**Equity**
Barriers								
Concerns about patients' reluctance	Comparative imaging of future outcomes	Shared decision aid that compares describing benefits versus risks of continuing to take the medicines	Yes	Yes	Yes	Yes	Yes	Yes
	Information about health and emotional consequences	Educational material	Yes	Yes	Yes	Yes	Yes	Yes
	Pharmacological support	Offer a safer alternative to patients	Maybe[1]	No[2]	Maybe[3]	Maybe[4]	Maybe[3]	Yes
Inadequate documentation	Behavioural practice and Habit formation	Prescribers devolving the habit of proper documentation of FRIDs prescribing updates	Yes	Maybe[5]	Unknown	Yes	Yes	Yes
Problems with communication and follow-up across the interface	Adding objects to the environment	Encourage using Healthmail	Yes	Maybe[6]	Yes	Maybe[6]	Yes	No[7]
	Adding objects to the environment	Adding divided sections for drug information in discharge summaries and	Yes	Yes	Unknown	Unknown	Yes	Yes

Target behaviours	BCT	Intervention	Affordability	Practicality	Effectiveness and cost-effectiveness	Acceptability	Side-effects and safety	Equity
		mandate filling of the details before moving to the next section in EMR						
	Restructuring the social environment	Assign a pharmacist as a care coordinator[8]	Unknown	Yes	Yes	Unknown	Yes	Unknown
Fear of consequences	Information about consequences and pros and cons	Shared decision aid to educate the patients about the consequences of chronic use of FRIDs and the benefit of deprescribing	Yes	Yes	Yes	Yes	Yes	Yes
Facilitators								
Patients' involvement	Generalisation of the target behaviour	If they involve patients in prescribing or clinical decision, therefore, they can involve them in deprescribing	Yes	Maybe[9]	Yes	Maybe[9]	Yes	Yes
Multidisciplinary work	social support and restructuring the social environment	Assign a clinical pharmacist to work with multidisciplinary teams (in the geriatric department or falls clinic)[10]	Maybe	Maybe	Yes	Yes	Yes	Yes
Prioritizing patients with a high risk of falls	Goal setting and action planning	Setting a goal for each patient to be reviewed once or twice a year (Seppala et al., 2019)	Yes	Yes	Yes	Yes	Yes	Yes
	Behavioural contract	Make a contract involving reviewing high-risk people with rewards	Unknown	Unknown	Yes	Yes	Yes	Unknown

Target behaviours	BCT	Intervention	Affordability	Practicality	Effectiveness and cost-effectiveness	Acceptability	Side-effects and safety	Equity
		(incentives by the HSE)						
	Prompts and cues	Flag the high-risk medication to be reviewed in the EMR	Yes	No[11]	Yes[12]	Yes	Yes	Yes
Reinforcement	Prompts and cues	Mouse mat for HCPs with reminder of the high-risk FRIDs classes to be reviewed	Yes	Yes	Yes[13]	Yes	Yes	Yes
		Social media posts targeting HCPs	Yes	Yes	Yes	Yes	Yes	Yes

1 Dependent on the cost and insurance coverage.

2 Depend on the availability of the alternative.

3 Dependent on the drug.

4 Dependent on the patient.

5 Linked to time barrier.

6 According to the Healthmail evaluation report (Larkin et al., 2017), some doctors were not checking their accounts regularly. Moreover, in our interviews, one GP mentioned they use multiple software in practice, and they have to log out from the patient's record to access Healthmail.

7 Not all hospitals or practitioners use Healthmail.

8 If the hospital can afford to hire a pharmacist or reallocate a pharmacist for the position. However, maybe not all patients will have access to this service.

9 Shared decision is needed but not all patients like to be involved.

10 If pharmacists are available in the institution and depending on the workload of the pharmacist.

11 This may not be practical due to alert fatigue risk.

12 Cost-effectiveness needs further investigation.

13 Evidence of cost-effectiveness in this context was not identified.

After selecting the target behaviours and possible techniques and matching them to APEASE, and additionally bearing in mind the concepts derived from patient stakeholders through the literature and focus group, it was necessary to select the possible intervention components to target them. The next section reviews the literature to discover the efficacy and nature of different interventions.

7.2.2. Interventions to reduce or prevent falls

There are many types of interventions to prevent falls reported in the literature. Interventions are divided into two groups based on the clinical setting, community and hospitals. Types of interventions in the community included risk assessment, medication review, medication withdrawal, education (patients and/or HCP), exercise, environmental safety (e.g. home safety modification), and treatment of vision problems (Bloomfield et al., 2020; Gillespie et al., 2012; Gray et al., 2021). In the hospital setting, possible interventions included management of risk-associated health conditions (e.g. cognitive impairment), medication review, patient and/or staff education, regular toileting, physiotherapy and environmental modifications (e.g. call buttons and use of assistive devices) (Morris et al., 2022).

Systematic reviews of falls prevention interventions agree that multifactorial interventions were the most effective regardless of the site (Gillespie et al., 2012; Guirguis-Blake et al., 2018; Hopewell et al., 2020; Morris et al., 2022). At least two intervention components are needed for effective multifactorial intervention (Morris et al., 2022). The most effective single falls interventions in hospital settings were education for patients and staff (Morris et al., 2022). In the community, exercise had the best results, followed by education of patients (Dautzenberg et al., 2021).

A narrative review of randomised trials of interventions to reduce falls done by Gray et al. found that single type interventions, applied only during the study or directed to a single stakeholder, did not reduce the use of FRIDs or change falls outcomes. The heterogeneity of the studies affected their conclusion; however, they recommended designing multifactorial intervention strategies that simultaneously target both patients and their providers (Gray et al., 2021).

During the interviews, general practitioners mentioned that prompts from patients, pharmacists or nurses encourage them to undertake a deprescribing initiative (n=7). Also, they stated that electronic reminders could help trigger a medication review action (n=3). Computer-based reminders were reported as effective in improving the prescribing for hospitalised older adults (Dalton et al., 2018). In a study by Agostini et al., prescribing sedative hypnotics was improved in hospitalised older adults using an alert system at the point of prescribing (Agostini et al., 2007). However, alert fatigue is a common problem with this type of intervention.

Exercise, clinical decision-making support, electronic reminders, treatment of vision problems, and environmental hazard changing interventions are out of the scope of this thesis. However, they can be considered when designing multifactorial interventions wherever resources and funds are available (Cheng et al., 2018). The discussion here will focus on educational and shared decision-making interventions as they are feasible according to APEASE criteria, as presented in Table 7.7. More details about this are in the following sections.

7.2.2.1. Educational interventions

Educational interventions were suggested by Van Poelgeest et al. (2022) as a facilitator of deprescribing. In a systematic analysis of the interventions that reduce potentially inappropriate medications, educational strategies were the most effective in primary care settings (Rodrigues et al., 2021). Another systematic review of interventions to reduce PIM in community-dwelling adults found that patient involvement through an intervention that includes educational material might effectively reduce inappropriate medication use (Bloomfield et al., 2020).

One way to empower and involve patients in the process is through education (Fajardo et al., 2019). Well-informed patients can participate in making the decision. Understanding the relationship between medications and fall risk may enhance patients' awareness of the side effects of their medicines (Bell et al., 2017). It might help them identify and watch for side effects after medication discontinuation (Fajardo et al., 2019). Some materials are available for patients (Fajardo et al., 2019). The EMPOWER brochure was the most used in interventional studies aimed at patient education and resulted in a positive impact (Niznik et al., 2022). Gemmeke et al. (2021) found participants were interested to know more about FRIDs either in printed or face to face education.

It is best to target doctors as well as patients for better results (Gray et al., 2021). The literature shows that deprescribing is not extensively taught in undergraduate programmes (Masud et al., 2022; Van Poelgeest et al., 2022). Doctors learned about deprescribing and inappropriate prescribing mainly from post-graduate training and professional meetings (Van Poelgeest et al., 2022). An educational intervention for both doctors and patients decreased the inappropriate antibiotics prescribed for acute upper respiratory tract infections in an outpatient setting in a pre-post study by Craddock et al. (2020).

7.2.2.2. Shared-decision making

Shared decision-making refers to the collaboration between the doctor and the patient to determine the care plan (NICE, 2021). The collaboration ensures patients' preferences and values

are embedded in the care plan. Furthermore, patients can keep the right not to agree to the plan (NICE, 2021).

Patients preferred to take fewer medicines and were open to discuss information about side effects (Fabricius et al., 2022). Patients' education is part of the shared decision guides. These guides may improve communication and enhance involvement (Thomas et al., 2021). It enhances doctor-patient relations, care satisfaction and buy-in (NICE, 2021). Shared decision-making helps to tailor medical care to patients' needs which may help reduce the harmful effect of medicines and medication-related admission (Fabricius et al., 2022).

There are some evidence that the use of shared decision-making tools is effective. The tools enhanced patients' satisfaction and reduced disagreements regarding surgical decisions as resulted from a systematic review of forty two studies (Niburski et al., 2020). In a multicentre RCT by Wang et al. (2023), it was effective in improving patient knowledge and decision making about stroke prevention.

7.2.2.3. Health coaching and the 4Es

Doctors and pharmacists agreed that involving the patients in the decision is essential. They also add that they do include patients. Health coaching and motivational interviewing are needed to empower and engage the patients. Applying these skills in practice may improve the patient's knowledge, adherence to the care plan, and motivation (Barnett & Sanghani, 2013; Jull et al., 2021). However, the details about the consultation skills of participants in this thesis were not explored. This aspect may benefit from future investigation.

7.2.2.4. Conclusion

Based on recent systematic reviews, the most effective single interventions for fall prevention were educational interventions in hospitals, and education and exercise in community settings. For potentially inappropriate medications, the most effective interventions have been found to be medication review in hospital, and education in primary care. The most recent systematic review of pharmacists' deprescribing interventions found that pharmacists' optimal role is to engage with patients and providers.

The most effective studies overall were the studies that included frail older adults, and were multidisciplinary, multicomponent initiatives with education for patients and doctors, combined with exercise and comprehensive review involving multiple interactions with patients (Gray et al., 2021; Niznik et al., 2022).

7.2.3. The proposed intervention protocol

Based on the previous section, educational interventions are effective for reducing inappropriate medications, comply with the APEASE criteria and can address more than one target behaviour. This section describes a suggested intervention to target some deprescribing barriers for stakeholders.

A brief educational/reminder intervention for doctors can target the fear of consequences, concerns about patients' reluctance, communication problems, and documentation problems. In addition lack of awareness about tools and resources for HCPs can be addressed.

Patient education/empowerment can target the lack of patients' knowledge about deprescribing, the harmful effect of FRIDs, fear of withdrawal symptoms, willingness to deprescribe, and the communication gap between patients and doctors, as mentioned in chapter 6.

A future potential intervention can therefore be developed with the aim of assessing the feasibility and effectiveness of a multifaceted intervention to improve the deprescribing of FRIDs in primary care clinics and hospitals.

7.2.3.1. Methods

Design and setting

The proposed intervention is a multicenter multidisciplinary randomised controlled trial. The control group will receive usual care while the intervention group will receive an intervention that consists of a package of educational material and reminders for patients and HCPs in primary care clinics and hospitals. It consists of:

- For patients - an educational and shared decision-making flyer;
- For HCPs, a mouse mat to act as an ongoing reminder of deprescribing, and social media posts (called 'Falls Capsule') to deliver brief, targeted education on (or reminders of) key principles.

Doctors and pharmacists will receive the Falls Capsule and mouse mat reminder to be used in practice. The Falls Capsule will involve brief information about various aspects of FRIDs management and deprescribing (Appendix 9). It is designed to be shared in social media for the purpose of prompting HCPs about medicines and fall risk in older adults. It consists of interactive information and reminders of the FRIDs classes, medication review guidance, tools and deprescribing tips, with the intention that each topic requires only 1-2 minutes of engagement, but addresses one or more of the barriers previously identified. Sample topics are presented in Appendix 9: An introductory one highlights useful resources, reassurance about patients' willingness to undergo deprescribing and shared decision-making; other sample topics address medication: two FRIDs classes – alpha blockers and anticholinergics. The topics were chosen

based on the results from the HCPs' interviews in this thesis and the medication classes were based on the STOPPFall guide. The mouse mat consists of a list of commonly prescribed FRIDs and hints about deprescribing (Appendix 10). Before use, these will be piloted with HCPs from the target populations, with revision as appropriate. Social media posts will be shared through private groups during the study.

Patients will receive written information (shared decision aid) providing core information about falls and medicines and a flyer. The objective is not to overburden patients with information (in keeping with the views expressed by the older people in our focus group) but rather to encourage and empower them to talk to their doctors about medication use review and deprescribing, by preparing them for discussion with their HCP and the decision. The flyer involves flagging the risk of using medications and an invitation to discuss the long-term use of FRIDs with their doctors (Appendix 11). In addition, more detailed shared decision information is to be handed out about deprescribing FRIDs in the hospital/clinic environment, in order that patients who are prompted to consider deprescribing will engage with their HCP rather than self-deprescribing. To ensure an appropriate reading level, the initial draft materials have been provided to the National Adult Literacy Agency for review, but they will also undergo piloting and further co-design with patient representatives prior to deployment in the main intervention.

Proposed participants

- Patients: Older people $\geq$ 65 years, using polypharmacy ($\geq$ 5 medicines) including FRIDs (based on STOPPFall list (Seppala et al., 2020)), who are hospital inpatients in geriatric medical wards, or who attend general practitioners.
- Doctors: Hospital doctors caring for older adults and general practitioners.
- Pharmacists: Clinical pharmacists in the study hospitals or general practice sites.

Proposed recruitment

Ethics approval will be obtained in line with the requirements of the individual establishments. Primary care clinics and hospitals, whose populations include older adults, will be recruited to participate in the study. A neutral gatekeeper will be assigned in each participating site to recruit doctors and pharmacists.

A researcher (pharmacy intern or pharmacist) linked to each hospital and primary care site will screen patients' records for eligibility. In the hospital, a neutral gatekeeper will reach out to eligible patients during their hospitalisation period and provide study recruitment material. In primary care clinics, the receptionist will send the recruitment material to patients when appointments are scheduled. Interested patients will therefore have an opportunity to reflect on potential participation before making a decision. Then the researcher will obtain informed consent from people who are interested in participating at a scheduled visit.

The intervention is multifaceted, and due to team-based care it will not be practical to have a mix of control and intervention patients at a single site. The hospital and general practice sites will therefore be randomised to intervention or control in a permutated block fashion, in random block sizes of two or four, with the goal of approximate equilibrium between groups, and both the patients and HCPs associated with these sites will follow the intervention or control pathway in accordance with the protocol for their site. Randomisation will take place after agreement to participate has been gained from study sites, to avoid influencing the decision to participate.

Intervention

At the start of the study, doctors and pharmacists at the intervention sites will receive the mouse mat and the Falls Capsule will be shared every two weeks throughout the study using email or social media notifications in accordance with HCPs' preferences.

Informed consent will be taken from patients by the research pharmacists/pharmacy interns. Consenting patients at the hospital intervention sites will be provided with the flyer and shared decision aid (Appendix 12) by a pharmacy intern. In the primary care clinic, consenting patients will be asked to come early to their scheduled visit, and the practice nurse will issue them with the flyer and decision aid.

Patients at control sites will receive usual care and HCPs at these sites will receive no additional materials.

At all sites, HCPs will be asked to maintain the necessary documentation for the study outcomes (see below). Data extraction for the purpose of the study will be supported by the research pharmacists/pharmacy interns.

Outcomes and measurement

The core outcome set advised by Martin-Kerry et al. (2022) for deprescribing interventions will be gathered, namely the number of prescribed medicines stopped, the number of prescribed medicines with dosage reduced, quality of life, mortality, adverse drug events and number of hospital stays. Plus, Falls outcomes will be number of falls, number of fallers, fall rate per person year, and time to first fall (Lamb et al., 2005).

Quality of life will be evaluated by the 36-Item Short Form Survey (SF-36) (RAND). All other data form part of the standard records in the hospital environment but some additional documentation may be required at primary care sites. The primary outcome will be the number of stopped medications during the study period of six months. The rest of the outcomes will be secondary outcomes.

Besides the core outcomes associated with the patients' clinical profile, the impact on their attitudes towards deprescribing, as determined by the revised Patients' Attitudes Towards Deprescribing (rPATD) questionnaire, will be assessed (Reeve et al., 2016). This questionnaire has

been validated in older adults and explores their belief in the appropriateness of withdrawal, the perceived burden of their medications, their concerns about stopping medication(s), and their level of involvement in medication management (Reeve et al., 2016).

Additionally, in the intervention group, patients' and HCPs' satisfaction with the information provided will be evaluated through brief additional questions (developed based on previous literature (Green et al., 2020)), as illustrated in (Table 7.8). In the HCPs' case, the questions will be associated with each Falls Capsule topic.

The research pharmacist/pharmacy intern associated with each study site will follow up outcome measures for participants who have no documented information, where possible.

Table 7.8: Evaluation survey for HCP and patients

Patients' survey	**HCPs survey**
• Did you find this information helpful? • What would you like to know more about? • Are there any changes that you would suggest to this flyer?	• Was this information useful? • Would you include some of these recommendations in your daily practice? • Have you any suggestions for topics or improvement?

Data analysis

Clinical outcomes will be measured at baseline, one month and six months, as short term follow up duration was more effective than long term based on results from chapter 2. The differences of number of deprescribed FRIDs will be compared between intervention and control groups, taking $p<0.05$ as significant.

Statistical power will be calculated based on the results from a randomised study that found that 39.7 % of the PIMs were discontinued during the study period (Dalleur et al., 2014). A sample of 246 (123 in each group) is needed to detect this difference between groups with a 95 % confidence interval.

Descriptive statistics will be generated for the patients' and HCPs' surveys, and open questions will undergo qualitative analysis, with representative quotes being presented where appropriate. The collected data will be used to enhance the quality of the information provided and the delivery of the intervention.

Discussion

The proposed intervention targets the main behavioural barriers for HCPs and patients toward deprescribing FRIDs. Educational interventions have previously been found to be cost-effective and practical in falls prevention (Alipour et al., 2021) and in managing inappropriate medications (Rodrigues et al., 2021).

Previous research has found increasing trends in doctors' use of social media for knowledge sharing (Panahi et al., 2016; Thamman et al., 2020). The main used forms of social media were YouTube, Twitter and Facebook (Panahi et al., 2016; Wang et al., 2012). Social media facilitates fast and cost-effective sharing of clinical information and updates across the world, which was prominent during the SARS-CoV-2 pandemic (Thamman et al., 2020; Zhou et al., 2018). For this reason, the Falls Capsule is designed to be used as a social media post for doctors and pharmacists instead of traditional education, but can also be shared by email according to HCPs' preference. The posts will be restricted to the intervention group for the duration of the study to avoid contamination of the results, but may subsequently be shared more widely. The posts are brief and quick prompts that act as knowledge refreshers and remind HCPs of an important goal in care for older patients, which is medication management as a factor of falls and the importance of managing FRIDs. Links are provided for further reading where HCPs wish to explore a topic in more depth.

In section 7.2.1 (Table 7.7) , the mouse mat ('Prompts and cues') was chosen as a constant handy reminder that does not need internet access or immediate action, instead of using a temporary electronic alert system which may lead to fatigue, as discussed previously. Studies using this type of reminder have not been identified in the literature. However, the underlying principle is similar to the use of such materials in advertising, as the use of repeated messages was effective for behavioural change (McCall & Ginis, 2004; Sasaki et al., 2021). The cost-effectiveness of its use in deprescribing context needs to be investigated in future research.

Shared decision making is one of the deprescribing implementation research priorities (Thompson et al., 2019). The shared decision aid was developed using NICE guidelines (NICE). It includes brief information with emphasis on talking to their doctors about falls and medicine, so they do not stop taking the drug. That is why they were meant to handed just before the clinic visit. The flyer was designed to give a hint to the patients to think about their medications and prepare questions before they see the doctor (Sleath et al., 2023).

The nature of the proposed intervention means blinding is not possible for the participants or researchers. However, the use of objective quantitative measures and validated tools insofar as possible mitigates the risk of bias that might otherwise be associated with the lack of blinding.

8. Overall conclusion and future recommendations

The primary aim of this thesis was to explore the feasibility of deprescribing FRIDs in older adults. First, the role of pharmacists in improving care in medication management after discharge from hospital was investigated. Their impact was evident on mortality, adherence and prescribing quality. Pharmacist interventions could be important in managing FRIDs at discharge and preventing discrepancies and inappropriate use that might lead to falls. This is applicable for further investigations in future research.

Second, stakeholders' views regarding deprescribing FRIDs in older adults were examined. Doctors in primary and secondary care and clinical pharmacists in secondary care were interviewed. Their opinions, challenges and facilitators were collected and analysed using a qualitative approach.

The next section presents the main findings, discussion, strengths and limitations of the thesis, future research and the overall conclusion.

8.1. Key findings

This thesis's novelty manifested in exploring stakeholders' views about deprescribing FRIDs. While other researchers have looked at deprescribing more broadly, and many of the findings from the current research are also seen in the wider deprescribing literature, the significant impact that a fall can have upon an older person's health and quality of life means that the risk/benefit balance in the deprescribing of FRIDs may differ somewhat from that associated with deprescribing other medicines. Very little previous work has focused on the deprescribing of FRIDs as a class, though more work on subsets of drugs within it (primarily benzodiazepines) has been undertaken.

The identified challenges and enablers that affect the implementation of the process in practice have been presented and discussed. A range of possible solutions have been suggested to influence the target behaviours that may enhance the implementation of deprescribing FRIDs in practice. Additionally, factors affecting stakeholders' behaviours have been described and data synthesised to form a body of evidence to formulate a proposed intervention design to be used in future interventions. The use of qualitative data to design an intervention moved the study from gathering subjective data to the next level, which is translating knowledge to practical applications (Thompson & Reeve, 2022).

