



# Deprescribing Medications that Increase the Risk of Falls in Older People: Exploring Doctors' Perspectives Using the Theoretical Domains Framework (TDF)

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## Abstract

**Background** Falls can lead to hospitalisation and death in older people. Polypharmacy is a major risk factor, and deprescribing fall-risk increasing drugs (FRIDs) is one of several possible important preventive measures. The objective of this study was to explore the factors that influence doctors when deprescribing FRIDs in a hospital setting.

**Method** Semi-structured interviews were conducted with consultant geriatricians and hospital doctors experienced in dealing with patients aged 65 years or older, at a large academic teaching hospital (~ 1000 beds), Dublin, Ireland. The interviews were directed by an interview guide and audio recorded and transcribed verbatim, with subsequent thematic analysis in NVivo 12 software.

**Results** A total of 18 participants were interviewed. Barriers to deprescribing included: insufficient time, incomplete patient records, changing medications initiated by other specialists and difficulties following up patients after discharge. Facilitators included: enhanced documentation through electronic patient records, the support of other healthcare professionals such as clinical pharmacists, and patients' engagement, which is considered essential for the success of the deprescribing process's outcome.

**Conclusion** Deprescribing FRIDs in older adults in the hospital setting is challenging. Implementation of the process in practice requires combined effort from stakeholders to tackle everyday work environment challenges. Future studies are required examining the clinical effect of the suggested interventions and exploring patients' involvement in deprescribing decisions.

## 1 Introduction

Older people have the highest incidence of falls injuries [1]. A descriptive study reported the incidence of falls in people aged 70 years and older in 22 European countries from 1990 to 2017. They found that the incidence of falls increased from 5667 per 100,000 (confidence interval (CI) 3999–7625) in patients who are in the age category of 70–74 years up to 47,239 per 100,000 (CI 33,684–63,127) in patients who are ≥ 95 years old [1]. The consequences of falls in the older population are costly and detrimental to health. In Europe, the rate of hospitalisation due to falls was 15.8 per 1000

### Key Points

Deprescribing fall-risk increasing drugs in the hospital setting can be challenging. However, tackling challenges such as incomplete documentation and sub-optimal communication between teams and across primary and secondary care, has the potential to enhance the feasibility of implementing the deprescribing process.

Pharmacists and nurses can assist and support doctors completing the time-intensive process of medication review and deprescribing.

Shared decision making, in a patient-centred approach, is considered essential for the ongoing success of the intervention.

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persons and 77% of fatal fall injuries occur in people aged 65 and older [2].

The factors that lead to falls are numerous and can be categorised as non-modifiable (e.g. age) and potentially modifiable (e.g. medications and environmental hazards such as slippery surfaces) [3]. Diseases such as arthritis, Parkinson's disease, dementia and stroke represent additional factors that can lead to falls, and may be considered potentially modifiable where a treatment pathway exists [3]. Of these, environmental hazards and some types of medication are considered major risk factors leading to falls in older adults [4].

Biological changes make older adults more sensitive to medications and their side effects [5] through both pharmacodynamic and pharmacokinetic mechanisms. For example, the decrease in acetylcholine levels in the aging brain increases its sensitivity to the anticholinergic effect of antipsychotic medications [6]. Also, a decline in renal and hepatic function might lead to increased serum levels of some drugs, and result in side effects such as orthostatic hypotension, dizziness and drowsiness [7].

Some medication classes have been found to be significantly linked to increased risk of falls and have been classified as fall-risk increasing drugs (FRIDs). Meta-analyses have shown that loop diuretics, psychotropics, and other classes such as opioids and antidepressants were significantly associated with increasing risk of falls in older adults [8–10] (see pooled odds ratios in Table 1). A systematic review found that 65–93% of patients admitted with a fall-related injury were on FRIDs at the time of hospitalisation [11]. Polypharmacy that includes FRIDs was associated with increased risk for fall injuries that require medical care [12].

Medication review and withdrawal of FRIDs, as a falls prevention initiative, has been shown to be potentially effective in some studies [14, 15], and therefore it has been included in falls prevention guidelines. Deprescribing is a complex strategy, but focusing on deprescribing a few high-risk medicines each time might be more feasible [16, 17]. 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 [18]. For example, Campbell et al. found that stopping psychotropic medications reduces the rate of falls and improves cognition [15]: in this study, there were 17 falls in the medication withdrawal group versus 40 in the control group after 44 weeks of follow-up.

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 [19, 20]. The evidence for deprescribing FRIDs as a solo intervention for falls prevention is limited [21]. However, targeting multiple risk factors might reduce the rate of falls by 25%

[22]. 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 [23]. Such interventions might reduce the risk of falls injuries that require medical treatment [12].

Inappropriate prescribing of FRIDs is prevalent in hospitalised older adults with a history of falls [24]. Hospitals can be a good place to initiate the deprescribing process [25]. There is an opportunity to review the patient's medications on admission, as Dalleur et al. stated in their randomised trial. They concluded that medication changes during the hospital stay continued after discharge [25].

Previous qualitative studies have focused on deprescribing inappropriate medications in general [26–30], or have focused on specific medication classes [31–34]. 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 [35]. 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.

## 1.1 Aim of the Study

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

## 2 Methods

### 2.1 Participants and Recruitment

The study was carried out at an academic teaching hospital with ~ 1000-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 directorate.

In Ireland, postgraduate medical training involves training as an intern (junior) (12 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 [36]. Consultants who participated in this study ranged in experience from 3 to 30 years.

An invitation email was sent to geriatricians and physicians with a special interest in gerontology, who were either working within the hospital's Medicine for the Elderly

**Table 1** Examples of common fall-risk increasing drugs (FRIDs) [8–10, 13]

Drug classes	Odds ratio <sup>a</sup>	95% confidence interval
<i>Drugs causing sedation, e.g.</i>		
Opioids	1.60	(1.35–1.91)
Benzodiazepines	1.42	(1.22–1.65)
Antipsychotics	1.54	(1.28–1.85)
Sedative antihistamines**	–	–
<i>Drugs causing hypotension, e.g.</i>		
Antihypertensives	1.38	(1.19–1.56)
Alpha-blockers for benign prostatic hyperplasia**	–	–
Loop diuretics	1.36	(1.17–1.57)
<i>Drugs with anticholinergic effects, e.g.</i>		
Tricyclic antidepressants	1.41	(1.07–1.86)
Overactive bladder and incontinence medications**	–	–
<i>Drugs causing bradycardia/arrhythmias, e.g.</i>		
Digoxin	2.06*	(1.56–2.74)
<i>Other associated classes, e.g.</i>		
Antiepileptics	1.55	(1.25–1.92)
Oral hypoglycaemics**	–	–

\*Unadjusted pooled OR

\*\*No OR was reported

<sup>a</sup>Pooled adjusted odds ratios (OR) from meta-analyses [8–10]

(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. In order to avoid influencing participants' responses, study documentation did not include education on deprescribing. Appointments were scheduled according to the participants' availability.

## 2.2 Interview

Individual semi-structured interviews were conducted by a member of the research team (RK). The interviewer had no previous relationship with the interviewees. The process started on 7 February 2020 and continued until 6 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.

## 2.3 Interview Guide

An interview guide was used for data collection (Online Supplementary Material (OSM) Resource 1). It was developed by the research team using the Theoretical Domains Framework (TDF) Version II [37]. This validated tool groups theories of behaviour and behaviour change into 14 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 [38] 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.

## 2.4 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: codes were used during data analysis, and no code sheet linking identities to the codes was retained following transcription and checking. Files were kept confidentially at the university campus.

## 2.5 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 [39]. 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 (OSM Resource 2) [40].

## 3 Results

A total of 18 hospital doctors participated in the research study. The duration of the interviews ranged between 11 and 30 min (median = 16.2 min). Interviewees included consultants, registrars, senior house officers and intern doctors (Table 2). The majority were in ward-based geriatric medicine services.

### 3.1 Hospital Setting (TDF domains: 'Environmental context and resources', 'Knowledge' and 'Social influences')

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). 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, for example, perceived resistance to changing sedatives.

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 ( $n = 9$ ).

### 3.2 Gap in the System (TDF domain: 'Social influences')

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 4).