The inappropriate use of FRIDs and the incidence of medication side effects have been found to be high in older patients during and after hospital stay (Parekh et al., 2018; Walsh et al., 2019). Chapter 2 describes the role of pharmacists in improving the care for older adults after discharge by reviewing pharmacist interventions. Although the evidence was low quality on the GRADE scale, this systematic review identified the variety of pharmaceutical care and pharmacists' involvement, its efficacy, and gave a holistic understanding of which interventions could improve

care. For example, confirmation that medication review by pharmacists can help with improving prescribing quality and probably patient adherence is valuable when reflecting on pharmacists' the possible role in deprescribing FRIDs. This was discussed in section 5.4.3.

Chapters 3, 4, and 5 presented the views of HCPs. In the hospital setting, documentation, communication and follow-up difficulties and time were common challenges for hospital doctors when reviewing FRIDs. The main collaborators identified as useful in deprescribing FRIDs were pharmacists and nurses. Patients and their carers were seen as essential players in the conversations and decision-making relating to FRIDs deprescribing.

In primary care, the significant barriers were time, fear of causing harm, perceived patient resistance, missing medication history, delayed discharge letters, and inefficient communication at the interface. Doctors' awareness of the topic, courage to take responsibility, willingness to collaborate with patients and other HCPs, and optimism were the significant facilitators for deprescribing FRIDs.

Chapter 6 included a systematic review and synthesis of qualitative data about patients' opinions of describing some FRIDs classes. The key issues were the lack of knowledge and communication with their doctors and fear of withdrawal symptoms. Repeat prescriptions and BZD dependence present a challenge as well. However, the majority were motivated to change when their doctors advised doing so. Education and support from HCPs appeared to be the primary facilitators of the process. The older patients participating in the focus group confirmed findings in the existing literature as well as providing new insights drawn from their experience.

Chapter 7 compared all challenges and enablers across the healthcare professional stakeholder groups. Target behaviours were determined and linked to suitable BCTs and interventions. In addition, APEASE criteria were applied to some interventions to assess their feasibility.

8.2. Discussion

8.2.1. Challenges in deprescribing FRIDs

Deprescribing in general, similar to other medical decisions, can carry both benefit and harm (Reeve et al., 2018). Compared to general deprescribing, deprescribing some FRIDs classes could be more challenging (Browne et al., 2014; Luymes et al., 2018) due to rebound symptoms and the need for a long tapering period (section 7.1.2). In a previous descriptive study in an Irish hospital, pharmacists reviewed FRIDs for patients and found that only 20% of 238 FRIDs prescriptions were potential candidates for deprescribing (Browne et al., 2014).

A multicentre randomised trial by Gulla et al. (2018), noticed that when deprescribing antihypertensives in frail older patients in a nursing home, there was an increase in participants'

blood pressure in the first four months of follow-up. However, after nine months of withdrawal, the participants' blood pressure returned towards normality. Staff education, individualised treatment and continuous monitoring were required. In another study by Luymes et al. (2018) in a primary care clinic about deprescribing preventive cardiovascular medicines, GPs reported that a small number of participants in the withdrawal group suffered side effects including headaches, increased blood pressure and cholesterol measurements. However, after two years of follow up withdrawal was found to be tolerated and only 18% returned to taking their medications (Luymes et al., 2018). In their study, the patients were at a younger age and had low cardiovascular disease risk compared to those described by Gulla et al. (2018).

Despite the challenges associated with deprescribing (chapter 3), HCPs are advised to balance the risk and benefits of deprescribing FRIDs for every patient (Scott et al., 2015). Moreover, continuous monitoring and support are needed for successful deprescribing (Scott et al., 2015). Guidance is available to help identify potential candidate medications. It is advised that there should be a step-wise approach to deprescribing, focusing on one drug at a time when the patient is in stable health status for smooth monitoring of side effects (Reeve et al., 2014).

8.2.2. Role and responsibilities of each stakeholder

In chapter 7, the HCPs' opinions about responsibility for reviewing FRIDs were considered collectively. HDrs and CPs agreed that everyone is responsible, while the majority of GPs believed it was their responsibility. A small group of HDrs and GPs said the prescribers were accountable. The difference in opinions may follow through to uncertainty about who should review the medication list, with HCPs potentially thinking that someone else will do it at a different stage. To address this risk, there is a need to define the tasks for each member of the care team based on their skills and role in care, especially when reviewing the use of high-risk medications such as FRIDs (Thompson et al., 2019).

Patients too need to know what they have to do. Patients can have an active role, e.g. reporting medication side effects or keeping a list of up-to-date medications to share with HCPs (HSE, 2020). In chapter 4, GPs mentioned that patients asking for discontinuation or complaining of side effects triggered a medication review and changes based on those patients' needs. Furthermore, the patient focus group participants expressed accountability for their medications (chapter 6). Empowering patients by providing information and shared decision aids can help them understand their role and start conversations about deprescribing (Turner et al., 2018).

All HCPs welcomed collaboration and multidisciplinary teamwork, which can help implement multidisciplinary teams. Collaboration with pharmacists in primary and secondary care was discussed in sections 3.4.4 and 4.4.3. Multidisciplinary teams including pharmacists have been

shown to improve outcomes such as healthcare costs and medication safety in randomised trials (Cossette et al., 2019; Gillespie et al., 2009; Kersten et al., 2012).

8.2.3. The conversations about FRIDs deprescribing

From both patients' perspective and our doctors' interviews, there seems to be a communication problem (chapter 6). Doctors may hold back from discussion through concern that patients and their families will resist change, while the patients think the doctor will say something if change is required. Turner et al. (2018) compared patient-doctor conversations for two drug classes, proton pump inhibitors and benzodiazepines, and noticed that the conversations improved after educational interventions. More patients started asking about deprescribing in the intervention group than in the control group. However, patients in the benzodiazepine cohort were more sceptical about the efficacy and necessity of stopping. The authors suggested that doctors should change their approach to deprescribing based on the medication. As some FRIDs carry a risk of psychological dependence and others do not, this is of particular relevance to this set of medicines. A tailored approach of this kind is likely to be valuable in the context of the shared decision making and patient-centred planning described in section (7.2.2.2).

8.2.4. Challenges in the hospital setting

Sixty-five of one hundred patients with fall-related admissions had one or more FRID in their medication list (Marvin et al., 2017). As mentioned in chapter 3, hospital admission was preferred for a medication review and deprescribing, and an inpatient stay presents a good opportunity to review and monitor medications. Changes during a hospital stay were sustained after discharge in a Belgian randomised study (Dalleur et al., 2014). Furthermore, hospitals include multiple care facilities and professions, which could facilitate medication management. For example, medication review by pharmacists was found to help reduce the number of FRIDs used in hospitalised older patients, in a hospital in the UK (Marvin et al., 2017). However, the time needed to complete a comprehensive medication review poses a universal challenge for HCPs (section 7.1.4).

Pereira et al. (2022) interviewed stakeholders to ask about the situation after-discharge. Patients and their carers shared some concerns, including medication discrepancies and lack of communication with HCPs about medication changes, lack of consideration of their preferences, and difficulty in self-managing medications. These factors collectively led to frustration, sometimes reflected in-poor adherence. In chapter 2, pharmacist interventions improved medication prescribing and patients' satisfaction with provided care.

8.2.5. Challenges in the primary care setting

Deprescribing needs more than one point of interaction between patients and HCPs (Huibers et al., 2022). People struggle to keep information after discharge including medication changes (Eibergen et al., 2018). Sharing information and collaboration with GPs after discharge is important for management of polypharmacy in older adults (Thevelin et al., 2022). Nevertheless, incomplete discharge letters or medication information across interfaces was a major issue at discharge (Chapters 3 and 4). In a randomised study, completion of the discharge medication summary by a pharmacist resulted in reduced treatment errors after discharge (Tong et al., 2017). The use of electronic communication such as Healthmail is also beneficial. Doctors reported that it saved time, improved care, and also reduced referrals (Larkin et al., 2017).

8.3. Strengths and limitations

The focus on describing FRIDs in older adults is a strong point of this thesis. Older adults are the most at risk of injuries and death due to falls (EuroSafe, 2016). They are also the most at risk of adverse effects of medications and targeting older population was a priority in deprescribing research (Thompson et al., 2019).

Deprescribing of general medications has been extensively studied in the literature. However, as previously outlined, the particular risk/benefit balance associated with FRIDs means a focused exploration of deprescribing such medicines is valuable. Since deprescribing FRIDs through medication review can also prevent other side effects, not only falls, benefits arising from the process are not solely a reduction in falls. For example, additional benefits may include reduction of the ADE and pill burden.

Using theories to analyse the data facilitated the design of a theory-driven intervention and revealed implementation issues to work on in future research. The theory helped determine which factors affect the behaviours of stakeholders and which behaviours need to be changed. Furthermore, the BCTs informed researchers on how to change the target behaviours and which techniques can be used.

Based on Cochrane's guide for evaluating qualitative research, the quality indicators of qualitative research include credibility, transferability, dependability and confirmability (Hannes, 2011). The coding of the data was done by one researcher, however, the team consensus, verbatim transcribing and using direct quotes support the credibility of the data. Details about the method, e.g. participants and settings were outlined comprehensively to ensure the transferability of the data. Finally, following the COREQ reporting guidance that includes information about the researcher and other salient information should enhance the capacity of readers to understand the research in context.

Some domains were not included in the questions comprising the interview topic guide. A concise set of questions was important to fit the HCPs' time and encourage them to participate. That may have led to missing some barriers and facilitators. However, participants were encouraged to elaborate upon their answers within the time constraints available, and mentioned some other factors which were captured and coded in suitable domains. It should be noted that our results were consistent with other studies in the literature that used a full TDF list (Ailabouni et al., 2016a; Bell et al., 2015; Scott et al., 2019).

The involvement of multiple stakeholders was also valuable. We interviewed several of the first line or immediately involved stakeholders, i.e. doctors and pharmacists who have direct contact with patients and provide immediate care. Interviewees were working in both primary and secondary care. This way, triangulation was possible between the different sets of results and the dependability of the data could be confirmed.

Some stakeholders were not interviewed, though their role in FRIDs management is essential—for example, nurses and nurse prescribers, psychiatrists, community pharmacists, health authorities and hospital administrators. We had planned to interview nurse prescribers, but recruitment challenges prevented this part of the study. Other groups are also important; however, the limited timeframe of the PhD program and the specific challenges associated with access to healthcare professionals working with a vulnerable older population made it necessary to focus on a limited set of stakeholders in the current study.

The involvement of patient stakeholders was highly valuable. They confirmed the previously identified issues and provided their ideas and wishes for future research and improvements in care for the older population.

The SARS-CoV-2 pandemic also had a negative impact on the work. The lockdown and the extreme pressure on health services and healthcare professionals caused an extensive delay in ethics approval and difficulty in recruiting study participants and collaboration with public organisations. Consequently, multiple changes to the plan were necessary to find alternative approaches to the research. The involvement of the older patients in the intervention design was also hindered by these factors.

8.4. Future recommendations

Large, randomised studies that investigated fall prevention programs, including medication review and optimisation, such as FallSafe in the UK (The Health Foundation) and STEADI in the US (Mark & Loomis, 2017). These studies proved that multidisciplinary and multifactorial fall prevention intervention is achievable and effective. However, the implementation is complex and costly. Simple behavioural changes such as habitual documentation of medication changes or prioritising

FRIDs for medication review may enhance implementation in practice and theoretically the sustainability of the intervention.

O'Ciardha et al. (2022) have recently investigated the effect of pharmacist and GP collaboration in primary care clinics in Ireland. The results were positive, and most deprescribed medications were FRIDs. This means this is possible when we have a pharmacist in the clinic. This can be replicated to test the effect on fall prevention. It is also important to keep in mind the recommendation that these interventions should not only focus on cessation, but should also prevent new prescriptions (Gray et al., 2021).

Based on this research, hospitals are encouraged to have local frameworks for deprescribing medications, including FRIDs. These frameworks should include a defined role for every HCP engaged in patient care, with suggested time points for when they need to review medications as well as a list of high-risk medications. The inclusion of resources to use and steps to follow may be beneficial, as may clarification of the legal framework in case of any adverse incidents. This can provide a structured process for all staff which might limit the effect of practice based on individual experience and harm to patients, plus provide protection for doctors and allay some of their concerns.

Hospitals are believed to be a suitable place to start the conversation about deprescribing. However, at discharge a HCP should encourage patients to talk to their GP about any medication problems arising from the process. The GP then can review the need to continue prescribing the medication or change it, involving the patient through shared decision making. In addition, despite the misgivings of some patients in our focus group, the communication challenges identified repeatedly by the stakeholders interviewed in the studies described make it advisable to provide the patients with their up-to-date list of medications at discharge, in order that they can hand it to their GP or pharmacist (O'Ciardha et al., 2022). This both fosters patient engagement and helps in closing the gap in communication at the interface.

During the patient focus group, they suggested the implementation of community social centres for older adults that offer a full fall prevention programme including exercise, medication review, physiotherapy etc. This idea is similar to the cardiac rehabilitation centres to which patients may be referred after acute myocardial infarction episodes for exercise and education about lifestyle changes. These centres displayed long-term mortality reduction (Piepoli et al., 2004). However, there are some factors, such as health insurance and accessibility problems, such as transportation, which lower the rate of participation (Ruano-Ravina et al., 2016).

In addition, the patient participants indicated certain needs, such as socialisation and age-friendly dissemination of health and medication information. The proposed future intervention was

suggested to meet those needs. With a suitable budget it might also be possible to hold live education sessions for the public within falls and fracture clinics in hospitals or GP practices. Each session could include a brief presentation by a doctor and a pharmacist, followed by an open discussion about fall prevention. The suggested model could help people have a friendly conversation with the medical team, share concerns and ask for advice while additionally helping with socialisation, while requiring fewer resources than the comprehensive fall prevention programme model desired by patients.

8.5. General conclusion

Older people are the most affected by inappropriate use of FRIDs and falls (Richardson et al., 2015), especially after discharge (Walsh et al., 2019). General deprescribing has been deemed challenging (Ailabouni et al., 2016a). Prior to our research, understanding of stakeholders' views on deprescribing FRIDs was insufficient. This thesis has discussed the views of three main stakeholders (doctors, pharmacists and patients) regarding the process. The possible role of pharmacists was investigated as well, and suggests current under-utilisation of this cohort. HCPs acknowledged that deprescribing FRIDs could be beneficial to avoid harmful consequences of falls and managing one of the major contributing factors. However, the work environment, social constraints and personal factors make implementation of FRIDs deprescribing challenging.

Patients face difficulties due to communication problems and lack of knowledge about medications, which was highlighted by the systematic review and the patient representatives in chapter 6. They can be held responsible but need to be empowered and supported to take a proactive role.

The finding from this thesis lay the basis for future intervention design, refinement and implementation in practice.

References

Abou, J., Crutzen, S., Tromp, V., Heringa, M., Van Marum, R., Elders, P., . . . Hugtenburg, J. (2022). Barriers and enablers of healthcare providers to deprescribe cardiometabolic medication in older patients: a focus group study. *Drugs and Aging, 39*(3), 209-221. doi:10.1007/s40266-021-00918-7

Agency for Healthcare Research and Quality. (2013, 2023). Preventing falls in hospitals a toolkit for improving quality of care. Retrieved from https://www.ahrq.gov/patient-safety/settings/hospital/fall-prevention/toolkit/index.html

Agostini, J. V., Zhang, Y., & Inouye, S. K. (2007). Use of a computer-based reminder to improve sedative-hypnotic prescribing in older hospitalized patients. *Journal of the American Geriatrics Society, 55*(1), 43-48. doi:10.1111/j.1532-5415.2006.01006.x

Ailabouni, N. J., Nishtala, P. S., Mangin, D., & Tordoff, J. M. (2016a). Challenges and enablers of deprescribing: A general practitioner perspective. *PloS One, 11*(4), e0151066. doi:10.1371/journal.pone.0151066

Ailabouni, N. J., Nishtala, P. S., Mangin, D., & Tordoff, J. M. (2016b). General practitioners' insight into deprescribing for the multimorbid older individual: A qualitative study. *International Journal of Clinical Practice, 70*(3), 261-276. doi:10.1111/ijcp.12780

Akande-Sholabi, W., Ogundipe, F. S., & Adisa, R. (2020). Pharmacists' knowledge and counselling on fall risk increasing drugs in a tertiary teaching hospital in Nigeria. *BMC Health Services Research, 20*(1), 259. doi:10.1186/s12913-020-05140-6

Al-Rashed, S., Wright, D. J., Roebuck, N., suntr, W., & Chrystyn, H. (2002). The value of inpatient pharmaceutical counselling to elderly patients prior to discharge. *British Journal of Clinical Pharmacology, 54*, 657–664. doi:10.1046/j.1365-2125.2002.01707.x.

Alassaad, A., Bertilsson, M., Gillespie, U., Sundstrom, J., Hammarlund-Udenaes, M., & Melhus, H. (2014). The effects of pharmacist intervention on emergency department visits in patients 80 years and older: Subgroup analyses by number of prescribed drugs and appropriate prescribing. *PloS One, 9*(11), e111797. doi:10.1371/journal.pone.0111797

Alhameed, A. F., Khansa, S. A., Hasan, H., Ismail, S., & Aseeri, M. (2019). Bridging the gap between theory and practice; the active role of inpatient pharmacists in therapeutic drug monitoring. *Pharmacy, 7*(1), 20. Retrieved from https://www.mdpi.com/2226-4787/7/1/20

Alipour, V., Azami-Aghdash, S., Rezapour, A., Derakhshani, N., Ghiasi, A., Yusefzadeh, N., . . . Amuzadeh, S. (2021). Cost-effectiveness of multifactorial interventions in preventing falls among elderly population: A systematic review. *Bull Emerg Trauma, 9*(4), 159-168. doi:10.30476/beat.2021.84375.1068

Almanasreh, E., Moles, R., & Chen, T. F. (2020). The medication discrepancy taxonomy (MedTax): The development and validation of a classification system for medication discrepancies identified through medication reconciliation. *Research in Social and Administrative Pharmacy, 16*(2), 142-148. doi:10.1016/j.sapharm.2019.04.005

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). doi:10.1136/bmjopen-2014-006544

Ansryan, L. Z., Aronow, H. U., Borenstein, J. E., Mena, V., Haus, F., Palmer, K., . . . Burnes Bolton, L. (2018). Systems addressing frail elder care: Description of a successful model. *Journal of Nursing Administration, 48*(1), 11-17. doi:10.1097/NNA.0000000000000564

Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., . . . Michie, S. (2017). A guide to using the Theoretical Domains Framework of behaviour change to investigate

implementation problems. *Implementation Science, 12*(1), 77. doi:10.1186/s13012-017-0605-9

Awad, A., & Hanna, O. (2019). Potentially inappropriate medication use among geriatric patients in primary care setting: A cross-sectional study using the Beers, STOPP, FORTA and MAI criteria. *PloS One, 14*(6). doi:10.1371/journal.pone.0218174

Balasubramanian, A., Zhang, J., Chen, L., Wenkert, D., Daigle, S. G., Grauer, A., & Curtis, J. R. (2019). Risk of subsequent fracture after prior fracture among older women. *Osteoporosis International, 30*(1), 79-92. doi:10.1007/s00198-018-4732-1

Barnett, N. L., & Sanghani, P. (2013). A coaching approach to improving concordance. *International Journal of Pharmacy Practice, 21*(4), 270-272. doi:10.1111/ijpp.12004

Barter, G., & Cormack, M. (1996). The long-term use of benzodiazepines: Patients' views, accounts and experiences. *Family Practice, 13*(6), 491-497. doi:10.1093/fampra/13.6.491

Basger, B. J., Moles, R. J., & Chen, T. F. (2015). Impact of an enhanced pharmacy discharge service on prescribing appropriateness criteria: A randomised controlled trial. *International Journal of Clinical Pharmacy, 37*(6), 1194-1205. doi:10.1007/s11096-015-0186-0

Beers, M. H. (1997). Explicit criteria for determining potentially inappropriate medication use by the elderly: An update. *Archives of Internal Medicine, 157*(14), 1531-1536. doi:10.1001/archinte.1997.00440350031003

Bekker, C. L., Mohsenian Naghani, S., Natsch, S., Wartenberg, N. S., & van den Bemt, B. J. F. (2020). Information needs and patient perceptions of the quality of medication information available in hospitals: A mixed method study. *International Journal of Clinical Pharmacy, 42*(6), 1396-1404. doi:10.1007/s11096-020-01125-x

Bell, H. T., Steinsbekk, A., & Granas, A. G. (2015). Factors influencing prescribing of fall-risk-increasing drugs to the elderly: A qualitative study. *Scandinavian Journal of Primary Health Care, 33*(2), 107-114. doi:10.3109/02813432.2015.1041829

Bell, H. T., Steinsbekk, A., & Granas, A. G. (2017). Elderly users of fall-risk-increasing drug perceptions of fall risk and the relation to their drug use - a qualitative study. *Scandinavian Journal of Primary Health Care, 35*(3), 247-255. doi:10.1080/02813432.2017.1358438

Bergen, G., Stevens, M. R., Kakara, R., & Burns, E. R. (2021). Understanding modifiable and unmodifiable older adult fall risk factors to create effective prevention strategies. *American Journal of Lifestyle Medicine, 15*(6), 580-589. doi:10.1177/1559827619880529

BETA. (2017). MEDSTOPPER. Retrieved from https://medstopper.com/team.php

Beuscart, J.-B., Pelayo, S., Robert, L., Thevelin, S., Marien, S., & Dalleur, O. (2021). Medication review and reconciliation in older adults. *European Geriatric Medicine, 12*(3), 499-507. doi:10.1007/s41999-021-00449-9