### 3.3 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. Many doctors thought it was a valuable intervention to reduce the risk of falls ( $n = 13$ ) (Table 5). 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 that 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 18 doctors were familiar with the common tools available such as the STOPP/START criteria [41] (Table 5). Other resources mentioned included the Medication Appropriate Index (MAI) [42], hospital guides, the deprescribing.org website [43], and the OncPal Deprescribing Guideline [44]. Despite awareness of such tools, half of the participants did not use any tools during their

**Table 2** Participants' characteristics ( $n = 18$ )

Characteristics	Number of participants
<i>Gender</i>	
Male	10
Female	8
<i>Doctors' registration level</i>	
Intern	3
Senior house officer	3
Registrar	10
Consultant	2
<i>Current training or working area</i>	
Geriatric medicine	12
Emergency medicine	3
Respiratory medicine	1
Pharmacology and therapeutics	1
Immunology	1

daily practice ( $n = 9$ ), especially registrars, who primarily depended on their experience or their colleagues' advice.

### 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 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.

### 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 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.

## 4 Discussion

Previous studies have discussed the views of hospital doctors about medication deprescribing in older adults [27–29] but few studies have focused on FRIDs [33, 34]. Scott et al. discussed deprescribing in general and developed a plan for implementation of deprescribing in the hospital setting [28], while Bell et al. involved primary-care doctors and studied their perspectives about prescribing FRIDs in older patients [34]. 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 [45].

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 [28, 29, 33, 34]. Lack of guidelines was noted in other studies [27, 28] 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.

### 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 [16]. 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 [46, 47]. Involving other team members such as clinical pharmacists or nurses, especially for tasks like medication reconciliation and patient education, might make deprescribing more feasible [17].

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 [48]. Ideally, a

**Table 3** Challenges to and facilitators of deprescribing fall-risk increasing drugs (FRIDs) in a hospital setting

Themes	Subthemes (n = no. 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 20 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% 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]
	Patient resistant to change (n = 5)	"It's hard because patients have been on them [FRIDs] for years and don't want to stop it." [I-F-10]
	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] "One week you might have an intern who's never worked with you before and they're gone the next week." [Reg-F-8]

Table 3 (continued)

Themes	Subthemes (n = no. of participants)	Sample quotes
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	Electronic medical records/electronic patient records (EMRs/ EPRs) (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]
Site	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 6 weeks and that's an excellent occasion to deprescribe because you want to be seeing the patient weekly for about 6 weeks." [Reg-M-2]
	Comprehensive medication review (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]
Doctors' factors	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 SSRIs ... so it is important in that regard you can prevent future falls from occurring." [I-F-12]

**Table 4** Themes relating to social influences

Subthemes ( <i>n</i> = no. of participants)	Sample quotes
<i>Challenges</i>	
Inefficient communication at discharge by letter or discharge prescription ( <i>n</i> = 12)	<p>"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]</p> <p>"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]</p>

**Table 5** Doctors' skills and background

Themes	Subthemes ( <i>n</i> = no. of participants)	Sample quotes
<i>Facilitators</i>		
Knowledge	Doctors were familiar with the term deprescribing ( <i>n</i> = 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]
Skills	Awareness of some deprescribing tools ( <i>n</i> = 16)	"I'm aware of the STOPP/ START guidelines." [Reg-F-16]
<i>Challenges</i>		
	Personal experience ( <i>n</i> = 6) and colleagues ( <i>n</i> = 6)	"It would be more going with the clinical judgment and discussion with consultants for deprescribing." [Reg-M-1]

**Table 6** Responsibility for reviewing patients' medications

Subthemes ( <i>n</i> = no. of participants)	Sample quotes
<i>Facilitators</i>	
The whole medical team is responsible ( <i>n</i> = 9)	"Pharmacists and clinicians, nurses. I guess it's the idea of the Swiss cheese model where if something's missed by one health care professional, another one can pick it up. So, I think it's a group effort." [SHO-F-14]
Mainly doctors ( <i>n</i> = 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 ( <i>n</i> = 7)	"It should be done by probably, 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 ( <i>n</i> = 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 ( <i>n</i> = 4)	"Having them [pharmacists] on ward helps a lot and reduces the amount of work." [Reg-M-11]
Nurses ( <i>n</i> = 4)	<p>"Nursing staff have very thorough handovers. And they are the ideal cohort... if medications are ever commenced overnight." [Reg-M-18]</p> <p>"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]</p>
<i>Challenges</i>	
General practitioners ( <i>n</i> = 4)	"I think everyone is responsible, but it really does fall on the GPs and pharmacists." [C-M-15]



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 [49].