Bhangu, J., King, K., L., B., Donoghue, A., O., Carroll, L., & Kenny, R. A. (2017). Falls, non-accidental falls and syncope in community-dwelling adults aged 50 years and older: Implications for cardiovascular assessment. *PloS One, 12*(7). doi:10.1371/journal.pone.0180997

Blalock, S. J., Renfro, C. P., Robinson, J. M., Farley, J. F., Busby-Whitehead, J., & Ferreri, S. P. (2020). Using the Drug Burden Index to identify older adults at highest risk for medication-related falls. *BMC Geriatrics, 20*(1), 208. doi:10.1186/s12877-020-01598-5

Blenkinsopp, A., Bond, C., & Raynor, D. K. (2012). Medication reviews. *British Journal of Clinical Pharmacology, 74*(4), 573-580. doi:10.1111/j.1365-2125.2012.04331.x

Bloomfield, H. E., Greer, N., Linsky, A. M., Bolduc, J., Naidl, T., Vardeny, O., . . . Wilt, T. J. (2020). Deprescribing for community-dwelling older adults: A systematic review and meta-analysis. *Journal of General Internal Medicine, 35*(11), 3323-3332. doi:10.1007/s11606-020-06089-2

Boockvar, K. S., Santos, S. L., Kushniruk, A., Johnson, C., & Nebeker, J. R. (2011). Medication reconciliation: barriers and facilitators from the perspectives of resident physicians and pharmacists. *Journal of Hospital Medicine, 6*(6), 329-337. doi:10.1002/jhm.891

Browne, C., Kingston, C., & Keane, C. (2014). Falls prevention focused medication review by a pharmacist in an acute hospital: Implications for future practice. *International Journal of Clinical Pharmacy, 36*, 969–975. doi:10.1007/s11096-014-9980-3

Bulow, C., Clausen, S. S., Lundh, A., & Christensen, M. (2023). Medication review in hospitalised patients to reduce morbidity and mortality. *Cochrane Database of Systematic Reviews, 1*(1), CD008986. doi:10.1002/14651858.CD008986.pub4

Burry, L., Turner, J., Morgenthaler, T., Tannenbaum, C., Cho, H. J., Gathecha, E., . . . Soong, C. (2021). Addressing Barriers to Reducing Prescribing and Implementing Deprescribing of Sedative-Hypnotics in Primary Care. *Annals of Pharmacotherapy, 56*(4), 463-474. doi:10.1177/10600280211033022

Cadogan, C. A., Ryan, C., & Hughes, C. M. (2016). Appropriate Polypharmacy and Medicine Safety: When Many is not Too Many. *Drug Safety, 39*(2), 109-116. doi:10.1007/s40264-015-0378-5

Caleres, G., Modig, S., Midlöv, P., Chalmers, J., & Bondesson, Å. (2020). Medication discrepancies in discharge summaries and associated risk factors for elderly patients with many drugs. *Drugs - real world outcomes, 7*(1), 53-62. doi:10.1007/s40801-019-00176-5

Cameron, I. D., Dyer, S. M., Panagoda, C. E., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2018). Interventions for preventing falls in older people in care facilities and hospitals. *Cochrane Database of Systematic Reviews,* 10.1002/14651858.CD005465.pub4(9). doi:10.1002/14651858.CD005465.pub4

Campbell, A. J., Robertson, M. C., Gardner, M. M., Norton, R. N., & Buchner, D. M. (1999). Psychotropic medication withdrawal and a home-based exercise program to prevent falls: A randomized controlled trial. *Journal of the American Geriatrics Society, 47*(7), 850-853. doi:https://doi.org/10.1111/j.1532-5415.1999.tb03843.x

Canham, S. L., Gallo, J., & Simoni-Wastila, L. (2014). Perceptions of benzodiazepine dependence among women age 65 and older. *J Gerontol Soc Work, 57*(8), 872-888. doi:10.1080/01634372.2014.901470

Cardwell, K., Smith, S. M., Clyne, B., McCullagh, L., Wallace, E., Kirke, C., . . . General Practice Pharmacist Study, G. (2020). Evaluation of the General Practice Pharmacist (GPP) intervention to optimise prescribing in Irish primary care: A non-randomised pilot study. *BMJ Open, 10*(6), e035087. doi:10.1136/bmjopen-2019-035087

Casey, C. M., Parker, E. M., Winkler, G., Liu, X., Lambert, G. H., & Eckstrom, E. (2017). Lessons learned from implementing CDC's STEADi falls prevention algorithm in primary care. *Gerontologist, 57*(4), 787-796. doi:10.1093/geront/gnw074

Ceschi, A., Noseda, R., Pironi, M., Lazzeri, N., Eberhardt-Gianella, O., Imelli, S., . . . Ferrari, P. (2021). Effect of medication reconciliation at hospital admission on 30-day returns to hospital: A randomized clinical trial. *JAMA network open, 4*(9), e2124672-e2124672. doi:10.1001/jamanetworkopen.2021.24672

Chen, L., Farrell, B., Ward, N., Russell, G., Eisener-Parsche, P., & Dore, N. (2010). Discontinuing benzodiazepine therapy: An interdisciplinary approach at a geriatric day hospital. *Canadian Pharmacists Journal / Revue des Pharmaciens du Canada, 143*(6), 286-295.e283. doi:10.3821/1913-701x-143.6.286

Cheng, P., Tan, L., Ning, P., Li, L., Gao, Y., Wu, Y., . . . Hu, G. (2018). Comparative effectiveness of published interventions for elderly fall prevention: A systematic review and network meta-analysis. *International Journal of Environmental Research and Public Health, 15*(3). doi:10.3390/ijerph15030498

Choi, J., & Vordenberg, S. E. (2021). Older adults' perceptions of deprescribing chronic benzodiazepines. *Journal of the American Pharmacists Association, 61*(5), 533-538. e533.

Chu, Z. R. (2017). Preventing in-patient falls: The nurse's pivotal role. *Nursing, 47*(3), 24-30. doi:10.1097/01.NURSE.0000512872.83762.69

Clyne, B., Cooper, J. A., Boland, F., Hughes, C. M., Fahey, T., & Smith, S. M. (2017). Beliefs about prescribed medication among older patients with polypharmacy: A mixed methods study in primary care. *British Journal of General Practice, 67*(660), e507-e518. doi:10.3399/bjgp17X691073

Cook, J. M., Biyanova, T., Masci, C., & Coyne, J. C. (2007a). Older patient perspectives on long-term anxiolytic benzodiazepine use and discontinuation: A qualitative study. *Journal of General Internal Medicine, 22*(8), 1094-1100. doi:10.1007/s11606-007-0205-5

Cook, J. M., Biyanova, T., Thompson, R., & Coyne, J. C. (2007b). Older primary care patients' willingness to consider discontinuation of chronic benzodiazepines. *General Hospital Psychiatry, 29*(5), 396-401. doi:10.1016/j.genhosppsych.2007.07.001

Cooper, J. A., Cadogan, C. A., Patterson, S. M., Kerse, N., Bradley, M. C., Ryan, C., & Hughes, C. M. (2015). Interventions to improve the appropriate use of polypharmacy in older people: A cochrane systematic review. *BMJ Open, 5*(12), 11. doi:10.1136/bmjopen-2015-009235

Cornwell, J. (2012). Continuity of care for older hospital patients: A call for action. *The King's Fund*.

Cossette, B., Taseen, R., Roy-Petit, J., Villemure, M. P., Grondin, M., Ricard, G., . . . Ethier, J. F. (2019). A pharmacist-physician intervention model using a computerized alert system to reduce high-risk medication use in primary care. *European Journal of Clinical Pharmacology, 75*(7), 1017-1023. doi:10.1007/s00228-019-02660-x

Cox, N., Ilyas, I., Roberts, H. C., & Ibrahim, K. (2022). Exploring the prevalence and types of fall-risk-increasing drugs among older people with upper limb fractures. *International Journal of Pharmacy Practice,* 10.1093/ijpp/riac084. doi:10.1093/ijpp/riac084

Craddock, K., Molino, S., Stranges, P. M., Suda, K. J., Bleasdale, S. C., Radosta, J., . . . Gross, A. E. (2020). The impact of educational interventions on antibiotic prescribing for acute upper respiratory tract infections in the ambulatory care setting: A quasi-experimental study. *Journal of the American College of Clinical Pharmacy, 3*(3), 609-614. doi:https://doi.org/10.1002/jac5.1205

Critical Appraisal Skills Programme. (2022). CASP qualitative research checklist: 10 questions to help make sense of qualitative research. Retrieved from https://casp-uk.net/casp-tools-checklists/

Cross, A. J., Buchbinder, R., Mathieson, S., Bourne, A., Maher, C. G., Lin, C. C., & O'Connor, D. A. (2022). Barriers and enablers to monitoring and deprescribing opioid analgesics for chronic non-cancer pain: A systematic review with qualitative evidence synthesis using the Theoretical Domains Framework. *BMJ quality & safety, 31*(5), 387-400. doi:10.1136/bmjqs-2021-014186

Crotty, M., Rowett, D., Spurling, L., Giles, L. C., & Phillips, P. A. (2004). Does the addition of a pharmacist transition coordinator improve evidence-based medication management and health outcomes in older adults moving from the hospital to a long-term care facility? Results of a randomized, controlled trial. *The American Journal of Geriatric Pharmacotherapy, 2*(4), 257-264.

Crutzen, S., Abou, J., Smits, S. E., Baas, G., Hugtenburg, J. G., Heringa, M., . . . Taxis, K. (2021). Older people's attitudes towards deprescribing cardiometabolic medication. *BMC Geriatrics, 21*(1), 366. doi:10.1186/s12877-021-02249-z

Cuevas-Trisan, R. (2019). Balance problems and fall risks in the elderly. *Clinics in Geriatric Medicine, 35*(2), 173-183. doi:10.1016/j.cger.2019.01.008

Cunningham, Y., Wood, K., Stewart, C., Nakham, A., Newlands, R., Gallacher, K. I., . . . Mair, F. S. (2021). Understanding stakeholder views regarding the design of an intervention trial to reduce anticholinergic burden: A qualitative study. *Front Pharmacology, 12*, 608208. doi:10.3389/fphar.2021.608208

Curtin, D., Gallagher, P., & O'Mahony, D. (2021). Deprescribing in older people approaching end-of-life: Development and validation of STOPPFrail version 2. *Age and Ageing, 50*(2), 465-471. doi:10.1093/ageing/afaa159

Curtin, D., Gallagher, P. F., & O'Mahony, D. (2019). Explicit criteria as clinical tools to minimize inappropriate medication use and its consequences. *Therapeutic Advances in Drug Safety, 10*. doi:10.1177/2042098619829431

D'Avanzo, B., Agosti, P., Reeve, E., Pasina, L., Sabbà, C., Mannucci, P. M., & Nobili, A. (2020). Views of medical practitioners about deprescribing in older adults: Findings from an Italian qualitative study. *Maturitas, 134*, 29-33. doi:10.1016/j.maturitas.2020.01.009

Da Silva, L. G. R., Da Silva Pinto, A. W., De Queiroz, W. E., Coelho, C. C., Blatt, C. R., Oliveira, M. G., . . . Baldoni, A. O. (2022). Deprescribing clonazepam in primary care older patients: A feasibility study. *International Journal of Clinical Pharmacy, 44*(2), 489-498. doi:10.1007/s11096-021-01371-7

Dalleur, O., Boland, B., Losseau, C., Henrard, S., Wouters, D., Speybroeck, N., . . . Spinewine, A. (2014). Reduction of potentially inappropriate medications using the stopp criteria in frail older inpatients: A randomised controlled study. *Drugs and Aging, 31*(4), 291-298. doi:10.1007/s40266-014-0157-5

Dalleur, O., Spinewine, A., Henrard, S., Losseau, C., Speybroeck, N., & Boland, B. (2012). Inappropriate prescribing and related hospital admissions in frail older persons according to the STOPP and START criteria. *Drugs and Aging, 29*(10), 829-837. doi:10.1007/s40266-012-0016-1

Dalton, K., Fleming, A., O'Mahony, D., & Byrne, S. (2022). Factors affecting physician implementation of hospital pharmacists' medication appropriateness recommendations in older adults. *British Journal of Clinical Pharmacology, 88*(2), 628-654. doi:10.1111/bcp.14987

Dalton, K., O'Brien, G., O'Mahony, D., & Byrne, S. (2018). Computerised interventions designed to reduce potentially inappropriate prescribing in hospitalised older adults: A systematic review and meta-analysis. *Age and Ageing, 47*(5), 670-678. doi:10.1093/ageing/afy086

Dautzenberg, L., Beglinger, S., Tsokani, S., Zevgiti, S., Raijmann, R., Rodondi, N., . . . Koek, H. L. (2021). Interventions for preventing falls and fall-related fractures in community-dwelling older adults: A systematic review and network meta-analysis. *Journal of the American Geriatrics Society, 69*(10), 2973-2984. doi:10.1111/jgs.17375

De Vries, M., Seppala, L. J., Daams, J. G., van de Glind, E. M. M., Masud, T., van der Velde, N., . . . Finish Group on Fall-Risk-Increasing, D. (2018). Fall-Risk-Increasing Drugs: A systematic review and meta-analysis: I. Cardiovascular drugs. *Journal of the American Medical Directors Association, 19*(4), 371 e371-371 e379. doi:10.1016/j.jamda.2017.12.013

Delgado-Silveira, E., Velez-Diaz-Pallares, M., Munoz-Garcia, M., Correa-Perez, A., Alvarez-Diaz, A. M., & Cruz-Jentoft, A. J. (2021). Effects of hospital pharmacist interventions on health outcomes in older polymedicated inpatients: A scoping review. *European Geriatric Medicine, 12*(3), 509-544. doi:10.1007/s41999-021-00487-3

Deprescribing guidelines and algorithms. (2015). Retrieved from https://deprescribing.org/resources/deprescribing-guidelines-algorithms/

Dickinson, R., Knapp, P., House, A. O., Dimri, V., Zermansky, A., Petty, D., . . . Raynor, D. K. (2010). Long-term prescribing of antidepressants in the older population: A qualitative study. *British Journal of General Practice, 60*(573), e144-155. doi:10.3399/bjgp10X483913

Dipanda, M., Barben, J., Nuémi, G., Vadot, L., Nuss, V., Vovelle, J., . . . Manckoundia, P. (2020). Changes in treatment of very elderly patients six weeks after discharge from geriatrics department. *Geriatrics, 5* (44). doi:10.3390/geriatrics5030044

Doellner, J. F., Dettloff, R. W., DeVuyst-Miller, S., & Wenstrom, K. L. (2017). Prescriber acceptance rate of pharmacists' recommendations. *Journal of the American Pharmacists Association, 57*(3), S197-S202. doi:10.1016/j.japh.2017.03.002

Duerden, M., Avery, T., & Rupert, P. (2013). Polypharmacy and medicines optimisation: making it safe and sound *The King's Fund*.
Duncan, P., Duerden, M., & Payne, R. A. (2017). Deprescribing: A primary care perspective. *European Journal of Hospital Pharmacy, 24*(1), 37-42. doi:10.1136/ejhpharm-2016-000967
Early, N. K., Fairman, K. A., Hagarty, J. M., & Sclar, D. A. (2019). Joint effects of advancing age and number of potentially inappropriate medication classes on risk of falls in Medicare enrollees. *BMC Geriatrics, 19*(1), 194. doi:10.1186/s12877-019-1202-3
eHealth Ireland. Healthmail. Retrieved from https://www.ehealthireland.ie/a2i-hids-programme/healthmail/
Eibergen, L., Janssen, M. J. A., Blom, L., & Karapinar-Çarkit, F. (2018). Informational needs and recall of in-hospital medication changes of recently discharged patients. *Research in Social and Administrative Pharmacy, 14*(2), 146-152. doi:10.1016/j.sapharm.2017.01.006
Elamin, M. M., Ahmed, K. O., Saeed, O. K., & Yousif, M. A. E. (2021). Impact of clinical pharmacist-led medication reconciliation on therapeutic process. *Saudi Journal for Health Sciences, 10*(2). doi:10.4103/sjhs.sjhs_6_21
Elias, A. M., Ogunwale, A. N., Pepin, M. J., Bailey, J. C., Adams, A. D., Colon-Emeric, C. S., . . . Pavon, J. M. (2020). High prevalence of fall-related medication use in older veterans at risk for falls. *Journal of the American Geriatrics Society, 68*(2), 438-439. doi:10.1111/jgs.16233
Ellitt, G. R. (2009). Quality patient care and pharmacists' role in its continuity-Asystematic review. *Annals of Pharmacotherapy, 43*(4), 677-691. doi:10.1345/aph.1L505
Ensing, H. T., Stuijt, C. C., Van Den Bemt, B. J., Van Dooren, A. A., Karapinar-Çarkit, F., Koster, E. S., & Bouvy, M. L. (2015). Identifying the optimal role for pharmacists in care transitions: A systematic review. *J Manag Care Spec Pharm, 21*(8), 614-636.
EuroSafe. (2016). Injuries in the European Union, Summary on injury statistics 2012-2014. 6th. Retrieved from https://www.eurosafe.eu.com/uploads/inline-files/EuropeSafe_Master_Web_02112016%20%282%29.pdf
Evrard, P., Pétein, C., Beuscart, J.-B., & Spinewine, A. (2022). Barriers and enablers for deprescribing benzodiazepine receptor agonists in older adults: A systematic review of qualitative and quantitative studies using the theoretical domains framework. *Implementation Science, 17*(1), 41. doi:10.1186/s13012-022-01206-7
Fabricius, P. K., Aharaz, A., Stefansdottir, N. T., Houlind, M. B., Steffensen, K. D., Andersen, O., & Kirk, J. W. (2022). Shared decision making with acutely hospitalized, older poly-medicated patients: A mixed-methods study in an emergency department. *International Journal of Environmental Research and Public Health, 19*(11). doi:10.3390/ijerph19116429
Fajardo, M. A., Weir, K. R., Bonner, C., Gnjidic, D., & Jansen, J. (2019). Availability and readability of patient education materials for deprescribing: An environmental scan. *British Journal of Clinical Pharmacology, 85*(7), 1396-1406. doi:10.1111/bcp.13912
Falconer, N., Snoswell, C., Morris, C., & Barras, M. (2021). The right time and place: The need for seven-day pharmacist service models. *Journal of Pharmacy Practice and Research,* 10.1002/jppr.1761. doi:10.1002/jppr.1761
Foley, R.-A., Hurard, L. L., Cateau, D., Koutaissoff, D., Bugnon, O., & Niquille, A. (2020). Physicians', nurses' and pharmacists' perceptions of determinants to deprescribing in nursing homes considering three levels of action: A qualitative study. *Pharmacy, 8*(1), 17.
Fredrickson, B. A., & Burkett, E. (2019). Interventions to improve the continuity of medication management upon discharge of patients from hospital to residential aged care facilities. *Journal of Pharmacy Practice and Research, 49*(2), 162-170. doi:10.1002/jppr.1462
Fretwell, M. D., Raymond, P. M., McGarvey, S. T., Owens, N., Traines, M., Silliman, R. A., & Mor, V. (1990). The Senior Care Study: A controlled trial of a consultative/unit-based geriatric

assessment program in acute care. *Journal of the American Geriatrics Society, 38*(10), 1073-1081. doi:10.1111/j.1532-5415.1990.tb01368.x

Fritsch, M. A., & Shelton, P. S. (2019). Geriatric polypharmacy: Pharmacist as key facilitator in assessing for falls risk: 2019 Update. *Clinics in Geriatric Medicine, 35*(2), 185-204. doi:10.1016/j.cger.2019.01.010

Galazzi, A., Lusignani, M., Chiarelli, M. T., Mannucci, P. M., Franchi, C., Tettamanti, M., . . . Nobili, A. (2016). Attitudes towards polypharmacy and medication withdrawal among older inpatients in Italy. *International Journal of Clinical Pharmacy, 38*(2), 454-461. doi:10.1007/s11096-016-0279-4

Gallagher, P., Ryan, C., Byrne, S., Kennedy, J., & O'Mahony, D. (2008). STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment). Consensus validation. *International Journal of Clinical Pharmacology and Therapeutics, 46*(2), 72-83. doi:10.5414/cpp46072

Gao, L., Maidment, I., Matthews, F. E., Robinson, L., Brayne, C., Medical Research Council Cognitive Function, & Ageing Study. (2017). Medication usage change in older people (65+) in England over 20 years: Findings from CFAS I and CFAS II. *Age and Ageing, 47*(2), 220-225. doi:10.1093/ageing/afx158

Garattini, L., Padula, A., & Freemantle, N. (2021). Do European pharmacists really have to trespass on medicine? *The European Journal of Health Economics, 22*(1), 1-4. doi:10.1007/s10198-020-01185-w

Garzón, C., Guerrero, J. M., Aramburu, O., & Guzmán, T. (2009). Effect of melatonin administration on sleep, behavioral disorders and hypnotic drug discontinuation in the elderly: A randomized, double-blind, placebo-controlled study. *Aging Clinical and Experimental Research, 21*(1), 38-42. doi:10.1007/bf03324897

Gemmeke, M., Koster, E. S., Janatgol, O., Taxis, K., & Bouvy, M. L. (2021). Pharmacy fall prevention services for the community-dwelling elderly: Patient engagement and expectations. *Health and Social Care in the Community,* 10.1111/hsc.13475. doi:10.1111/hsc.13475

Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L. M., & Lamb, S. E. (2012). Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews,* 10.1002/14651858.CD007146.pub3(9). doi:10.1002/14651858.CD007146.pub3

Gillespie, R., Mullan, J., & Harrison, L. (2018a). Deprescribing for older adults in Australia: factors influencing GPs. *Aust J Prim Health, 24*(6), 463-469. doi:10.1071/PY18056

Gillespie, R. J., Harrison, L., & Mullan, J. (2018b). Deprescribing medications for older adults in the primary care context: A mixed studies review. *Health Sci Rep, 1*(7), e45. doi:10.1002/hsr2.45

Gillespie, U., Alassaad, A., Hammarlund-Udenaes, M., Mörlin, C., Henrohn, D., Bertilsson, M., & Melhus, H. (2013). Effects of pharmacists' interventions on appropriateness of prescribing and evaluation of the instruments' (MAI, STOPP and STARTs') ability to predict hospitalization--analyses from a randomized controlled trial. *PloS One, 8*(5), e62401-e62401. doi:10.1371/journal.pone.0062401

Gillespie, U., Alassaad, A., Henrohn, D., Garmo, H., Hammarlund-Udenaes, M., Toss, H., . . . Mörlin, C. (2009). A comprehensive pharmacist intervention to reduce morbidity in patients 80 years or older: A randomized controlled trial. *Archives of Internal Medicine, 169*(9), 894-900. doi:10.1001/archinternmed.2009.71

Gnjidic, D., Ong, H. M. M., Leung, C., Jansen, J., & Reeve, E. (2019). The impact of in hospital patient-education intervention on older people's attitudes and intention to have their benzodiazepines deprescribed: A feasibility study. *Therapeutic Advances in Drug Safety, 10*, 2042098618816562.