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) [50] or outpatient clinics might be more suitable for deprescribing medications in such patients when they are more stable [50].

## 4.2 Gap in the System

Improving communication between the hospital and the GP is necessary to promote continuity of care after hospital discharge [51]. 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 [52]. 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 COVID-19 pandemic and the efficiency of transferring information changed thereafter.

## 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 1). 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 [45]. These include the AntiCholinergic Burden calculator (ACB) [53], and web-based resources such as <http://www.deprescribing.org>. The ACB calculator is only used for medications with anticholinergic burden, and gives a score from 1 to 3, 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 [53]. 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 [13]. Our participants' perception that tools were helpful but time-consuming is consistent with previous research [27, 45, 54].

## 4.4 Other Providers

Deprescribing is complex and a multidisciplinary approach is recommended [55]. The appreciation of a clinical pharmacy service seen in this study is in keeping with literature reports that pharmacist input is beneficial [16, 23, 56]. Clinical pharmacists can offer many services to facilitate assessing and reducing falls risk [57]. 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

**Table 7** Patients' involvement

Subthemes ( $n =$ no. of participants)	Sample quotes
<i>Facilitators</i>	
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]

team about controlling the use of FRIDs, and recommend safer alternatives [57].

In some countries, such as the UK and USA, pharmacists can also prescribe and deprescribe certain medications directly instead of recommending the changes [58]. A hospital in the USA 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 1 year [59].

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 [60]. Some nurses have gained an advanced role as nurse prescribers, potentially enabling them to play an active role in deprescribing as well [61].

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 [33]. 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.

#### 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 [46]. 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 [46], 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 [62] and 92% in another [63], especially when educated about it [64]. 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.

#### 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 [22].

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 'knowledge', 'skills', 'environmental context and resources', 'social influences', and 'emotion'. Mapping the target domains that represent the barriers to Behaviour Change Techniques (BCT) [65] resulted in some suggestions for planning and implementation of FRIDs' deprescribing interventions as part of falls prevention programs in a hospital setting (OSM Resource 3).

To address the 'knowledge' 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, for example, brochures and web pages [66]. 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 [66] 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 [53], Drug Burden Index (DBI) [33] and STOPPFall [13]. 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 [57]. In addition, having a patient-centred, structured deprescribing process in place that involves appropriate withdrawal of the medication and close monitoring of the outcomes might address any concerns about patients' safety issues [67].

#### 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.

#### 4.8 Limitations

Doctors from one hospital only were included, which might limit the generalisability of the results to other settings. Participants' focus on antihypertensives may have been influenced by consideration of these agents in falls prevention among people > 80 years old at the study hospital.

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.

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, reducing the risk of biased

responses. Pharmacists, nurses and hospital administrators were not interviewed in this study, but further work is underway to identify the views of other stakeholders.

## 5 Conclusion

Deprescribing FRIDs in the hospital setting can be a challenging process, but facilitators have been proposed that 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.

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**Ethics approval** This study was approved by the Joint Research Ethics Committee, St James's Hospital and Tallaght University Hospital (RCE: 2020-01 List 3 (5)). The study was conducted according to the guidelines of the Declaration of Helsinki.