Goodwin, N. (2016). Understanding integrated care. *International journal of integrated care, 16*(4), 6. doi:10.5334/ijic.2530

Gray, S. L., Elsisi, Z., Phelan, E. A., & Hanlon, J. T. (2021). Interventions to reduce fall-risk-increasing drug use to prevent falls: A narrative review of randomized trials. *Drugs and Aging, 38*(4), 301-309. doi:10.1007/s40266-021-00835-9

Green, A. R., Boyd, C. M., Gleason, K. S., Wright, L., Kraus, C. R., Bedoy, R., . . . Bayliss, E. A. (2020). Designing a primary care–based deprescribing intervention for patients with dementia and multiple chronic conditions: A qualitative study. *Journal of General Internal Medicine, 35*(12), 3556-3563. doi:10.1007/s11606-020-06063-y

Green, A. R., Lee, P., Reeve, E., Wolff, J. L., Chen, C. C. G., Kruzan, R., & Boyd, C. M. (2019). Clinicians' perspectives on barriers and enablers of optimal prescribing in patients with dementia and coexisting conditions. *Journal of the American Board of Family Medicine, 32*(3), 383-391. doi:10.3122/jabfm.2019.03.180335

Grimes, T. C., Deasy, E., Allen, A., O'Byrne, J., Delaney, T., Barragry, J., . . . Wall, C. (2014). Collaborative pharmaceutical care in an Irish hospital: uncontrolled before-after study. *BMJ Quality & Safety, 23*(7), 574-583. doi:10.1136/bmjqs-2013-002188

Guirguis-Blake, J. M., Michael, Y. L., Perdue, L. A., Coppola, E. L., & Beil, T. L. (2018). Interventions to prevent falls in older adults: Updated evidence report and systematic review for the US preventive services task force. *JAMA, 319*(16), 1705-1716. doi:10.1001/jama.2017.21962

Gulla, C., Flo, E., Kjome, R. L., & Husebo, B. S. (2018). Deprescribing antihypertensive treatment in nursing home patients and the effect on blood pressure. *Journal of geriatric cardiology : JGC, 15*(4), 275-283. doi:10.11909/j.issn.1671-5411.2018.04.011

Gupta, S., & Cahill, J. D. (2016). A prescription for 'Deprescribing' in psychiatry. *Psychiatric Services, 67*(8), 904-907. doi:10.1176/appi.ps.201500359

Haagsma, J. A., Olij, B. F., Majdan, M., van Beeck, E. F., Vos, T., Castle, C. D., . . . Polinder, S. (2020). Falls in older aged adults in 22 European countries: incidence, mortality and burden of disease from 1990 to 2017. *Injury Prevention, 26*, i67-i74. doi:10.1136/injuryprev-2019-043347

Haggerty, J., Reid, R. J., Freeman, G. K., Starfield, B. H., Adair, C. E., & R., M. (2003). Continuity of care: A multidisciplinary review. *BMJ, 327*, 1219–1221.

Hahn, E. E., Munoz-Plaza, C. E., Lee, E. A., Luong, T. Q., Mittman, B. S., Kanter, M. H., . . . Danforth, K. N. (2021). Patient and physician perspectives of deprescribing potentially inappropriate medications in older adults with a history of falls: A qualitative study. *Journal of General Internal Medicine, 36*(10), 3015-3022. doi:10.1007/s11606-020-06493-8

Hamilton, H., Gallagher, P., Ryan, C., Byrne, S., & O'Mahony, D. (2011). Potentially inappropriate medications defined by STOPP criteria and the risk of adverse drug events in older hospitalized patients. *Archives of Internal Medicine, 171*(11), 1013-1019. doi:10.1001/archinternmed.2011.215

Hanlon, J. T., Schmader, K. E., Samsa, G. P., Weinberger, M., Uttech, K. M., Lewis, I. K., . . . Feussner, J. R. (1992). A method for assessing drug therapy appropriateness. *Journal of Clinical Epidemiology, 45*(10), 1045-1051. doi:10.1016/0895-4356(92)90144-C

Hannes, K. (2011). Critical appraisal of qualitative research. In Noyes J, Booth A, Hannes K, Harden A, Harris J, Lewin S, Lockwood C (editors), Supplementary guidance for inclusion of qualitative research in cochrane systematic reviews of interventions (1 ed., Retrieved from http://cqrmg.cochrane.org/supplemental-handbook-guidance): Cochrane Collaboration Qualitative Methods Group. Retrieved from http://cqrmg.cochrane.org/supplemental-handbook-guidance.

Hart, L. A., Phelan, E. A., Yi, J. Y., Marcum, Z. A., & Gray, S. L. (2020). Use of Fall Risk-Increasing Drugs around a fall-related injury in older adults: A systematic review. *Journal of the American Geriatrics Society, 68*(6), 1334-1343. doi:10.1111/jgs.16369

Health Information and Quality Authority. (2014). *Guidance for health and social care providers: Principles of good practice in medication reconciliation*. Ireland Retrieved from https://www.hiqa.ie/reports-and-publications/guide/guidance-principles-good-practice-medication-reconciliation.

Higgins JPT, & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]*. In Retrieved from http://handbook.cochrane.org. Retrieved from http://handbook.cochrane.org.

Hilmer, S. N., Mager, D. E., Simonsick, E. M., Cao, Y., Ling, S. M., Windham, B. G., . . . Abernethy, D. R. (2007). A drug burden index to define the functional burden of medications in older people. *Archives of Internal Medicine, 167*, 781-787.

Holland, R., Desborough, J., Goodyer, L., Hall, S., Wright, D., & Loke, Y. K. (2008). Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis. *British Journal of Clinical Pharmacology, 65*(3), 303-316. doi:10.1111/j.1365-2125.2007.03071.x

Holmes, H. M., & Todd, A. (2017). The Role of Patient Preferences in Deprescribing. *Clinics in Geriatric Medicine, 33*, 165-175. doi:10.1016/j.cger.2017.01.004

Hopewell, S., Copsey, B., Nicolson, P., Adedire, B., Boniface, G., & Lamb, S. (2020). Multifactorial interventions for preventing falls in older people living in the community: A systematic review and meta-analysis of 41 trials and almost 20 000 participants. *British Journal of Sports Medicine, 54*(22), 1340-1350. doi:10.1136/bjsports-2019-100732

Hoy, S. (2010). Pharmacist involvement in fall prevention. *American Journal of Health-System Pharmacy, 67*(16), 1312. doi:10.2146/ajhp100048

HSE. ICP for older persons. Retrieved from https://www.hse.ie/eng/about/who/cspd/icp/older-persons/#:~:text=The%20aim%20of%20the%20integrated,based%2C%20planned%20and%20coordinated%20care.

HSE. The structured chronic disease management programme. Retrieved from https://www.hse.ie/eng/about/who/gmscontracts/2019agreement/chronic-disease-management-programme/

HSE. (2020). Get started: Know check ask for people who use medicines and their families. Retrieved from https://www.hse.ie/eng/about/who/nqpsd/qps-improvement/get-started-know-check-ask-for-people-who-use-medicines-and-their-families.html

HSE. (2021). Medicines management programme: Guidance on appropriate prescribing of benzodiazepines and z-drugs (BZRA) for the treatment of anxiety and insomnia. Retrieved from https://www.hse.ie/eng/about/who/cspd/ncps/medicines-management/bzra-for-anxiety-insomnia/guidance-on-appropriate-prescribing-of-bzra-feb-2021.pdf.

Huibers, C. J. A., Sallevelt, B., Heij, J., O'Mahony, D., Rodondi, N., Dalleur, O., . . . Knol, W. (2022). Hospital physicians' and older patients' agreement with individualised STOPP/START-based medication optimisation recommendations in a clinical trial setting. *European Geriatric Medicine, 13*(3), 541-552. doi:10.1007/s41999-022-00633-5

Iliffe, S., Curran, H. V., Collins, R., Yuen Kee, S. C., Fletcher, S., & Woods, B. (2004). Attitudes to long-term use of benzodiazepine hypnotics by older people in general practice: Findings from interviews with service users and providers. *Aging & Mental Health, 8*(3), 242-248. doi:10.1080/13607860410001669778

INVOLVE. (2012). Briefing notes for researchers: Involving the public in NHS, public health and social care research. Retrieved from https://www.invo.org.uk/wp-content/uploads/2012/04/INVOLVEBriefingNotesApr2012.pdf

Isenor, J. E., Bai, I., Cormier, R., Helwig, M., Reeve, E., Whelan, A. M., . . . Kennie-Kaulbach, N. (2021). Deprescribing interventions in primary health care mapped to the Behaviour Change Wheel: A scoping review. *Research in Social & Administrative Pharmacy, 17*(7), 1229-1241. doi:10.1016/j.sapharm.2020.09.005

Iwasaki, S., & Yamasoba, T. (2014). Dizziness and imbalance in the elderly: Age-related decline in the vestibular system. *Aging and Disease, 6*(1), 38-47. doi:10.14336/AD.2014.0128

Johansson, M., Guyatt, G., & Montori, V. (2023). Guidelines should consider clinicians' time needed to treat. *BMJ, 380*, e072953. doi:10.1136/bmj-2022-072953

Johnston, D., McMurray, O., McKee, M., McConville, M., & Leonard, N. (2018). 'Discharge letter quality: How to help both junior doctors and GPs?'. *Ulster Medical Journal, 87*(2), 130.

Johnston, Y. A., Bergen, G., Bauer, M., Parker, E. M., Wentworth, L., McFadden, M., . . . Garnett, M. (2019). Implementation of the stopping elderly accidents, deaths, and injuries initiative in primary care: An outcome evaluation. *Gerontologist, 59*(6), 1182-1191. doi:10.1093/geront/gny101

Joling, K. J., van Eenoo, L., Vetrano, D. L., Smaardijk, V. R., Declercq, A., Onder, G., . . . van der Roest, H. G. (2018). Quality indicators for community care for older people: A systematic review. *PloS One, 13*(1), Article e0190298. doi:10.1371/journal.pone.0190298

Jull, J., Köpke, S., Smith, M., Carley, M., Finderup, J., Rahn, A. C., . . . et al. (2021). Decision coaching for people making healthcare decisions. *Cochrane Database of Systematic Reviews,* 10.1002/14651858.CD013385.pub2(11). doi:10.1002/14651858.CD013385.pub2

Kaboli, P. J., Hoth, A. B., McClimon, B. J., & Schnipper, J. L. (2006). Clinical pharmacists and inpatient medical care: A systematic review. *Archives of Internal Medicine, 166*(9), 955-964. doi:10.1001/archinte.166.9.955

Kalim, R., McMahon, N., & Ryder, S. (2019). 113 Pharmacist interventions at discharge and the quality of older patients' care: A systematic review. *Age and Ageing, 48*.

Kaufmann, C., Tremp, R., Hersberger, K., & Lampert, M. (2014). Inappropriate prescribing: A systematic overview of published assessment tools. *European Journal of Clinical Pharmacology, 70*(1), 1-11. doi:10.1007/s00228-013-1575-8

Kelly, D., Graffi, J., Noonan, M., Green, P., McFarland, J., Hayes, P., & Glynn, L. (2021). Exploration of GP perspectives on deprescribing antidepressants: A qualitative study. *BMJ Open, 11*(4), e046054. doi:10.1136/bmjopen-2020-046054

Kersten, H., Molden, E., Tolo, I. K., Skovlund, E., Engedal, K., & Wyller, T. B. (2012). Cognitive effects of reducing anticholinergic drug burden in a frail elderly population: A randomized controlled trial. *The Journals of Gerontology: Series A, 68*(3), 271-278. doi:10.1093/gerona/gls176

Khow, K. S. F., & Visvanathan, R. (2017). Falls in the aging population. *Clinics in Geriatric Medicine, 33*(3), 357-368. doi:10.1016/j.cger.2017.03.002

Kiesel, E., & Hopf, Y. (2018). Hospital pharmacists working with geriatric patients in Europe: A systematic literature review. *European Journal of Hospital Pharmacy, 25*(e1), e74-e81. doi:10.1136/ejhpharm-2017-001239

Kindstedt, J., Svahn, S., Sjölander, M., Glader, E.-L., Lövheim, H., & Gustafsson, M. (2020). Investigating the effect of clinical pharmacist intervention in transitions of care on drug-related hospital readmissions among the elderly: Study protocol for a randomised controlled trial. *BMJ Open, 10*(4), e036650-e036650. doi:10.1136/bmjopen-2019-036650

King, R., & Rabino, S. (2023). ACB calculator. Retrieved from http://www.acbcalc.com/

Koehler, B. E., Richter, K. M., Youngblood, L., Cohen, B. A., Prengler, I. D., Cheng, D., & Masica, A. L. (2009). Reduction of 30-day postdischarge hospital readmission or emergency department (ED) visit rates in high-risk elderly medical patients through delivery of a targeted care bundle. *Journal of Hospital Medicine, 4*(4), 211-218. doi:10.1002/jhm.427

Kouladjian, L., Gnjidic, D., Reeve, E., Chen, T. F., & Hilmer, S. N. (2016). Health care practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Annals of Pharmacotherapy, 50*(8), 625-636. doi:10.1177/1060028016652997

Krishnaswami, A., Steinman, M. A., Goyal, P., Zullo, A. R., Anderson, T. S., Birtcher, K. K., . . . American College of Cardiology. (2019). Deprescribing in older adults with cardiovascular disease. *Journal of the American College of Cardiology, 73*(20), 2584-2595. doi:10.1016/j.jacc.2019.03.467

Kua, C.-H., 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. doi:10.1016/j.jamda.2018.10.026

Kuntz, J., Kouch, L., Christian, D., Peterson, P. L., & Gruss, I. (2018). Barriers and facilitators to the deprescribing of nonbenzodiazepine sedative medications among older adults. *Perm J, 22*, 17-157. doi:10.7812/tpp/17-157

Kutner, J. S., Blatchford, P. J., Taylor, D. H., Jr., Ritchie, C. S., Bull, J. H., Fairclough, D. L., . . . Abernethy, A. P. (2015). Safety and benefit of discontinuing statin therapy in the setting of advanced, life-limiting illness: A randomized clinical trial. *JAMA internal medicine, 175*(5), 691-700. doi:10.1001/jamainternmed.2015.0289

Laflamme, L., Monárrez-Espino, J., Johnell, K., Elling, B., & Möller, J. (2015). Type, number or both? A population-based matched case-control study on the risk of fall injuries among older people and number of medications beyond fall-inducing drugs. *PloS One, 10*(3), e0123390-e0123390. doi:10.1371/journal.pone.0123390

Lamb, S. E., Jørstad-Stein, E. C., Hauer, K., & Becker, C. (2005). Development of a common outcome data set for fall injury prevention trials: the Prevention of Falls Network Europe consensus. *Journal of the American Geriatrics Society, 53*(9), 1618-1622. doi:10.1111/j.1532-5415.2005.53455.x

Lambson, M. A. (2003). Benzodiazepine use in elderly residents of a retirement village in Sandton: Knowledge, attitudes and perceptions of the patients, the nursing staff and the prescribing doctors. *the Faculty of Health Sciences, Family Medicine, Master*, 54.

Langford, A. V., Gnjidic, D., Lin, C. C., Bero, L., Penm, J., Blyth, F. M., & Schneider, C. R. (2021). Challenges of opioid deprescribing and factors to be considered in the development of opioid deprescribing guidelines: A qualitative analysis. *BMJ Qual Saf, 30*(2), 133-140. doi:10.1136/bmjqs-2020-010881

Larkin, J., Pericin, I., & Collins, C. (2017). Healthmail evaluation report. Retrieved from https://www.ehealthireland.ie/a2i-hids-programme/healthmail/healthmail-evaluation-report-final.pdf

Lee, J., Negm, A., Peters, R., Wong, E. K. C., & Holbrook, A. (2021). Deprescribing fall-risk increasing drugs (FRIDs) for the prevention of falls and fall-related complications: A systematic review and meta-analysis. *BMJ Open, 11*(2). doi:10.1136/bmjopen-2019-035978

Lee, J. K., Alshehri, S., Kutbi, H. I., & Martin, J. R. (2015). Optimizing pharmacotherapy in elderly patients: The role of pharmacists. *Integr. pharm. res. pract., 4*, 101-111. doi:10.2147/IPRP.S70404

Lehnbom, E. C., Stewart, M. J., Manias, E., & Westbrook, J. I. (2014). Impact of medication reconciliation and review on clinical outcomes. *Annals of Pharmacotherapy, 48*(10), 1298-1312. doi:10.1177/1060028014543485

Lenander, C., Elfsson, B., Danielsson, B., Midlov, P., & Hasselstrom, J. (2014). Effects of a pharmacist-led structured medication review in primary care on drug-related problems and hospital admission rates: A randomized controlled trial. *Scandinavian Journal of Primary Health Care, 32*(4), 180-186. doi:10.3109/02813432.2014.972062

Lenssen, R., Schmitz, K., Griesel, C., Heidenreich, A., Schulz, J. B., Trautwein, C., . . . Eisert, A. (2018). Comprehensive pharmaceutical care to prevent drug-related readmissions of dependent-living elderly patients: A randomized controlled trial. *BMC Geriatrics, 18*(1), 135. doi:10.1186/s12877-018-0814-3

Lewis, T. (2004). 10-minute consultation: Using the NO TEARS tool for medication review. *BMJ, 329*, 434.

Linden-Lahti, C., Holmstrom, A. R., Pennanen, P., & Airaksinen, M. (2019). Facilitators and barriers in implementing medication safety practices across hospitals within 11 European Union countries. *Pharmacy Practice, 17*(4), 1583. doi:10.18549/PharmPract.2019.4.1583

Lindqvist, M. H., Gustafsson, M., & Gallego, G. (2019). Exploring physicians, nurses and ward-based pharmacists working relationships in a Swedish inpatient setting: A mixed methods study. *International Journal of Clinical Pharmacy, 41*(3), 728-733. doi:10.1007/s11096-019-00812-8

Lindsay, J., Dooley, M., Martin, J., Fay, M., Kearney, A., Khatun, M., & Barras, M. (2015). The development and evaluation of an oncological palliative care deprescribing guideline: The 'OncPal deprescribing guideline'. *Supportive Care in Cancer, 23*(1), 71-78. doi:10.1007/s00520-014-2322-0

Lipton, H. L., Bero, L. A., Bird, J. A., & McPhee, S. J. (1992). The impact of clinical pharmacists' consultations on physicians' geriatric drug prescribing. A randomized controlled trial. *Medical Care, 30*(7), 646-658.

Lipton, H. L., & Bird, J. A. (1994). The impact of clinical pharmacists' consultations on geriatric patients' compliance and medical care use: A randomized controlled trial. *Gerontologist, 34*(3), 307-315. Retrieved from http://cochranelibrary-wiley.com/o/cochrane/clcentral/articles/074/CN-00104074/frame.html

Loffler, C., Drewelow, E., Paschka, S. D., Frankenstein, M., Eger, J., Jatsch, L., . . . Altiner, A. (2014). Optimizing polypharmacy among elderly hospital patients with chronic diseases-study protocol of the cluster randomized controlled POLITE-RCT trial. *Implementation Science, 9*, 8. doi:10.1186/s13012-014-0151-7

Lopez, R., J. A., Rogero, B., E., Aza, P.-S., M., Lopez, V., F., Pico, S., V., Leiva, F., F., . . . group, M. (2020). Potentially inappropriate prescriptions according to explicit and implicit criteria in patients with multimorbidity and polypharmacy. MULTIPAP: A cross-sectional study. *PloS One, 15*(8). doi:10.1371/journal.pone.0237186

Lukacena, K. M., Keck, J. W., Freeman, P. R., Harrington, N. G., Huffmyer, M. J., & Moga, D. C. (2022). Patients' attitudes toward deprescribing and their experiences communicating with clinicians and pharmacists. *Ther Adv Drug Saf, 13*, 20420986221116465. doi:10.1177/20420986221116465

Luymes, C. H., Poortvliet, R. K. E., van Geloven, N., de Waal, M. W. M., Drewes, Y. M., Blom, J. W., . . . Numans, M. E. (2018). Deprescribing preventive cardiovascular medication in patients with predicted low cardiovascular disease risk in general practice - the ECSTATIC study: a cluster randomised non-inferiority trial. *BMC Medicine, 16*(1), 5. doi:10.1186/s12916-017-0988-0

Mackenzie, L., & McIntyre, A. (2019). How do general practitioners (GPs) engage in falls prevention with older people? A pilot survey of GPs in NHS England suggests a gap in routine practice to address falls prevention. *Frontiers in Public Health, 7*, 32-32. doi:10.3389/fpubh.2019.00032

Maher, R. L. J., Hanlon, J. T., & Hajjar, E. R. (2014). Clinical consequences of polypharmacy in elderly. *Expert Opinion on Drug Safety, 13*(1). doi:10.1517/14740338.2013.827660.

Mahlknecht, A., Wiedermann, C. J., Sandri, M., Engl, A., Valentini, M., Vögele, A., . . . Piccoliori, G. (2021). Expert-based medication reviews to reduce polypharmacy in older patients in

primary care: a northern-Italian cluster-randomised controlled trial. *BMC Geriatrics, 21*(1), 659. doi:10.1186/s12877-021-02612-0

Maly, J., Dosedel, M., Vosatka, J., Mala-Ladova, K., Kubena, A. A., Brabcova, I., . . . Vlcek, J. (2019). Pharmacotherapy as major risk factor of falls - analysis of 12 months experience in hospitals in South Bohemia. *Journal of Applied Biomedicine, 17*(1), 60. doi:10.32725/jab.2019.001

Manias, E., Bucknall, T., Hughes, C., Jorm, C., & Woodward-Kron, R. (2019). Family involvement in managing medications of older patients across transitions of care: A systematic review. *BMC Geriatrics, 19*(1), 95. doi:10.1186/s12877-019-1102-6

Mark, J. A., & Loomis, J. (2017). The STEADI toolkit: Incorporating a fall prevention guideline into the primary care setting. *The Nurse Practitioner, 42*(12), 50-55. doi:10.1097/01.Npr.0000525720.06856.34

Martin-Kerry, J., Taylor, J., Scott, S., Patel, M., Wright, D., Clark, A., . . . Bhattacharya, D. (2022). Developing a core outcome set for hospital deprescribing trials for older people under the care of a geriatrician. *Age and Ageing, 51*(11). doi:10.1093/ageing/afac241

Martin, P., Tamblyn, R., Benedetti, A., Ahmed, S., & Tannenbaum, C. (2018). Effect of a pharmacist-led educational intervention on inappropriate medication prescriptions in older adults: The D-PRESCRIBE randomized clinical trial. *JAMA, 320*(18), 1889-1898. doi:10.1001/jama.2018.16131

Martin, P., & Tannenbaum, C. (2017). A realist evaluation of patients' decisions to deprescribe in the EMPOWER trial. *BMJ Open, 7*(4), e015959. doi:10.1136/bmjopen-2017-015959

Marvin, V., Ward, E., Poots, A. J., Heard, K., Rajagopalan, A., & Jubraj, B. (2017). Deprescribing medicines in the acute setting to reduce the risk of falls. *Eur J Hosp Pharm, 24*(1), 10-15. doi:10.1136/ejhpharm-2016-001003

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

Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2018). Tools for Assessment of the Appropriateness of Prescribing and Association with Patient-Related Outcomes: A Systematic Review. *Drugs and Aging, 35*(1), 43-60. doi:10.1007/s40266-018-0516-8

Masud, T., Ogliari, G., Lunt, E., Blundell, A., Gordon, A. L., Roller-Wirnsberger, R., . . . Stuck, A. E. (2022). A scoping review of the changing landscape of geriatric medicine in undergraduate medical education: curricula, topics and teaching methods. *European Geriatric Medicine, 13*(3), 513-528. doi:10.1007/s41999-021-00595-0

Maund, E., Dewar-Haggart, R., Williams, S., Bowers, H., Geraghty, A. W., Leydon, G., . . . Kendrick, T. (2019). Barriers and facilitators to discontinuing antidepressant use: a systematic review and thematic synthesis. *Journal of Affective Disorders, 245*, 38-62.

McCall, L. A., & Ginis, K. A. M. (2004). The effects of message framing on exercise adherence and health beliefs among patients in a cardiac rehabilitation program. *Journal of Applied Biobehavioral Research, 9*(2), 122-135. doi:doi.org/10.1111/j.1751-9861.2004.tb00096.x

McCarthy, C., Clyne, B., Boland, F., Moriarty, F., Flood, M., Wallace, E., . . . team, S. P. S. (2022). GP-delivered medication review of polypharmacy, deprescribing, and patient priorities in older people with multimorbidity in Irish primary care (SPPiRE Study): A cluster randomised controlled trial. *PLoS Medicine, 19*(1), e1003862-e1003862. doi:10.1371/journal.pmed.1003862

McGrath, K., Hajjar, E. R., Kumar, C., Hwang, C., & Salzman, B. (2017). Deprescribing: A simple method for reducing polypharmacy. *The Journal of Family Practice 66*(7), 436-445.

McIntosh, J., Alonso, A., MacLure, K., Stewart, D., Kempen, T., Mair, A., . . . Consortium, S. (2018). A case study of polypharmacy management in nine European countries: Implications for change management and implementation. *PloS One, 13*(4), e0195232. doi:10.1371/journal.pone.0195232

McMahon, C. G., Cahir, C. A., Kenny, R. A., & Bennett, K. (2014). Inappropriate prescribing in older fallers presenting to an Irish emergency department. *Age and Ageing, 43*(1), 44-50. doi:10.1093/ageing/aft114

Mekonnen, A. B., McLachlan, A. J., & Brien, J. A. (2016). Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: A systematic review and meta-analysis. *BMJ Open, 6*(2), e010003. doi:10.1136/bmjopen-2015-010003

Michalcova, J., Vasut, K., Airaksinen, M., & Bielakova, K. (2020). Inclusion of medication-related fall risk in fall risk assessment tool in geriatric care units. *BMC Geriatrics, 20*(1), 454. doi:10.1186/s12877-020-01845-9

Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel: A guide to designing interventions* (1st ed.). Great Britain: Silverback Publishing.

Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From theory to intervention: Mapping theoretically derived behavioural determinants to behaviour change techniques. *Applied Psychology, 57*(4), 660-680. doi:10.1111/j.1464-0597.2008.00341.x

Midlov, P., Deierborg, E., Holmdahl, L., Hoglund, P., & Eriksson, T. (2008). Clinical outcomes from the use of medication report when elderly patients are discharged from hospital. *Pharmacy World and Science, 30*(6), 840-845. doi:10.1007/s11096-008-9236-1

Mikkel, C., & Andreas, L. (2016). Medication review in hospitalised patients to reduce morbidity and mortality. *Cochrane Database of Systematic Reviews, 2*(2). doi:10.1002/14651858.CD008986.pub3

Mlodinow, S. G., Linn, B. S., Mahvan, T., Nicole, R. L., & Ngaima, N. M. (2019). Strategies to reduce and prevent polypharmacy in older patients. *J Fam Pract., 68*(8), 429-440.

Moncada, L. V. V., & Mire, L. G. (2017). Preventing Falls in Older Persons. *American Family Physician, 96*(4), 240-247.

Mongaret, C., Quillet, P., Vo, T. H., Aubert, L., Fourgeaud, M., Michelet-Huot, E., . . . Hettler, D. (2018). Predictive factors for clinically significant pharmacist interventions at hospital admission. *Medicine (Baltimore), 97*(9), e9865. doi:10.1097/md.0000000000009865

Montero-Odasso, M. M., Kamkar, N., Pieruccini-Faria, F., Osman, A., Sarquis-Adamson, Y., Close, J., . . . Masud, T. (2021). Evaluation of clinical practice guidelines on fall prevention and management for older adults: A systematic review. *JAMA Netw Open, 4*(12). doi:10.1001/jamanetworkopen.2021.38911

Moriarty, F., Hardy, C., Bennett, K., Smith, S. M., & Fahey, T. (2015). Trends and interaction of polypharmacy and potentially inappropriate prescribing in primary care over 15 years in Ireland: A repeated cross-sectional study. *BMJ Open, 5*(9). doi:10.1136/bmjopen-2015-008656

Morris, M. E., Webster, K., Jones, C., Hill, A. M., Haines, T., McPhail, S., . . . Cameron, I. (2022). Interventions to reduce falls in hospitals: A systematic review and meta-analysis. *Age and Ageing, 51*(5). doi:10.1093/ageing/afac077

Moth, A. E., Hølmkjær, P., Holm, A., Rozing, M. P., & Overbeck, G. (2021). What makes deprescription of psychotropic drugs in nursing home residents with dementia so challenging? A qualitative systematic review of barriers and facilitators. *Drugs and Aging, 38*(8), 671-685.

Mott, D. A., Martin, B., Breslow, R., Michaels, B., Kirchner, J., Mahoney, J., & Margolis, A. (2016). Impact of a medication therapy management intervention targeting medications associated with falling: Results of a pilot study. *Journal of the American Pharmaceutical Association, 56*(1), 22-28. doi:10.1016/j.japh.2015.11.001

Mueller, S. K., Sponsler, K. C., Kripalani, S., & Schnipper, J. L. (2012). Hospital-based medication reconciliation practices: A systematic review. *Archives of Internal Medicine, 172*(14), 1057-1069. doi:10.1001/archinternmed.2012.2246

Musich, S., Wang, S. S., Ruiz, J., Hawkins, K., & Wicker, E. (2017). Falls-related drug use and risk of falls among older adults: A study in a US Medicare population. *Drugs and Aging, 34*(7), 555-565. doi:10.1007/s40266-017-0470-x

Naas General Hospital. Day hospital. Retrieved from https://naashospital.ie/departments/dayhospt/

National Clinical Effectiveness Committee. (2018). *Framework for public involvement in clinical effectiveness processes*. The Department of Health Retrieved from http://hdl.handle.net/10147/623037.

National Office of Clinical Audit. (2022). *Major trauma audit national report 2019 and 2020*. Retrieved from Dublin: https://www.noca.ie/publications/publications-listing/P0/category/3

Nazar, H., Nazar, Z., Portlock, J., Todd, A., & Slight, S. P. (2015). A systematic review of the role of community pharmacies in improving the transition from secondary to primary care. *British Journal of Clinical Pharmacology, 80*(5), 936-948. doi:10.1111/bcp.12718

Nazareth, I., Burton, A., Shulman, S., Smith, P., Haines, A., & Timberall, H. (2001). A pharmacy discharge plan for hospitalized elderly patients: A randomized controlled trial. *Age and Ageing, 30*, 33-40.

Ng, B. J., Le Couteur, D. G., & Hilmer, S. N. (2018). Deprescribing benzodiazepines in older patients: Impact of interventions targeting physicians, pharmacists, and patients. *Drugs and Aging, 35*(6), 493-521. doi:10.1007/s40266-018-0544-4

Niburski, K., Guadagno, E., Abbasgholizadeh-Rahimi, S., & Poenaru, D. (2020). Shared decision making in surgery: A meta-analysis of existing literature. *The Patient - Patient-Centered Outcomes Research, 13*(6), 667-681. doi:10.1007/s40271-020-00443-6

NICE. Shared decision making. Retrieved from https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-guidelines/shared-decision-making

NICE. (2021). Shared decision making guidance. NICE guideline [NG197]. Retrieved from https://www.nice.org.uk/guidance/ng197/chapter/Context

Nixon, M., & Kousgaard, M. B. (2016). Organising medication discontinuation: A qualitative study exploring the views of general practitioners toward discontinuing statins. *BMC Health Services Research, 16*, 226. doi:10.1186/s12913-016-1495-2

Niznik, J. D., Collins, B. J., Armistead, L. T., Larson, C. K., Kelley, C. J., Hughes, T. D., . . . Ferreri, S. P. (2022). Pharmacist interventions to deprescribe opioids and benzodiazepines in older adults: A rapid review. *Research in Social and Administrative Pharmacy, 18*(6), 2913-2921.

Noble, H., & Mitchell, G. (2016). What is grounded theory? *Evidence-Based Nursing, 19*(2), 34-35. doi:10.1136/eb-2016-102306

O'Ciardha, D., Blake, A. M., Creane, D., Callaghan, M. O., & Darker, C. (2022). Can a practice pharmacist improve prescribing safety and reduce costs in polypharmacy patients? A pilot study of an intervention in an Irish general practice setting. *BMJ Open, 12*(5), e050261. doi:10.1136/bmjopen-2021-050261

O'Connor, R., O'Callaghan, C., McNamara, R., & Salim, U. (2019). An audit of discharge summaries from secondary to primary care. *Irish Journal of Medical Science, 188*(2), 537-540. doi:10.1007/s11845-018-1862-6

O'Dowd, T., Ivers, J.-H., & Handy, D. (2017). *A future together building a better GP and primary care service*. Retrieved from http://hdl.handle.net/10147/622643.

Owens, N., Sherburne, N., Silliman, R., & Fretwell, M. (1990). The Senior Care Study. The optimal use of medications in acutely ill older patients. *Journal of the American Geriatrics Society, 38*(10), 1082-1087. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1532-5415.1990.tb01369.x

Page, A. T., Clifford, R. M., Potter, K., Schwartz, D., & Etherton-Beer, C. D. (2016a). 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. doi:https://doi.org/10.1111/bcp.12975

Page, A. T., Etherton-Beer, C. D., Clifford, R. M., Burrows, S., Eames, M., & Potter, K. (2016b). Deprescribing in frail older people – Do doctors and pharmacists agree? *Research in Social & Administrative Pharmacy, 12*(3), 438-449. doi:https://doi.org/10.1016/j.sapharm.2015.08.011

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery, 88*, 105906. doi:https://doi.org/10.1016/j.ijsu.2021.105906

Panahi, S., Watson, J., & Partridge, H. (2016). Social media and physicians: Exploring the benefits and challenges. *Health Informatics J, 22*(2), 99-112. doi:10.1177/1460458214540907

Parekh, N., Ali, K., Page, A., Roper, T., & Rajkumar, C. (2018). Incidence of medication-related harm in older adults after hospital discharge: A systematic review. *Journal of the American Geriatrics Society, 66*(9), 1812-1822. doi:10.1111/jgs.15419

Parsons, M., Senior, H., Kerse, N., Chen, M. H., Jacobs, S., Vanderhoorn, S., & Anderson, C. (2012). Should care managers for older adults be located in primary care? A randomized controlled trial. *Journal of the American Geriatrics Society, 60*(1), 86-92. doi:10.1111/j.1532-5415.2011.03763.x

Payne, R. A. (2016). The epidemiology of polypharmacy. *Clinical Medicine, 16*(5), 465-469. doi:10.7861/clinmedicine.16-5-465

PCNE. (2013). PCNE statement on medication review. Retrieved from https://www.pcne.org/upload/files/150_20160504_PCNE_MedRevtypes.pdf.

PCNE. (2016, 20 Dec 2022). Position paper on the PCNE definition of medication review. Retrieved from https://www.pcne.org/working-groups/1/medication-review

Peat, G., Fylan, B., Marques, I., Raynor, D. K., Breen, L., Olaniyan, J., & Alldred, D. P. (2022). Barriers and facilitators of successful deprescribing as described by older patients living with frailty, their informal carers and clinicians: A qualitative interview study. *BMJ Open, 12*(3), e054279. doi:10.1136/bmjopen-2021-054279

Pedrós, C., Formiga, F., Corbella, X., & Arnau, J. M. (2016). Adverse drug reactions leading to urgent hospital admission in an elderly population: Prevalence and main features. *European Journal of Clinical Pharmacology, 72*(2), 219-226. doi:10.1007/s00228-015-1974-0

Pereira, F., Bieri, M., Martins, M. M., del Río Carral, M., & Verloo, H. (2022). Safe medication management for polymedicated home-dwelling older adults after hospital discharge: A qualitative study of older adults, informal caregivers and healthcare professionals' perspectives. *Nursing Reports, 12*(2), 403-423. doi:10.3390/nursrep12020039

Peterson, J. F., Kuperman, G. J., Shek, C., Patel, M., Avorn, J., & Bates, D. W. (2005). Guided prescription of psychotropic medications for geriatric inpatients. *Archives of Internal Medicine, 165*(7), 802-807. doi:10.1001/archinte.165.7.802

Petrov, K., Varadarajan, R., Healy, M., Darvish, E., & Cowden, C. (2018). Improving medication history at admission utilizing pharmacy students and technicians: A pharmacy-driven improvement initiative. *Pharmacy and Therapeutics, 43*(11), 676-684. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6205119/pdf/ptj43011676.pdf

Piepoli, M. F., Davos, C., Francis, D. P., & Coats, A. J. (2004). Exercise training meta-analysis of trials in patients with chronic heart failure (ExTraMATCH). *BMJ, 328*(7433), 189. doi:10.1136/bmj.37938.645220.EE

Pit, S. W., Byles, J. E., Henry, D. A., Holt, L., Hansen, V., & Bowman, D. A. (2007). A quality use of medicines program for general practitioners and older people: A cluster randomised controlled trial. *Medical Journal of Australia, 187*(1), 23-30. doi:10.5694/j.1326-5377.2007.tb01110.x

Pravodelov, V. (2020). Thoughtful prescribing and deprescribing. *Medical Clinics of North America, 104*(5), 751-765. doi:10.1016/j.mcna.2020.06.001

PrescQIPP. (2018). Polypharmacy & Deprescribing webkit. Retrieved from https://www.prescqipp.info/our-resources/webkits/polypharmacy-and-deprescribing/

Pruskowski, J., & Handler, S. M. (2017). The DE-PHARM project: A pharmacist-driven deprescribing initiative in a nursing facility. *Consultant Pharmacist, 32*(8), 468-478. doi:10.4140/TCP.n.2017.468

PSI. (2013). Core competency framework for pharmacists. Retrieved from https://www.thepsi.ie/Libraries/Pharmacy_Practice/PSI_Core_Comp_Framework_Web_Version_Final.sflb.ashx

PSI. (2020). Guidance for prescribers and pharmacists on legislation changes to facilitate the safe supply of medicines during the COVID-19 pandemic. Retrieved from https://www.thepsi.ie/Libraries/COVID/Guidance_for_prescribers_and_pharmacists_on_legislation_changes_to_facilitate_the_safe_supply_of_medicines_during_the_COVID-19_pandemic.sflb.ashx

PSI. (2023, 2023). Pharmacists statistics a summary of the pharmacist and pharmaceutical assistant register. Retrieved from https://www.thepsi.ie/Libraries/Monthly_Statistics/Pharmacists_-_Website_Statistics.sflb.ashx

Quality, H. S. E., & Directorate, P. S. *Safety incident management policy*. Retrieved from http://hdl.handle.net/10147/575228

RAND. 36-Item Short Form Survey (SF-36). Retrieved from https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form.html

Rasmussen, A. F., Poulsen, S. S., Oldenburg, L. I. K., & Vermehren, C. (2021). The Barriers and facilitators of different stakeholders when deprescribing benzodiazepine receptor agonists in older patients-a systematic review. *Metabolites, 11*(4). doi:10.3390/metabo11040254

RCPI. (2015). Career Pathway. Retrieved from https://web.archive.org/web/20150718060947/http://www.rcpi.ie/article.php?locID=1.6.197.415

Reeve, E. (2020). Deprescribing tools: A review of the types of tools available to aid deprescribing in clinical practice. *Journal of Pharmacy Practice and Research, 50*(1), 98-107. doi:10.1002/jppr.1626

Reeve, E., Gnjidic, D., Long, J., & Hilmer, S. (2015). A systematic review of the emerging definition of 'deprescribing' with network analysis: implications for future research and clinical practice. *British Journal of Clinical Pharmacology, 80*(6), 1254-1268. doi:10.1111/bcp.12732

Reeve, E., Low, L. F., & Hilmer, S. N. (2019). Attitudes of older adults and caregivers in australia toward deprescribing. *Journal of the American Geriatrics Society, 67*(6), 1204-1210. doi:10.1111/jgs.15804

Reeve, E., Low, L. F., Shakib, S., & Hilmer, S. N. (2016). Development and validation of the revised patients' attitudes towards deprescribing (rPATD) questionnaire: Versions for older adults and caregivers. *Drugs and Aging, 33*(12), 913-928. doi:10.1007/s40266-016-0410-1

Reeve, E., Moriarty, F., Nahas, R., Turner, J. P., Kouladjian O'Donnell, L., & Hilmer, S. N. (2018). A narrative review of the safety concerns of deprescribing in older adults and strategies to mitigate potential harms. *Expert Opinion on Drug Safety, 17*(1), 39-49. doi:10.1080/14740338.2018.1397625

Reeve, E., Shakib, S., Hendrix, I., Roberts, M. S., & Wiese, M. D. (2014). Review of deprescribing processes and development of an evidence-based, patient-centred deprescribing process. *British Journal of Clinical Pharmacology, 78*(4), 738-747. doi:10.1111/bcp.12386

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

Reeve, E., Wiese, M. D., Hendrix, I., Roberts, M. S., & Shakib, S. (2013). People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to deprescribe. *Journal of the American Geriatrics Society, 61*(9), 1508-1514. doi:10.1111/jgs.12418

Renaudin, P., Baumstarck, K., Daumas, A., Esteve, M.-A., Gayet, S., Auquier, P., . . . Honore, S. (2017). Impact of a pharmacist-led medication review on hospital readmission in a pediatric and elderly population: Study protocol for a randomized open-label controlled trial. *Trials, 18*(1) (no pagination). doi:10.1186/s13063-017-1798-6

. Review Manager (RevMan Web) (Version 5.4.1). (2020): The Cochrane Collaboration. Retrieved from revman.cochrane.org

Richardson, K., Bennett, K., & Kenny, R. A. (2015). Polypharmacy including falls risk-increasing medications and subsequent falls in community-dwelling middle-aged and older adults. *Age and Ageing, 44*(1), 90-96. doi:10.1093/ageing/afu141

Riordan, C. O., Delaney, T., & Grimes, T. (2016). Exploring discharge prescribing errors and their propagation post-discharge: An observational study. *International Journal of Clinical Pharmacy, 38*(5), 1172-1181. doi:10.1007/s11096-016-0349-7

Roblek, T., Deticek, A., Leskovar, B., Suskovic, S., Horvat, M., Belic, A., . . . Lainscak, M. (2016). Clinical-pharmacist intervention reduces clinically relevant drug-drug interactions in patients with heart failure: A randomized, double-blind, controlled trial. *International Journal of Cardiology, 203*, 647-652. doi:10.1016/j.ijcard.2015.10.206

Rodrigues, C. R., Harrington, A. R., Murdock, N., Holmes, J. T., Borzadek, E. Z., Calabro, K., . . . Slack, M. K. (2017). Effect of pharmacy-supported transition-of-care interventions on 30-day readmissions: A systematic review and meta-analysis. *Annals of Pharmacotherapy, 51*(10), 866-889. doi:10.1177/1060028017712725

Rodrigues, D. A., Plácido, A. I., Mateos-Campos, R., Figueiras, A., Herdeiro, M. T., & Roque, F. (2021). Effectiveness of interventions to reduce potentially inappropriate medication in older patients: A systematic review. *Frontiers in Pharmacology, 12*, 777655. doi:10.3389/fphar.2021.777655

Roger, P. M., Brofferio, P., Labate, C., Barriere, J. R., Minguet, J. M., Foulon, P., & Zumbo, C. (2010). [Prospective evaluation of antibiotic combinations in a general hospital]. *Med Mal Infect, 40*(3), 165-171. doi:10.1016/j.medmal.2009.08.019

Romero-Ventosa, E. Y., Samartin-Ucha, M., Martin-Vila, A., Martinez-Sanchez, M. L., Rey Gomez-Serranillos, I., & Pineiro-Corrales, G. (2016). Multidisciplinary teams involved: Detection of drug-related problems through continuity of care. *Farm Hosp, 40*(n06), 529-543. doi:10.7399/fh.2016.40.6.10506

Ruano-Ravina, A., Pena-Gil, C., Abu-Assi, E., Raposeiras, S., van 't Hof, A., Meindersma, E., . . . González-Juanatey, J. R. (2016). Participation and adherence to cardiac rehabilitation programs. A systematic review. *International Journal of Cardiology, 223*, 436-443. doi:10.1016/j.ijcard.2016.08.120

Ruiz-Ramos, J., Hernández, M. H., Juanes-Borrego, A. M., Milà, R., Mangues-Bafalluy, M. A., & Mestres, C. (2021). The impact of pharmaceutical care in multidisciplinary teams on health outcomes: Systematic review and meta-analysis. *Journal of the American Medical Directors Association, 22*(12), 2518-2526.