**Consent to participate** The participants provided written informed consent before the interview.

**Conflict of interest** The authors have no conflicts of interest.

**Consent for publication** Not applicable.

**Code availability** Not applicable.

**Availability of data and material** The data are available on request from the corresponding author.

## References

- Haagsma JA, Olij BF, Majdan M, et al. Falls in older aged adults in 22 European countries: incidence, mortality and burden of disease from 1990 to 2017. *Inj Prev*. 2020;26:i67–74. <https://doi.org/10.1136/injuryprev-2019-043347>.
- EuroSafe. Injuries in the European Union, Summary on injury statistics 2012–2014. Amsterdam: EuroSafe; 2016. 6th ed. [https://www.eurosafe.eu.com/uploads/inline-files/EuropeSafe\\_Master\\_Web\\_02112016%20%282%29.pdf](https://www.eurosafe.eu.com/uploads/inline-files/EuropeSafe_Master_Web_02112016%20%282%29.pdf). Accessed 08 Feb 2021.
- Moncada LVV, Mire LG. Preventing falls in older persons. *Am Fam Physician*. 2017;96(4):240–7.
- Zhu H, Hu K, Liu S, et al. Systematic causality mapping of factors leading to accidental falls of older adults. *Public Health Pract*. 2020. <https://doi.org/10.1016/j.puhip.2020.100045>.
- Turnheim K. When drug therapy gets old: pharmacokinetics and pharmacodynamics in the elderly. *Exp Gerontol*. 2003;38(8):843–53. [https://doi.org/10.1016/s0531-5565\(03\)00133-5](https://doi.org/10.1016/s0531-5565(03)00133-5).
- Kompoliti K, Goetz CG. Neuropharmacology in the elderly. *Neurol Clin North Am*. 1998;16(3):599–610. [https://doi.org/10.1016/S0733-8619\(05\)70083-9](https://doi.org/10.1016/S0733-8619(05)70083-9).
- Mühlberg W, Platt D. Age-dependent changes of the kidneys: pharmacological implications. *Gerontology*. 1999;45(5):243–53. <https://doi.org/10.1159/000022097>.
- De Vries M, Seppala LJ, Daams JG, et al. Fall-risk-increasing drugs: a systematic review and meta-analysis: I. Cardiovascular drugs. *J Am Med Dir Assoc*. 2018;19(4):371e1–e9. <https://doi.org/10.1016/j.jamda.2017.12.013>.
- Seppala LJ, van de Glind EMM, Daams JG, et al. Fall-risk-increasing drugs: a systematic review and meta-analysis: III. Others. *J Am Med Dir Assoc*. 2018;19(4):372e1–e8. <https://doi.org/10.1016/j.jamda.2017.12.099>.
- Seppala LJ, Wermelink A, de Vries M, et al. Fall-risk-increasing drugs: a systematic review and meta-analysis: II. Psychotropics. *J Am Med Dir Assoc*. 2018;19(4):371e11–e17. <https://doi.org/10.1016/j.jamda.2017.12.098>.
- Hart LA, Phelan EA, Yi JY, et al. Use of fall risk-increasing drugs around a fall-related injury in older adults: a systematic review. *J Am Geriatr Soc*. 2020;68(6):1334–43. <https://doi.org/10.1111/jgs.16369>.
- Xue L, Boudreau RM, Donohue JM, et al. Persistent polypharmacy and fall injury risk: the Health, Aging and Body Composition Study. *BMC Geriatr*. 2021;21(1):710. <https://doi.org/10.1186/s12877-021-02695-9>.
- Seppala LJ, Petrovic M, Ryg J, et al. 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 Ageing*. 2020. <https://doi.org/10.1093/ageing/afaa249>.
- Van Der Velde N, Stricker BHC, Pols HAP, et al. Withdrawal of fall-risk-increasing drugs in older persons. *Drugs Aging*. 2007;24(8):691–9. <https://doi.org/10.2165/00002512-200724080-00006>.
- Campbell AJ, Robertson MC, Gardner MM, et al. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized, controlled trial. *J Am Geriatr Soc*. 1999;47(7):850–3. <https://doi.org/10.1111/j.1532-5415.1999.tb03843.x>.
- Browne C, Kingston C, Keane C. Falls prevention focused medication review by a pharmacist in an acute hospital: implications for future practice. *Int J Clin Pharm*. 2014;36:969–75. <https://doi.org/10.1007/s11096-014-9980-3>.
- Mlodinow SG, Linn BS, Mahvan T, et al. Strategies to reduce and prevent polypharmacy in older patients. *J Fam Pract*. 2019;68(8):429–40.