Salonoja, M., Salminen, M., Vahlberg, T., Aarnio, P., & Kivelä, S. L. (2012). Withdrawal of psychotropic drugs decreases the risk of falls requiring treatment. *Archives of Gerontology and Geriatrics, 54*(1), 160-167. doi:10.1016/j.archger.2011.02.015

Santolaya-Perrín, R., Calderón, H., B., Jiménez, D., G., Galán, R., N., Moreno, C., M. T., Rodríguez, C., J. M., . . . Sánchez, N., I. (2019). The efficacy of a medication review programme

conducted in an emergency department. *International Journal of Clinical Pharmacy, 41*(3), 757-766. doi:10.1007/s11096-019-00836-0

Sasaki, S., Kurokawa, H., & Ohtake, F. (2021). Effective but fragile? Responses to repeated nudge-based messages for preventing the spread of COVID-19 infection. *The Japanese Economic Review, 72*(3), 371-408. doi:10.1007/s42973-021-00076-w

Sawan, M., Reeve, E., Turner, J., Todd, A., Steinman, M. A., Petrovic, M., & Gnjidic, D. (2020). A systems approach to identifying the challenges of implementing deprescribing in older adults across different health-care settings and countries: A narrative review. *Expert Review of Clinical Pharmacology, 13*(3), 233-245. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7309419/pdf/nihms-1597970.pdf

Schlender, J. F., Vozmediano, V., Golden, A. G., Rodriguez, M., Samant, T. S., Lagishetty, C. V., . . . Schmidt, S. (2018). Current strategies to streamline pharmacotherapy for older adults. *European Journal of Pharmaceutical Sciences, 111*, 432-442. doi:10.1016/j.ejps.2017.10.015

Scott, I., Hilmer, S., Reeve, E., Potter, K., Couteur, D., Rigby, D., . . . Martin, J. (2015). Reducing inappropriate polypharmacy the process of deprescribing. *JAMA internal medicine, 75*(5), 827-834. doi:10.1001/jamainternmed.2015.0324

Scott, I. A., Anderson, K., Freeman, C. R., & Stowasser, D. A. (2014). First do no harm: a real need to deprescribe in older patients. *Medical Journal of Australia, 201*(7), 390-392. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25296059

Scott, S., May, H., Patel, M., Wright, D. J., & Bhattacharya, D. (2021). A practitioner behaviour change intervention for deprescribing in the hospital setting. *Age and Ageing, 50*(2), 581-586. doi:10.1093/ageing/afaa169

Scott, S., Twigg, M. J., Clark, A., Farrow, C., May, H., Patel, M., . . . Bhattacharya, D. (2019). Development of a hospital deprescribing implementation framework: A focus group study with geriatricians and pharmacists. *Age and Ageing, 49*(1), 102-110. doi:10.1093/ageing/afz133

Scottish Government Polypharmacy Model of Care Group. (2018). Polypharmacy guidance, realistic prescribing. 3rd Edition. Retrieved from https://www.therapeutics.scot.nhs.uk/wp-content/uploads/2018/04/Polypharmacy-Guidance-2018.pdf

Seewoodharry, M., Khunti, K., Davies, M. J., Gillies, C., & Seidu, S. (2022). Attitudes of older adults and their carers towards de-prescribing: A systematic review. *Diabetic Medicine, 39*(7), e14801. doi:10.1111/dme.14801

Seppala, L. J., Kamkar, N., van Poelgeest, E. P., Thomsen, K., Daams, J. G., Ryg, J., . . . Task Force on Global Guidelines for Falls in Older Adults. (2022). Medication reviews and deprescribing as a single intervention in falls prevention: A systematic review and meta-analysis. *Age and Ageing, 51*(9). doi:10.1093/ageing/afac191

Seppala, L. J., Petrovic, M., Ryg, J., Bahat, G., Topinkova, E., Szczerbinska, K., . . . van der Velde, N. (2020). STOPPFall (Screening Tool of Older Persons Prescriptions in older adults with high fall risk): A Delphi study by the EuGMS Task and Finish Group on fall-risk-increasing drugs. *Age and Ageing,* 10.1093/ageing/afaa249, 1–11. doi:10.1093/ageing/afaa249

Seppala, L. J., van de Glind, E. M. M., Daams, J. G., Ploegmakers, K. J., de Vries, M., Wermelink, A., & van der Velde, N. (2018a). Fall-risk-increasing drugs: A systematic review and meta-analysis: III. Others. *Journal of the American Medical Directors Association, 19*(4), 372-378. doi:10.1016/j.jamda.2017.12.099

Seppala, L. J., van der Velde, N., Masud, T., Blain, H., Petrovic, M., van der Cammen, T. J., . . . EuGMS Special Interest Group on Pharmacology. (2019). EuGMS task and finish group on fall-risk-increasing drugs (FRIDs): Position on knowledge dissemination, management, and future research. *Drugs and Aging, 36*(4), 299-307. doi:10.1007/s40266-018-0622-7

Seppala, L. J., Wermelink, A., de Vries, M., Ploegmakers, K. J., van de Glind, E. M. M., Daams, J. G., . . . Finish group on fall-risk-increasing drugs. (2018b). Fall-risk-increasing drugs: A systematic review and meta-analysis: II. Psychotropics. *Journal of the American Medical Directors Association, 19*(4), 371 e311-371 e317. doi:10.1016/j.jamda.2017.12.098

Shankar, K. N., Taylor, D., Rizzo, C. T., & Liu, S. W. (2017). Exploring older adult ed fall patients' understanding of their fall: A qualitative study. *Geriatric Orthopaedic Surgery & Rehabilitation, 8*(4), 231-237. doi:10.1177/2151458517738440

Shaw, J., Murphy, A. L., Turner, J. P., Gardner, D. M., Silvius, J. L., Bouck, Z., . . . Tannenbaum, C. (2019). Policies for deprescribing: An international scan of intended and unintended outcomes of limiting sedative-hypnotic use in community-dwelling older adults. *Healthc Policy, 14*(4), 39-51. doi:10.12927/hcpol.2019.25857

Sheehan, A., & O'Sullivan, R. (2020). Ageing and public health – an overview of key statistics in Ireland and Northern Ireland. Dublin: Institute of Public Health.

Sheehan, R., Strydom, A., Brown, E., Marston, L., & Hassiotis, A. (2018). Association of focused medication review with optimization of psychotropic drug prescribing: A systematic review and meta-analysis. *JAMA Netw Open, 1*(6). doi:10.1001/jamanetworkopen.2018.3750

Sirdifield, C., Chipchase, S. Y., Owen, S., & Siriwardena, A. N. (2017). A systematic review and meta-synthesis of patients' experiences and perceptions of seeking and using benzodiazepines and z-drugs: Towards safer prescribing. *Patient, 10*(1), 1-15. doi:10.1007/s40271-016-0182-z

Sleath, B., Carpenter, D. M., Davis, S. A., Budenz, D. L., Muir, K. W., Romero, M. S., . . . Robin, A. L. (2023). Improving black patient question-asking and provider education during glaucoma visits. *Ophthalmol Glaucoma, 6*(2), 206-214. doi:10.1016/j.ogla.2022.09.003

Smith, H., Miller, K., Barnett, N., Oboh, L., Jones, E., Darcy, C., . . . Crawford, P. (2019). Person-centred care including deprescribing for older people. *Pharmacy, 7*(3). doi:10.3390/pharmacy7030101

Smith, L., McGowan, L., Moss-Barclay, C., Wheater, J., Knass, D., & Chrystyn, H. (1997). An investigation of hospital generated pharmaceutical care when patients are discharged home from hospital. *British Journal of Clinical Pharmacology, 44*(2), 163-165. Retrieved from http://cochranelibrary-wiley.com/o/cochrane/clcentral/articles/722/CN-00196722/frame.html

Somers, A., Robays, H., De Paepe, P., Van Maele, G., Perehudoff, K., & Petrovic, M. (2013). Evaluation of clinical pharmacist recommendations in the geriatric ward of a Belgian university hospital. *Clinical Interventions in Aging, 8*, 703-709. doi:10.2147/CIA.S42162

Spinewine, A., Fialova, D., & Byrne, S. (2012). The role of the pharmacist in optimizing pharmacotherapy in older people. *Drugs and Aging, 29*(6), 495-510. doi:10.2165/11631720-000000000-00000

Spinewine, A., Swine, C., Dhillon, S., Lambert, P., Nachega, J. B., Wilmotte, L., & Tulkens, P. M. (2007). Effect of a collaborative approach on the quality of prescribing for geriatric inpatients: A randomized, controlled trial. *Journal of the American Geriatrics Society, 55*(5), 658-665. doi:10.1111/j.1532-5415.2007.01132.x

Stam, H., Harting, T., Sluijs, M., van Marum, R., Horst, H., Wouden, J. C., & Maarsingh, O. R. (2016a). Usual care and management of fall risk increasing drugs in older dizzy patients in Dutch general practice. *Scandinavian Journal of Primary Health Care, 34*(2), 165-171. doi:10.3109/02813432.2016.1160634

Stam, H., Harting, T., Sluijs, M. v. d., van Marum, R., Horst, H. v. d., Wouden, J. C. v. d., & Maarsingh, O. R. (2016b). Usual care and management of fall risk increasing drugs in older dizzy patients in Dutch general practice. *Scandinavian Journal of Primary Health Care, 34*(2), 165-171. doi:10.3109/02813432.2016.1160634

Starkey, V., & Omorinoye, T. (2013). Deprescribing: A practical guide Retrieved from www.derbyshiremedicinesmanagement.nhs.uk/assets/Clinical_Guidelines/clinical_guidelines_front_page/Deprescribing.pdf

STEADI—Older Adult Fall Prevention; Patient & Caregiver Resources. (2020). Retrieved from https://www.cdc.gov/steadi/patient.html

Stevens, J. A., & Lee, R. (2018). The potential to reduce falls and avert costs by clinically managing fall risk. *American Journal of Preventive Medicine, 55*(3), 290-297. doi:10.1016/j.amepre.2018.04.035

Stevens, J. A., Smith, M. L., Parker, E. M., Jiang, L., & Floyd, F. D. (2020). Implementing a clinically based fall prevention program. *American Journal of Lifestyle Medicine, 14*(1), 71-77. doi:10.1177/1559827617716085

Stranges, P. M., Jackevicius, C. A., Anderson, S. L., Bondi, D. S., Danelich, I., Emmons, R. P., . . . Smithgall, S. (2020). Role of clinical pharmacists and pharmacy support personnel in transitions of care. *Journal of the American College of Clinical Pharmacy, 3*(2), 532-545. doi:10.1002/jac5.1215

Tammes, P., Purdy, S., Salisbury, C., MacKichan, F., Lasserson, D., & Morris, R. W. (2017). Continuity of primary care and emergency hospital admissions among older patients in England. *The Annals of Family Medicine, 15*(6), 515-522. doi:10.1370/afm.2136

Tannenbaum, C., Martin, P., Tamblyn, R., Benedetti, A., & Ahmed, S. (2014). Reduction of inappropriate benzodiazepine prescriptions among older adults through direct patient education: The EMPOWER cluster randomized trial. *JAMA internal medicine, 174*(6), 890-898. doi:10.1001/jamainternmed.2014.949

Thamman, R., Gulati, M., Narang, A., Utengen, A., Mamas, M. A., & Bhatt, D. L. (2020). Twitter-based learning for continuing medical education? *European Heart Journal, 41*(46), 4376-4379. doi:10.1093/eurheartj/ehaa346

The Health Foundation. Closing the gap through clinical communities: The FallSafe project. Retrieved from https://www.health.org.uk/sites/default/files/CtGtCC_FallSafe_Report.pdf

The National Institute for Health and Care Excellence. (2013). Falls in older people: assessing risk and prevention. Retrieved from https://www.nice.org.uk/guidance/cg161

The National Steering Group on the Prevention of Falls in Older People and the Prevention and Management of Osteoporosis throughout Life. (2008). Strategy to prevent falls and fractures in Ireland's ageing population. Retrieved from https://www.hse.ie/eng/services/publications/olderpeople/strategy-to-prevent-falls-and-fractures-in-irelands-ageing-population.html

Thevelin, S., Petein, C., Metry, B., Adam, L., van Herksen, A., Murphy, K., . . . Dalleur, O. (2022). Experience of hospital- initiated medication changes in older people with multimorbidity: A multicentre mixed- methods study embedded in the OPtimising thERapy to prevent Avoidable hospital admissions in Multimorbid older people (OPERAM) trial. *BMJ quality & safety,* 10.1136/bmjqs-2021-014372. doi:10.1136/bmjqs-2021-014372

Thillainadesan, J., Gnjidic, D., Green, S., & Hilmer, S. N. (2018). Impact of deprescribing interventions in older hospitalised patients on prescribing and clinical outcomes: A systematic review of randomised trials. *Drugs and Aging, 35*(4), 303-319. doi:10.1007/s40266-018-0536-4

Thomas, E. C., Ben-David, S., Treichler, E., Roth, S., Dixon, L. B., Salzer, M., & Zisman-Ilani, Y. (2021). A systematic review of shared decision–making interventions for service users with serious mental illnesses: State of the science and future directions. *Psychiatric Services, 72*(11), 1288-1300. doi:10.1176/appi.ps.202000429

Thomas, R., Huntley, A. L., Mann, M., Huws, D., Elwyn, G., Paranjothy, S., & Purdy, S. (2014). Pharmacist-led interventions to reduce unplanned admissions for older people: A

systematic review and meta-analysis of randomised controlled trials. *Age and Ageing, 43*(2), 174-187. doi:10.1093/ageing/aft169

Thompson, W., & Reeve, E. (2022). Deprescribing: Moving beyond barriers and facilitators. *Research in Social and Administrative Pharmacy, 18*(3), 2547-2549. doi:10.1016/j.sapharm.2021.04.004

Thompson, W., Reeve, E., Moriarty, F., Maclure, M., Turner, J., Steinman, M. A., . . . Farrell, B. (2019). Deprescribing: Future directions for research. *Research in Social & Administrative Pharmacy, 15*(6), 801-805. doi:10.1016/j.sapharm.2018.08.013

Todd, A., Jansen, J., Colvin, J., & McLachlan, A. J. (2018). The deprescribing rainbow: A conceptual framework highlighting the importance of patient context when stopping medication in older people. *BMC Geriatrics, 18*(1), 295. doi:10.1186/s12877-018-0978-x

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care, 19*(6), 349–357. doi:10.1093/intqhc/mzm042

Tong, E. Y., Roman, C. P., Mitra, B., Yip, G. S., Gibbs, H., Newnham, H. H., . . . Dooley, M. J. (2017). Reducing medication errors in hospital discharge summaries: A randomised controlled trial. *Medical Journal of Australia, 206*(1), 36-39. doi:10.5694/mja16.00628

Trivedi, D., Goodman, C., Gage, H., Baron, N., Scheibl, F., Iliffe, S., . . . Drennan, V. (2013). The effectiveness of inter-professional working for older people living in the community: A systematic review. *Health & Social Care in the Community, 21*(2), 113-128. doi:10.1111/j.1365-2524.2012.01067.x

A researcher's guide to patient and public involvement: A guide based on the experiences of health and medical researchers, patients and members of the public, (2016).

Turner, J. P., Edwards, S., Stanners, M., Shakib, S., & Bell, J. S. (2016). What factors are important for deprescribing in Australian long-term care facilities? Perspectives of residents and health professionals. *BMJ Open, 6*(3), 9. doi:10.1136/bmjopen-2015-009781

Turner, J. P., Richard, C., Lussier, M. T., Lavoie, M. E., Farrell, B., Roberge, D., & Tannenbaum, C. (2018). Deprescribing conversations: A closer look at prescriber–patient communication. *Therapeutic Advances in Drug Safety, 9*(12), 687-698. doi:10.1177/2042098618804490

Turnheim, K. (2003). When drug therapy gets old: Pharmacokinetics and pharmacodynamics in the elderly. *Experimental Gerontology, 38*(8), 843-853. doi:10.1016/s0531-5565(03)00133-5

United Nations. (2020). World population ageing (2019). *(ST/ESA/SER.A/444).* Retrieved from http://www.un.org/en/sections/issues-depth/ageing/

US deprescribing network. (2019). Resources for clinicians. Retrieved from https://deprescribingresearch.org/resources-2/resources-for-clinicians/

Van der Linden, L., Hias, J., Walgraeve, K., Flamaing, J., Tournoy, J., & Spriet, I. (2020). Clinical pharmacy services in older inpatients: An evidence-based review. *Drugs and Aging, 37*(3), 161-174. doi:10.1007/s40266-019-00733-1

Van Der Velde, N., Stricker, B. H. C., Pols, H. A. P., & Van Der Cammen, T. J. M. (2007). Withdrawal of fall-risk-increasing drugs in older persons. *Drugs and Aging, 24*(8), 691-699. doi:10.2165/00002512-200724080-00006

Van Middelaar, T., Ivens, S. D., Van Peet, P. G., Poortvliet, R. K. E., Richard, E., Pols, A. J., & Moll van Charante, E. P. (2018). Prescribing and deprescribing antihypertensive medication in older people by Dutch general practitioners: A qualitative study. *BMJ Open, 8*(4), e020871. doi:10.1136/bmjopen-2017-020871

Van Poelgeest, E. P., Seppala, L. J., Lee, J. M., Bahat, G., Ilhan, B., Lavan, A. H., . . . van der Velde, N. (2022). Deprescribing practices, habits and attitudes of geriatricians and geriatricians-in-training across Europe: A large web-based survey. *European Geriatric Medicine,* 10.1007/s41999-022-00702-9. doi:10.1007/s41999-022-00702-9

Vinluan, C., Wittman, D., & Morisky, D. (2015). Effect of pharmacist discharge counselling on medication adherence in elderly heart failure patients: A pilot study. *Journal of pharmaceutical health services research, 6*(2), 103-110. doi:10.1111/jphs.12093

Wallis, K. A., Andrews, A., & Henderson, M. (2017). Swimming against the tide: Primary care physicians' views on deprescribing in everyday practice. *Annals of Family Medicine, 15*(4), 341-346. doi:10.1370/afm.2094

Walsh, K. A., Dennehy, R., Sinnott, C., Browne, J., Byrne, S., McSharry, J., . . . Timmons, S. (2017). Influences on decision-making regarding antipsychotic prescribing in nursing home residents with dementia: A systematic review and synthesis of qualitative evidence. *Journal of the American Medical Directors Association, 18*(10), 897. e891-897. e812.

Walsh, K. A., O'Riordan, D., Kearney, P. M., Timmons, S., & Byrne, S. (2016). Improving the appropriateness of prescribing in older patients: A systematic review and meta-analysis of pharmacists' interventions in secondary care. *Age and Ageing, 45*(2), 201-209. doi:10.1093/ageing/afv190

Walsh, K. A., Sinnott, C., Fleming, A., Mc Sharry, J., Byrne, S., Browne, J., & Timmons, S. (2018). Exploring antipsychotic prescribing behaviors for nursing home residents with dementia: A qualitative study. *Journal of the American Medical Directors Association, 19*(11), 948-958. e912. Retrieved from https://www.jamda.com/article/S1525-8610(18)30386-4/fulltext

Walsh, M. E., Boland, F., Moriarty, F., & Fahey, T. (2019). Modification of potentially inappropriate prescribing following fall-related hospitalizations in older adults. *Drugs and Aging, 36*(5), 461-470. doi:10.1007/s40266-019-00646-z

Wang, A. T., Sandhu, N. P., Wittich, C. M., Mandrekar, J. N., & Beckman, T. J. (2012). Using social media to improve continuing medical education: A survey of course participants. *Mayo Clinic Proceedings, 87*(12), 1162-1170. doi:10.1016/j.mayocp.2012.07.024

Wang, P. J., Lu, Y., Mahaffey, K. W., Lin, A., Morin, D. P., Sears, S. F., . . . Stafford, R. S. (2023). Randomized clinical trial to evaluate an atrial fibrillation stroke prevention shared decision-making pathway. *J Am Heart Assoc, 12*(3), e028562. doi:10.1161/jaha.122.028562

Wastesson, J. W., Morin, L., Tan, E. C. K., & Johnell, K. (2018). An update on the clinical consequences of polypharmacy in older adults: A narrative review. *Expert Opinion on Drug Safety, 17*(12), 1185-1196. doi:10.1080/14740338.2018.1546841

Wehling, M., Burkhardt, H., Kuhn-Thiel, A., Pazan, F., Throm, C., Weiss, C., & Frohnhofen, H. (2016). VALFORTA: a randomised trial to validate the FORTA (Fit fOR The Aged) classification. *Age and Ageing, 45*(2), 262-267. doi:10.1093/ageing/afv200

Weir, K. R., Ailabouni, N. J., Schneider, C. R., Hilmer, S. N., & Reeve, E. (2022). Consumer attitudes towards deprescribing: A systematic review and meta-analysis. *Journals of Gerontology. Series A: Biological Sciences and Medical Sciences, 77*(5), 1020-1034. doi:10.1093/gerona/glab222

WHO. (2007). WHO global report on falls prevention in older age. Retrieved from https://www.who.int/ageing/publications/Falls_prevention7March.pdf

WHO. (2017). Global strategy and action plan on ageing and health. Retrieved from https://www.who.int/publications/i/item/9789241513500.

Williams, F., Mahfouz, C., Bonney, A., Pearson, R., Seidel, B., Dijkmans-Hadley, B., & Ivers, R. (2016). A circle of silence: The attitudes of patients older than 65 years of age to ceasing long-term sleeping tablets. *Australian Family Physician, 45*(7), 506-511.

Wilson, F. P., Martin, M., Yamamoto, Y., Partridge, C., Moreira, E., Arora, T., . . . Ugwuowo, U. (2021). Electronic health record alerts for acute kidney injury: Multicenter, randomized clinical trial. *BMJ, 372*, m4786. doi:10.1136/bmj.m4786

Wilson, N. M., Hilmer, S. N., March, L. M., Cameron, I. D., Lord, S. R., Seibel, M. J., . . . Sambrook, P. N. (2011). Associations between drug burden index and falls in older people in residential aged care. *Journal of the American Geriatrics Society, 59*, 875–880.

Woodward, M. C. (2003). Deprescribing: Achieving better health outcomes for older people through reducing medications. *Journal of Pharmacy Practice and Research, 33*(4), 323-328. doi:10.1002/jppr2003334323

Wright, D., Scott , S., & Buck, J. e. a. (2019). Role of nurses in supporting proactive deprescribing. *Nursing Standard, 34*(3). doi:10.7748/ns.2019.e11249

Wu, H., O'Donnell, L. K., Fujita, K., Masnoon, N., & Hilmer, S. N. (2021). Deprescribing in the older patient: A narrative review of challenges and solutions. *International Journal of General Medicine, 14*, 3793.

Xue, L., Boudreau, R. M., Donohue, J. M., Zgibor, J. C., Marcum, Z. A., Costacou, T., . . . Strotmeyer, E. S. (2021). Persistent polypharmacy and fall injury risk: The health, aging and body composition study. *BMC Geriatrics, 21*(1), 710. doi:10.1186/s12877-021-02695-9

Yemm, R., Bhattacharya, D., Wright, D., & Poland, F. (2014). What constitutes a high quality discharge summary? A comparison between the views of secondary and primary care doctors. *Int J Med Educ, 5*, 125-131. doi:10.5116/ijme.538b.3c2e

Zaal, R. J., den Haak, E. W., Andrinopoulou, E. R., van Gelder, T., Vulto, A. G., & van den Bemt, P. (2020). Physicians' acceptance of pharmacists' interventions in daily hospital practice. *International Journal of Clinical Pharmacy, 42*(1), 141-149. doi:10.1007/s11096-020-00970-0

Zaninotto, P., Huang, Y. T., Di Gessa, G., Abell, J., Lassale, C., & Steptoe, A. (2020). Polypharmacy is a risk factor for hospital admission due to a fall: Evidence from the english longitudinal study of ageing. *BMC Public Health, 20*(1). doi:10.1186/s12889-020-09920-x

Zhou, L., Zhang, D., Yang, C. C., & Wang, Y. (2018). Harnessing social media for health information management. *Electronic Commerce Research and Applications, 27*, 139–151. doi:10.1016/j.elerap.2017.12.003

Zhu, H., Hu, K., Liu, S., Kim, H.-C., Wang, Y., & Xue, Q. (2020). Systematic causality mapping of factors leading to accidental falls of older adults. *Public Health in Practice, 1*. doi:10.1016/j.puhip.2020.100045

Zulman, D. M., Sussman, J. B., Chen, X., Cigolle, C. T., Blaum, C. S., & Hayward, R. A. (2011). Examining the evidence: A systematic review of the inclusion and analysis of older adults in randomized controlled trials. *Journal of General Internal Medicine, 7*. doi:10.1007/s11606-010-1629-x.

Appendices

Appendix 1: Search strategies and key terms

- Strategy used to search PubMed

1. **''Continuity of patient care'' [Mesh]** OR (**[Title/Abstract]** ''Continuity of patient care'' OR ''seamless care'' OR ''transition of care'' OR ''primary and secondary healthcare interface'' OR ''care coordination'' OR ''after care'' OR ''Patient Care Continuity'' OR ''Continuum of Care'' OR ''Care Continuum'' OR ''Continuity of Care'' OR ''Care Continuity'' OR ''integrated care'' OR ''intermediate care'')
2. **''patient care'' [Mesh]** OR (**[Title/Abstract]** ''patient care'' OR ''Patient discharge'' OR ''patient transfer'' OR '' hospital discharge'' OR ''discharge services'' OR ''post discharge'')
3. **Aged [Mesh]** OR **''aged 80 and over'' [Mesh]** OR (**[Title/Abstract]** elderly OR aged OR ''aged 80 and over'' OR ''older adult'' OR ''old adult'' OR ''old people'' OR geriatrics OR geriatric OR ''geriatric patient'' OR nonagenarians OR Nonagenarian OR Octogenarians OR Octogenarian OR Centenarians OR Centenarian OR ''frail elderly'' OR ''frail elder'')
4. **Pharmacist [Mesh] OR ''pharmacy technician'' [Mesh] OR ''Pharmaceutical Services'' [Mesh]** OR **([Title/Abstract]** pharmacist OR pharmacists OR ''Clinical Pharmacists'' OR ''Clinical Pharmacist'' OR ''pharmacy technician'' OR ''pharmacy technicians'' OR ''pharmacist aides'' OR ''pharmacy student'' OR pharmacy OR pharmacies OR ''pharmaceutical services'' OR "Community Pharmacy Services" OR ''medication liaison services'' OR ''pharmacy practitioner'' OR "Hospital Pharmacy Service'')
5. **1 AND 2 AND 3 AND 4**

- **Strategy used to search Scopus**

1. TITLE-ABS-KEY(“Continuity of patient care” OR “seamless care” OR “transition of care” OR “primary and secondary healthcare interface” OR “care coordination” OR “after care” OR “Patient Care Continuity” OR “Continuum of Care” OR “Care Continuum” OR “Continuity of Care” OR “Care Continuity” OR “integrated care” OR “intermediate care”)
2. TITLE-ABS-KEY(“patient care” OR “Patient discharge” OR “patient transfer” OR “hospital discharge” OR “discharge services” OR “post discharge” OR “Drug related problems”)
3. TITLE-ABS-KEY(elderly OR aged OR "aged 80 and over" OR "older adult" OR "old adult" OR "old people" OR geriatrics OR geriatric OR "geriatric patient" OR nonagenarians OR Nonagenarian OR Octogenarians OR Octogenarian OR Centenarians OR Centenarian OR "frail elderly" OR "frail elder")

4. TITLE-ABS-KEY(pharmacist OR pharmacists OR "Clinical Pharmacists" OR "Clinical Pharmacist" OR "pharmacy technician" OR "pharmacy technicians" OR "pharmacist aides" OR "pharmacy student" OR pharmacy OR pharmacies OR "pharmaceutical services" OR "Community Pharmacy Services" OR "medication liaison services" OR "pharmacy practitioner" OR "Hospital Pharmacy Service")
5. Then #1 AND #2
6. Then #3 AND #4
7. #5 AND #6

Appendix 2: Examples of excluded studies (chapter 2)

Study	Design	Demographic	Sample size	Intervention	Outcome
Reasons for exclusion **Age**					
Ahmed et al. 2012	RCT	▪ Aged 60 years and older ▪ Using five or more medications	340	Medication review by community pharmacist	Drug related problems
Duggan et al. 1998		▪ English speaking ▪ Aged between 16 and 79 ▪ Have no mental impairment or alcohol abuse and living within the study area	501	A list of discharge medication was given to the patients to provide it to the community pharmacist after discharge followed by a home visit	Medication discrepancies
Odeh et al. 2020	RCT	▪ Aged ≥ 18 years ▪ Taking four or more medications ▪ Unplanned hospital admissions	62	Post-discharge pharmacist-led medicines optimisation clinic	Primary outcomes: ▪ Unplanned readmission to hospital within thirty days Secondary outcomes: ▪ Number and time to hospital readmission ▪ length of hospital stay during first readmission.
Cadman et al. 2017	RCT	▪ Adult patient using at least one medication ▪ Admitted from the emergency department to one of the study wards ▪ Did not receive medication review before inclusion	200	Systematic medication review by pharmacist at admission and discharge	▪ Length of stay ▪ Quality of life ▪ Unintentional medication discrepancies ▪ Emergency readmission within 3 months
Intervention outcomes measured during hospital stay					

Study	Design	Demographic	Sample size	Intervention	Outcome
Lisby et al. 2010	RCT	▪ Aged 70 years or older ▪ Admitted to the acute ward of internal medicine within 24 hours ▪ Taking at least one drug	100	Medication review and counselling by pharmacists	Primary outcome: ▪ length of hospital stay Secondary outcomes: ▪ Number and time of readmissions, number of emergency visits, ▪ To outpatient clinics visits ▪ Mortalities at three months after randomisation
Burnett et al. 2009	RCT	▪ Aged ≥65 years Admitted within 24 hours to the project ward with one of the following: ▪ Taking four or more medications, one high-risk drug or antidepressant ▪ Have been hospitalised within six months before the study ▪ Received intravenous antibiotic at hospital admission	117	Assessment of the medication appropriateness through the integrated medicines management service	▪ Appropriateness of the medications prescribed on admission and discharge using MAI ▪ The difference between admission and discharge MAI scores for individual patients
Observetional, non-randomised or non control					
MacDonald et al. 2017	Prospective study	▪ Aged 65 years or older ▪ Hospitalised for more than four days ▪ Taking > 5 drugs at discharge	72	Evaluation of the medication reconciliation and the exchange of electronic discharge report between hospital and community pharmacy after discharge	▪ The number of discharge medication reconciliation reports sent to the community pharmacies ▪ The time needed for reports to reach community pharmacies after discharge ▪ The number of drug related problems identified by community pharmacist

Study	Design	Demographic	Sample size	Intervention	Outcome
					▪ The quantity of correspondence between community pharmacists and doctors
Ooi et al. 2017	Pre- and post-intervention study	Discharged from the study hospital during the data collection	200	Discharge medication management summary prepared and sent to GPs by hospital pharmacists	▪ Accuracy of medication change information in the summary ▪ GP satisfaction ▪ Feasibility of a pharmacist-prepared discharge medication management summary
Intervention by other providers (no pharmacist in the team)					
Eklund et al. 2010	RCT	▪ Aged 65 and older ▪ Have one or more chronic disease ▪ Being dependent in at least one activity of daily living ▪ Admitted to the emergency department ▪ Discharged to their own homes	181	Multidisciplinary emergency care team	▪ Independency in activities of daily living ▪ Frailty indicators
Primary care setting					
Lenaghan et al. 2007	RCT	▪ Aged > 80 years ▪ Taking > 4 drugs ▪ Living alone, mentally or physically impaired, taking more than seven medications or taking medications predispose them to morbidity	136	Collaboration with GP and home visits by community pharmacist	Primary outcomes: ▪ Hospital re admissions within 6 months Secondary outcomes: ▪ Number of deaths ▪ Care home admissions ▪ Quality of life ▪ Number of medicines prescribed

Study	Design	Demographic	Sample size	Intervention	Outcome
Sellors et al. 2003	RCT	▪ Patients living in the community ▪ Taking ≥ 5 medications daily	889	▪ Comprehensive medication reviews by pharmacists ▪ Written recommendations to the physicians regarding drug-related problems	▪ Number of drug-related problems identified among ▪ The percentage of recommendations implemented by the physicians

Appendix 3: Guide for Doctors' interviews

Domains: knowledge, skills, environmental context and resource, professional role, social influence, emotions.

General prompts:

- Could you explain more about this?
- Could you give an example that illustrates this?

Knowledge

1. What does the term deprescribing mean to you?
2. In your opinion, is deprescribing a valuable and safe initiative to address inappropriate polypharmacy and decrease the risk of falls?
3. Some classes of medication are more likely to increase the risk of fall, which? three classes would you deprescribe first? And why? (Prompt: a frail 85 years old patient, name at least three)

Environment

- ❖ **Some factors can make the deprescribing process more challenging:**

1. What work environment factors can make it challenging to deprescribe?
2. When do you think is the optimal time for reviewing and deprescribing the patients' medication – admission, during inpatient stay or at discharge?

Resources

- ❖ **There are some resources available to assist prescribers with deprescribing and medication review:**

1. What (if any) deprescribing tools do you use to guide you with the process?
   - If yes, can you name which ones you find most helpful?
   - If no, have heard about the Scottish Guidelines or STOPP (and START) tools?
2. Are you familiar with the available online information at the Hospital website about older adults' care and falls risk medication review?
   - If yes, how useful do you find these online resources?

Skills

1. Can you please take me through the step by step process you use when deprescribing a patient's medication?
2. Do you involve patients or carers in the deprescribing process?
   - Is it important? And why?

Emotion

- ❖ **Patients or carers may react to your deprescribing decision:**

1. How does their response influence your decision? (Prompt: accepting or rejecting)
2. As a doctor, do you have any other concerns about deprescribing and the possible consequences?

Professional role

1. Who in your opinion, should be responsible for reviewing patient's medication?
2. Are there other health care providers who could assist you with this task?
3. How would involving a clinical pharmacist in the medication review process affect your overall workload?

Social influence

1. When a medication you are reviewing had been prescribed by another prescriber, is that an additional challenge?

- If yes, can you explain why this is challenging?

2. Is there a process of communication between teams within the hospital about medication change?
   - If yes, is this process effective?
   - If no, what process do you recommend?
3. On discharge, how do you communicate the medication changes to the patient's GP? (e.g., dose reduction, duration).

……..

End

Appendix 4: Guide for General Practitioners' interviews

Background questions

4. Gender:
5. Registration level:
6. Years of practice:

Prompts:

- 'Could you explain more about this?'
- 'Could you give an example that illustrates this?'
- 'Anything else?'

Knowledge

7. What does the term 'deprescribing' mean to you?
8. In your opinion, is deprescribing a valuable and safe initiative to address inappropriate polypharmacy and decrease the risk of falls?
9. Some classes of medication are more likely to increase the risk of fall. Which classes would you deprescribe first and why?

Resource

There are some resources available to assist prescribers with deprescribing and medication review:

10. Which of these resources are you familiar with?

Environment

Some factors can make the deprescribing process more challenging:

11. What work environment factors can make it challenging to deprescribe fall-risk-increasing drugs (FRIDs)?

Skills

12. Describe the process that you follow when deprescribing patient's medications?
13. How important is involving patients or carers in deprescribing FRIDs?

Patients or carers may react to your deprescribing decision:

14. How does their response influence your decision?

Professional role

15. Who, in your opinion, should be responsible for reviewing patient's medication?
16. How would involving a clinical pharmacist in the medication review process affect your overall workload?

Social influence

17. When a medication you are reviewing had been prescribed by another prescriber, is that an additional challenge? And why?
18. Is there a process of communication between hospital and primary care clinics about medication change? If yes, is this process effective? If no, what process do you recommend?

Reinforcement

19. What might encourage you to undertake a deprescribing process (e.g. FRIDs)?

Emotion

20. As a doctor, do you have any concerns about the possible consequences of deprescribing FRIDs?

……..

End

Appendix 5: Guide for pharmacists' interviews

Background

Gender: ……

Years of experience: ……..

Staff grade (level of seniority): ……..

Prompts:

- Could you explain more about this?
- Could you provide an example that illustrates this?
- Is there anything else?

Knowledge

1. What does the term deprescribing mean to you?
2. In your opinion, is deprescribing a valuable and safe initiative to address inappropriate polypharmacy and decrease the risk of falls?
3. Some classes of medication are more likely to increase the risk of falls. Which classes would you recommend to deprescribe first and why?

Environment

4. Some factors can make the deprescribing process more challenging; what work environment factors make it challenging to be involved in medication reviews that lead to deprescribing FRIDs?
5. When do you think is the optimal time for deprescribing FRIDs?
   Prompt: Upon admission, during inpatient stay or at discharge?

Resource

6. Some resources are available to assist with deprescribing and medication review; which of these resources are you familiar with?
7. Are there specific resources for medication review for fall prevention in your institution?

Skills

8. Describe the process that you follow when reviewing a patient's medications.
9. How often do you review FRIDs for older patients?
10. How likely are you to discuss FRIDs' issues with the doctor, patient or their carers? Do you think that patients and carers should be involved?

Professional role

11. Who, in your opinion, should be responsible for reviewing medications for patients at risk of falling?
12. How would the medication review process affect your overall workload?

Social influence

13. Is there a communication process between you (the pharmacist) and doctors or medical teams in the hospital regarding medication changes? Is this process effective? What process do you recommend?
14. When your recommendation is not accepted, what do you do?
15. How do you communicate with general practitioners about medication issues (e.g. FRIDs)?

Reinforcement

16. What might encourage you to recommend deprescribing FRIDs?

Emotion

17. What other concerns do you have about deprescribing FRIDs?

The END

Appendix 6: Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Item	Description
Domain 1: Research team and reflexivity	
Personal Characteristics	
1. Interviewer/facilitator **2. Credentials** **3. Occupation** **4. Gender** **5. Experience and training**	Reham Kalim Pharm D PhD student Female Worked as demonstrator in university Pharmacy departments in Ireland and Saudi Arabia.
Relationship with participants	
6. Relationship established **7. Participant knowledge of the interviewer**	No relationship exists Participants did not know the interviewer prior to the interview
8. Interviewer characteristics	No characteristics were reported
Domain 2: study design	
Theoretical framework	
9. Methodological orientation and Theory	Thematic and inductive analysis (Theoretical domain framework and grounded theory)
Participant selection	
10. Sampling	Purposive sampling technique was used: A. doctors with experience or interest in geriatric medicine were targeted to give rich data in relation to older patients' care. B. General practitioners where targeted to give rich data in relation to older patient's care. C. Pharmacist who were members of the Care of The Older Persons Special Interest Group (SIG) at the Hospital Pharmacists Association, Ireland (HPAI)
11. Method of approach	Semi-structured interviews
12. Sample size	A. 18 B. 15 C. 12
13. Non-participation	A. 3 (did not respond to invitation emails) B. The study was advertised on social media, and groups of general practitioners associated with SS and NM research and clinical networks. For that it is not feasible to calculate nonparticipation rate. C. 18
Setting	
14. Setting of data collection	A. Hospital (Face to face).

Item	Description
	B. and C. Online (ZOOM.com).
15. Presence of non-participants	A. PI (NM) as observer in three of the interviews only. B and C. None
16. Description of sample	A. See Table 3.2 B. Table 4.1 C. and 5.1
Data collection	
17. Interview guide	A. Nineteen questions categorised into six domains drawn from the Theoretical Domains Framework (TDF) version 2 (Atkins et al., 2017) (knowledge, skills, environmental context and resources, professional role, social influence, and emotions). Prompt questions, such as 'Could you explain more about this?' or **'**Could you give an example that illustrates this?', ' Anything else?' were used to get more explicit answers when needed. B. And C. Seventeen questions categorized into seven domains (knowledge, skills, environmental context and resource, professional role, social influence, emotions, and reinforcement). Prompt questions, such as 'Could you explain more about this?' or 'Could you give an example that illustrates this?', ' Anything else?' were used to get more explicit answers when needed.
18. Repeat interviews	None
19. Audio/visual recording	Audio recording
20. Field notes	Yes
21. Duration	A. The duration of the interviews ranged between 11 and 30 minutes (Median= 16.2 minutes). B. The duration of the interviews ranged between 10.25 to 42.55 min (Median =21.53 min). C. Interviews lasted between 19.53 and 54.02min (Median=28.63 min).
22. Data saturation	Data saturation was reached
23. Transcripts returned	No
Domain 3: analysis and findings	
Data analysis	

Item	Description
24. Number of data coders	One initial coder (RK). Codes were then reviewed by (SR) and coding was more widely discussed within the team (RK, SR, NM). Any conflicts were resolved by team discussion to reach consensus.
25. Description of the coding tree	The Theoretical Domain Framework (TDF) (Atkins et al., 2017) was used as a basis for the initial coding tree.
26. Derivation of themes	Subthemes were derived from data using grounded theory.
27. Software	NVivo 12 by QRS limited, UK.
28. Participant checking	Participants had the opportunity to review transcripts before anonymisation if they wished. It was agreed that findings would be shared with them at the end of the study.
Reporting	
29. Quotations presented **30. Data and findings consistent** **31. Clarity of major themes**	Yes Yes Yes
32. Clarity of minor themes	Participant responses were analysed in depth. Themes and subthemes were presented in: A. Tables 3.3, 3.4, 3.5, 3.6, 3.7, 3.8. B. Tables 4.2, 4.3, 4.4, 4.5, 4.6, 4.7. C. Tables 5.2, 5.3, 5.4, 5.5, 5.6, 5.7
A = Hospital doctors' interviews B = General practitioners' interviews C = Pharmacists' interviews	

Appendix 7: Qualitative systematic review search strategy

Pubmed:

(''older adult''[Title/Abstract]) OR (''older adults''[Title/Abstract]) OR (aged[Title/Abstract]) OR (frail[Title/Abstract]) OR (caregiver[Title/Abstract]) OR (caregivers[Title/Abstract]) OR (''older adult'') OR (''older adults'') OR (aged) OR (frail) OR (caregiver) OR (carer[MeSH Terms]) OR (carer[Title/Abstract]) OR (carers[Title/Abstract]) OR (carer[MeSH Terms])

AND

(Research, Qualitative[Title/Abstract]) AND (Research, Qualitative[MeSH Terms]) OR (attitude[Title/Abstract]) OR ("attitude"[Title/Abstract] OR "attitudes"[Title/Abstract]) OR ("attitude"[MeSH Terms]) OR ("perspectives"[Title/Abstract]) OR ("barriers"[Title/Abstract] OR "facilitators"[Title/Abstract] OR "enabler"[Title/Abstract] OR "enablers"[Title/Abstract]) OR ("perception"[Title/Abstract] OR "perceptions"[Title/Abstract]) OR ("view"[Title/Abstract] OR "willingness"[Title/Abstract]) OR ("opinion"[Title/Abstract] OR "opinions"[Title/Abstract]) OR ("belief"[Title/Abstract] OR "beliefs"[Title/Abstract]) OR ("behavior"[Title/Abstract] OR "behaviors"[Title/Abstract] OR "behaviour"[Title/Abstract] OR "behaviours"[Title/Abstract] OR "behavior"[Title/Abstract])

AND

(Deprescription [MeSH Terms]) OR (deprescribing [MeSH Terms]) OR ("deprescriptions"[Title/Abstract] OR "deprescription"[Title/Abstract] OR "deprescriptions"[Title/Abstract] OR "deprescribe"[Title/Abstract] OR "deprescribed"[Title/Abstract] OR "deprescribing"[Title/Abstract] OR "withdrawal"[Title/Abstract] OR "withdrawals"[Title/Abstract] OR "discontinuation"[Title/Abstract] OR "cessation"[Title/Abstract] OR "withdrawing"[Title/Abstract])

AND

(Sedating-Antihistamine*[Title/Abstract]) OR (Neuroleptic*[Title/Abstract] OR Antipsychotic*[Title/Abstract] OR Antipsychotic-Drugs[Title/Abstract]) OR (Cardiovascular-Agent[Title/Abstract] OR Cardiovascular-Drug[Title/Abstract]) OR (vasodilator*[Title/Abstract]) OR (Vasodilator-drug*[Title/Abstract]) OR (vasodilator-agent*[Title/Abstract]) OR ("antidepressant drug*"[Title/Abstract] OR "antidepressant medication*"[Title/Abstract]) OR (Anticonvulsant-Drug[Title/Abstract] OR Antiepileptic-Drug[Title/Abstract] OR Antiepileptic-agent[Title/Abstract] OR Anticonvulsive-Agent[Title/Abstract]) OR (Opioid-Analgesic*[Title/Abstract]) OR (Diuretic*[Title/Abstract]) OR (Adrenergic-alpha-Antagonists[Title/Abstract] OR alpha-Adrenergic-Receptor-Blockaders[Title/Abstract] OR alpha-Adrenergic-Blocking-Agents[Title/Abstract]) OR ("benzodiazepine"[tiab] OR "benzodiazepines"

[tiab] OR "benzodiazepines"[mh] OR "benzodiazepin"[tiab] OR "benzodiazepins"[tiab] OR "z-drug"[tiab] OR "z-drugs"[tiab] OR "anxiolytic"[tiab] OR "anxiolytics"[tiab] OR "sedative"[tiab] OR "sedatives"[tiab] OR "hypnotic"[tiab] OR "hypnotics"[tiab]) OR (fall-risk-increasing-drugs[Title/Abstract]) OR (fall* [MeSH Terms]) OR (fall* [Title/Abstract])

Google scholar:

Attitude AND medication AND falls AND older AND deprescribing =1770

Embase:

'qualitative research'/exp OR 'qualitative research' OR 'attitude'/mj OR 'perspectives':ti,ab OR 'perception'/de OR 'barriers':ti,ab OR ‘facilitators’ OR 'facilitator'/exp OR 'facilitator' OR ‘enabler’ OR ‘views’ OR ‘opinion OR opinions:ti,ab’ OR ‘enablers’ OR 'beliefs':ti,ab OR 'behavior' OR 'behaviors':ti,ab OR 'qualitative research':ti,ab OR qualitative research' OR 'attitude':ti,ab OR 'perspectives':ti,ab OR perception':ti,ab OR 'facilitator':ti,ab OR enabler:ti,ab OR views:ti,ab
AND
'deprescription'/exp OR 'deprescription' OR 'treatment withdrawal'/exp OR 'treatment withdrawal' OR 'drug withdrawal'/exp OR 'drug withdrawal' OR ‘cessation':ti,ab OR deprescription':ti,ab OR treatment withdrawal':ti,ab OR 'drug withdrawal':ti,ab
AND
'caregiver' OR 'caregivers'/mj OR 'older people':ti,ab OR ‘older people' OR 'aged'/mj OR 'very elderly' OR 'older adults'/de OR 'older adult':ti,ab OR 'caregiver' OR 'caregivers':ti,ab OR ‘aged':ti,ab OR 'older people':ti,ab
AND
fall*: mi OR fall*: ti,ab OR 'fall risk increasing drugs':ti,ab OR 'histamine h1 receptor antagonist':ti,ab OR 'hypnotic sedative agent':ti,ab OR 'neuroleptic agent':ti,ab OR 'cardiovascular agent':ti,ab OR 'vasodilator agent':ti,ab OR 'alpha adrenergic receptor blocking agent':ti,ab OR ‘antidepressant agent':ti,ab OR 'opiate agonist'/exp OR 'opiate agonist' OR 'anticonvulsive agent':ti,ab OR 'diuretic agent':ti,ab OR 'benzodiazepine derivative'/exp OR 'benzodiazepine derivative' OR 'anxiolytic agent'/exp OR 'anxiolytic agent' OR 'benzodiazepine receptor stimulating agent'/exp OR 'benzodiazepine receptor stimulating agent'

Appendix 8: Guide for PPI

Medicines and Falls in Older Adults

Summary

Falls may cause harm to older adults. Some medicines are known to increase the risk of a person falling. The balance between risk and benefit of medicines can change as people age and their circumstances change. Therefore, if a healthcare professional (*e.g*. a doctor or a pharmacist) reviews and amends the medicines a person is taking, it may reduce their risk of falling.

We are conducting a research study at Trinity College Dublin that explores the role of medicine review in reducing the risk of falls. People's involvement in decisions around changing their medicines (that increase the risk of falls) is valuable and of interest to us. **We need your help to build upon the previous research results and ensure that any recommendations we make are appropriate and take the needs and wants of older people into consideration.**

Background information about falls

Falls are common in older adults but are not part of normal ageing and can be prevented ("STEADI—Older Adult Fall Prevention; Patient & Caregiver Resources," 2020). Falls might cause bone fractures, and injuries that may lead to long stays in hospitals or sometimes even contribute to the death of the person.

Causes of falls

Many factors can lead to falls: for example, increasing age; diseases such as arthritis, dementia and stroke; home or environment hazards (*e.g*., slippery surfaces and loose rugs); and taking certain medicines. Some causes can be modified, while others cannot (Moncada & Mire, 2017). Muscle weakness and taking medicines are common factors that can potentially be modified (Moncada & Mire, 2017). Ageing can change the way medicines work in the body. Some medicines can make people sleepy or dizzy and make falls more likely ("STEADI—Older Adult Fall Prevention; Patient & Caregiver Resources," 2020).

How to prevent falls

Some measures might prevent or reduce the risk of falls. Exercise that includes strength and balance training is an excellent way to prevent falls. Making the home safer is also beneficial, *e.g*., removing loose rugs and adding grab bars near the bath ("STEADI—Older Adult Fall Prevention; Patient & Caregiver Resources," 2020). Another possibility is for a healthcare professional (*e.g.,* a doctor or pharmacist) to assess the risk of falls and recommend stopping or

reducing the dose of medicines that might cause falls (The National Institute for Health and Care Excellence, 2013). Multiple measures can be combined to target more than one of the causes of falls and maximise prevention.

Previous research about medicine changes to reduce falls risk

In a previous study, we interviewed doctors and pharmacists to find out what issues are raised when they talk to people about changing their medicines.

We found that:

- Doctors and pharmacists said that people are sometimes reluctant to change their medicines, especially when they have been using them for a long time or when another doctor (*e.g*. a hospital specialist) has prescribed these medicines.
- The purpose of the medicine may affect how willing people are to change it.
- Doctors are keen to maintain people's trust. So some avoid talking about changing medicines if they feel this may cause concern, while others avoid changing medicines unless they can involve the person.

In addition, other researchers (Weir et al., 2022) have found that:

- There are some medicines that people may no longer need or that are giving them side effects.
- If their doctor recommended stopping a medicine, some people would feel that he/she was giving up on them.
- Most people were agreeable to changes to their medicines that their doctor recommended.

What is the current study about?

We hope to design an intervention (recommendations/supports) to reduce the risk of medication-related falls. The intervention is intended for people aged 65 years or older, who are taking five or more medicines, and who have fallen within the past year.

The role of the PPI panel in this research

We need to hear your opinions about medicines review, as a measure to reduce falls risk. This, along with the results of the previous research, will help us to understand people's views and to find a way to help healthcare professionals and people work together to find solutions and reduce the risk of falls.

The following questions may help you think about medicines and falls risk before we meet:

- How much do you think older people know about medicines that increase the risk of fall?
- What may make older people reluctant to change their medicines?
- How much do you think older people want to be involved in making decisions about their medicines?
- Would providing information to people about medicines and falls in the form of leaflets, posters, or similar materials help?
    - If yes, what is the best way, time and place to provide information about this topic? What information should be highlighted?
    - If no, what do you suggest?

We need your help to ensure that any intervention we design is appropriate and suits older people living in Ireland. Please feel free to comment and ask questions when we meet.

Appendix 9: The falls capsule

Mrs. Murphy is 65 years old. She is on enalapril simvastatin and diazepam. Which of her medications might increase her risk of falls?

Answer: Her diazepam

While antihypertensives might cause dizziness as a side effect however in metanalysis showed that the relation is not significant*. The table below highlight the strongly associated classes.

Fall Risk–Increasing Drugs	
Benzodiazepines	Antiepileptics
Opioids	Anticholinergics
Antipsychotics	Loop diuretics
Tricyclic-antidepressants	Alpha-blockers
Oral hypoglycaemics	Sedative antihistamines

What can you do?

- Change (to a safer alternative, if any)
- Stop/withdraw
- Reduce the dose
- Monitor
- **Involve your patients**

Source: *doi:10.1016/j.jamda.2017.12.013 and https://kik.amc.nl/falls/decision-tree/

Mr. Murphy is on long-term temazepam for his insomnia. Might he agree to stop using it?

Answer:

Most people **Some people**

To find out, you can use the four Es

- **Explore** what the patient wants.
- **Educate** them (benefits and concerns).
- **Empower** patients to take responsibility for taking medicines.
- **Enable** behavioural change to help patients achieve their aims.

Source: Barnett, N.L., Sanghani, P. A. (2013). Coaching approach to improving concordance. *International Journal of Pharmacy Practice*., *21*(4), 270-272. https://doi.org/10.1111/ijpp.12004.

A 70-year-old man uses terazosin for his benign prostatic hyperplasia. Would it affect his fall risk?

Answer: It can

Alpha-blockers are significantly linked to falls in older adults.
When used:

- As antihypertensives
- For benign prostate hyperplasia

Stop if:

- Orthostatic hypotension
- Dizziness

How to withdraw?
Taper over one to two weeks

What to monitor?

- Symptoms and BP
- Fall incidents

Check: https://kik.amc.nl/falls/decision-tree/

How can anticholinergics increase the risk of falls?

Answer:

By causing dizziness and blurry vision

Remember:

- Higher ACH* activity
- Higher number/dose of medication
- Older age

→ Higher risk of fall

Examples of drugs with moderate to severe anticholinergic effect**	
Antidepressants	Amitriptyline
Urinary incontinence	Oxybutynin
Acid reflux	Ranitidine

*Anticholinergic

** Source: ACB calculator

Do you use any tools or guidance when reviewing medications for older people at risk of falls?

Here are some:

Tools

- **STOPPFall** (contains a comprehensive list of and algorithms for managing fall risk–increasing drugs)
- **ACB calculator** (helps calculate the anticholinergic burden, which is highly associated with falls)

Guides

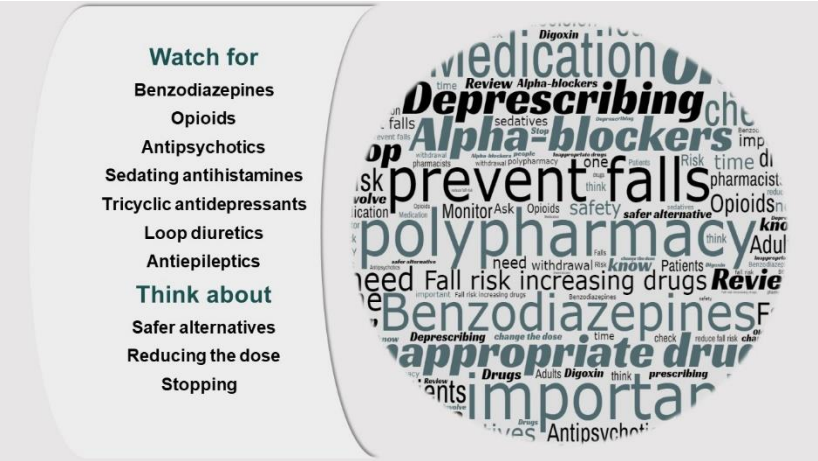
- **The 7 Steps** (contains a table of medication classes arranged based on their association with falls)
- **Deprescribing.org** (contains algorithms for managing five classes of medications, plus resources for patients)

Links: https://kik.amc.nl/falls/decision-tree/
www.Deprescribing.org
https://www.isimpathy.eu/uploads/Polypharmacy-Guidance-2018.pdf
https://www.acbcalc.com/pages/about

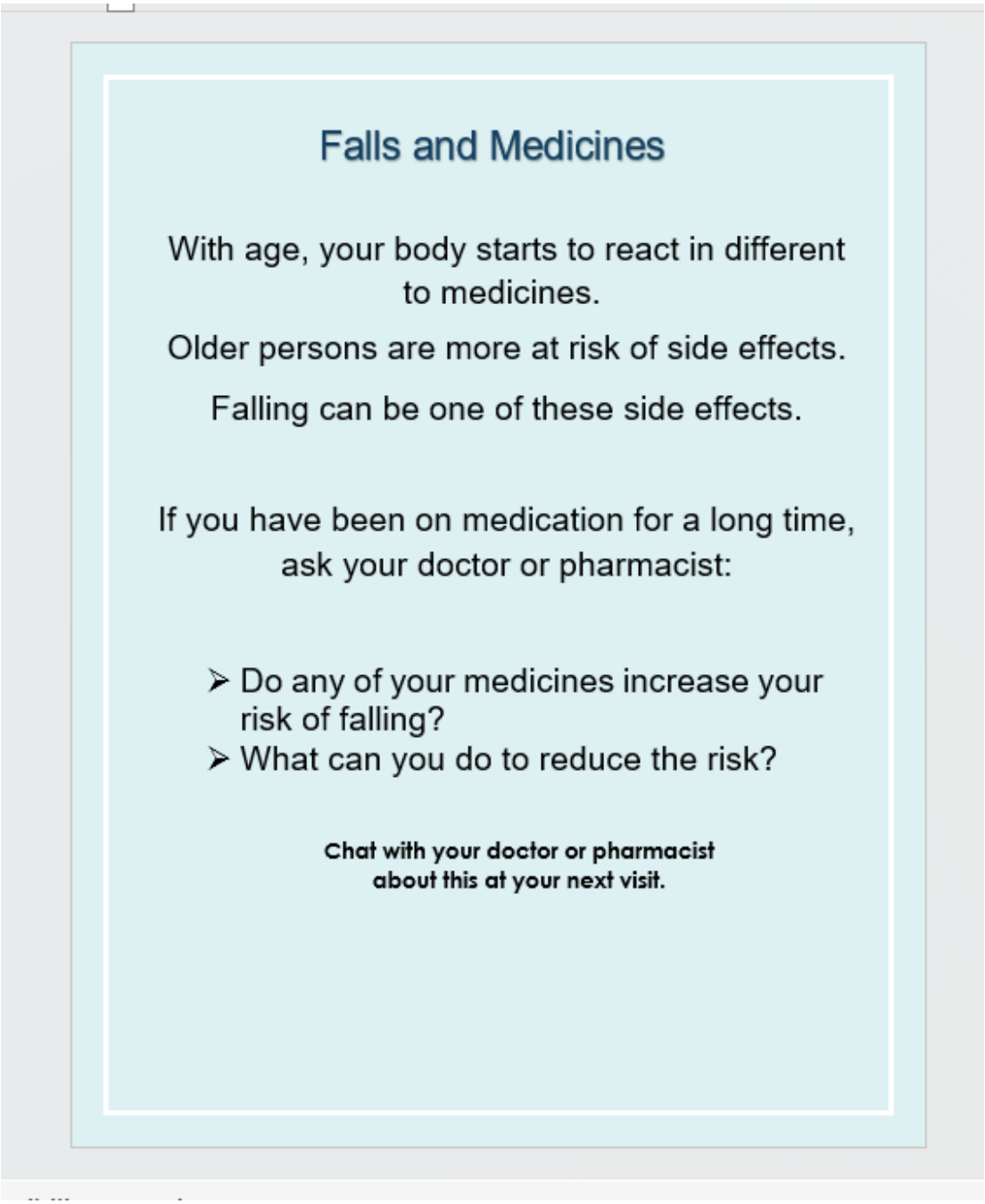
Tell us what you think

- Was this information useful? Yes /no/maybe
- Would you include some of these recommendations in your daily practice? Yes/no/maybe

Appendix 10: The mouse mat



Appendix 11: The flyer



Falls and Medicines

With age, your body starts to react in different to medicines.

Older persons are more at risk of side effects.

Falling can be one of these side effects.

If you have been on medication for a long time, ask your doctor or pharmacist:

- Do any of your medicines increase your risk of falling?
- What can you do to reduce the risk?

Chat with your doctor or pharmacist about this at your next visit.

Appendix 12: The shared decision aid

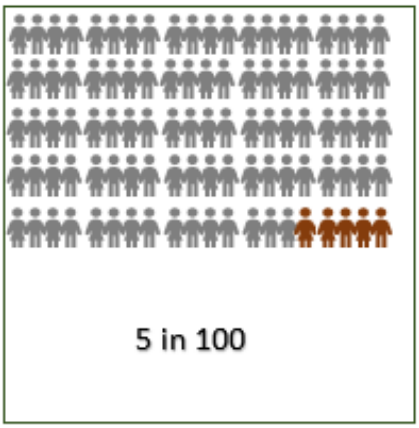
Patients' Decision Aid

Medicines and Falls

The risk of falls

No one can predict how many people will fall because not everyone does. Scientists have noted that "for Irish people aged 65 to 75 years, five people in every 100 may fall for some reason every year*."

You may find this diagram helpful in understanding the risk of falling. The red colour shows how many people actually fell.



What causes falls?

Painful joints, slippery surfaces, loose rugs and taking certain medicines are all risk factors of falls.

People exposed to more than one factor have a higher risk of falling. Also, if a person has experienced a fall, they are more likely to fall again.

How can medicines cause falls?

With increasing age, your body reacts to medicines in different ways and can put older people at greater risk of side effects, such as falling.
Taking one or more of some types of medicines might increase your risk of falling.

What do the guidelines recommend?

The guidelines recommend that doctors review the list of medicines you are taking as part of a fall prevention plan. Your doctor can check whether each medicine is either helping or no longer helping you and whether it increases your risk of falling. The doctor may then change your prescription if needed.

What are the benefits of reviewing medicines?

To reduce the risk of falling, you need to address various factors. For example, it is important to exercise in order to strengthen your muscles, wear eyeglasses if you have vision problems and use a walking aid if

needed. Reviewing your medicines with your doctors can also help reduce your risk of falling.

What are the risks of continuing to take medicines that may lead to falls?

Some medicines can lead to drowsiness, dizziness, unsteadiness or blurry vision. Taking these medicines for long periods of time without asking the doctor to review them may increase your risk of falling.

What are my options?

- You can choose to do nothing.
- You can follow lifestyle changes to reduce the risk of falling.
- You can ask your doctor to review your medicines with you and tell you:
  - If you still need to take them.
  - If you no longer need them, the doctor can discuss the following options with you: dose reduction, changing to safer medicines or stopping the intake of certain medicines.

***Source:** Bhangu J., King, K. L. B., et al. Falls, non-accidental falls and syncope in community-dwelling adults aged 50 years and older: Implications for cardiovascular assessment. PLoS One. 2017;12(7):e0180997.