- Early NK, Fairman KA, Hagarty JM, et al. Joint effects of advancing age and number of potentially inappropriate medication classes on risk of falls in Medicare enrollees. *BMC Geriatr*. 2019;19(1):194. <https://doi.org/10.1186/s12877-019-1202-3>.
- Stevens JA, Lee R. The potential to reduce falls and avert costs by clinically managing fall risk. *Am J Prev Med*. 2018;55(3):290–7. <https://doi.org/10.1016/j.amepre.2018.04.035>.
- Page AT, Clifford RM, Potter K, et al. The feasibility and effect of deprescribing in older adults on mortality and health: a systematic review and meta-analysis. *Br J Clin Pharmacol*. 2016;82(3):583–623. <https://doi.org/10.1111/bcp.12975>.
- Lee J, Negm A, Peters R, et al. Deprescribing fall-risk increasing drugs (FRIDs) for the prevention of falls and fall-related complications: a systematic review and meta-analysis. *BMJ Open*. 2021;11(2): e035978. <https://doi.org/10.1136/bmjopen-2019-035978>.
- The Health Foundation. Closing the gap through clinical communities: the FallSafe project. [https://www.health.org.uk/sites/default/files/CtGtCC\\_FallSafe\\_Report.pdf](https://www.health.org.uk/sites/default/files/CtGtCC_FallSafe_Report.pdf). Accessed 01 Jun 2021.
- Mott DA, Martin B, Breslow R, et al. Impact of a medication therapy management intervention targeting medications associated with falling: results of a pilot study. *J Am Pharm Assoc*. 2016;56(1):22–8. <https://doi.org/10.1016/j.japh.2015.11.001>.
- Walsh ME, Boland F, Moriarty F, et al. Modification of potentially inappropriate prescribing following fall-related hospitalizations in older adults. *Drugs Aging*. 2019;36(5):461–70. <https://doi.org/10.1007/s40266-019-00646-z>.
- Dalleur O, Boland B, Losseau C, et al. Reduction of potentially inappropriate medications using the STOPP criteria in frail older inpatients: a randomised controlled study. *Drugs Aging*. 2014;31(4):291–8. <https://doi.org/10.1007/s40266-014-0157-5>.
- Ailabouni NJ, Nishtala PS, Mangin D, et al. Challenges and enablers of deprescribing: a general practitioner perspective. *PLoS ONE*. 2016;11(4): e0151066. <https://doi.org/10.1371/journal.pone.0151066>.
- Wallis KA, Andrews A, Henderson M. Swimming against the tide: primary care physicians' views on deprescribing in everyday practice. *Ann Fam Med*. 2017;15(4):341–6. <https://doi.org/10.1370/afm.2094>.
- D'Avanzo B, Agosti P, Reeve E, et al. Views of medical practitioners about deprescribing in older adults: findings from an Italian qualitative study. *Maturitas*. 2020;134:29–33. <https://doi.org/10.1016/j.maturitas.2020.01.009>.
- Scott S, May H, Patel M, et al. A practitioner behaviour change intervention for deprescribing in the hospital setting. *Age Ageing*. 2021;50(2):581–6. <https://doi.org/10.1093/ageing/afaa169>.
- Green AR, Lee P, Reeve E, et al. Clinicians' perspectives on barriers and enablers of optimal prescribing in patients with dementia and coexisting conditions. *J Am Board Fam Med*. 2019;32(3):383–91. <https://doi.org/10.3122/jabfm.2019.03.180335>.
- Middelaar TV, Ivens SD, van Peet PG, et al. Prescribing and deprescribing antihypertensive medication in older people by Dutch general practitioners: a qualitative study. *BMJ Open*. 2018;8(4): e020871. <https://doi.org/10.1136/bmjopen-2017-020871>.
- Nixon M, Kousgaard MB. Organising medication discontinuation: a qualitative study exploring the views of general practitioners toward discontinuing statins. *BMC Health Serv Res*. 2016;16:226. <https://doi.org/10.1186/s12913-016-1495-2>.
- Kouladjian L, Gnjjidic D, Reeve E, et al. Health care practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Ann Pharmacother*. 2016;50(8):625–36. <https://doi.org/10.1177/1060028016652997>.
- Bell HT, Steinsbekk A, Granas AG. Factors influencing prescribing of fall-risk-increasing drugs to the elderly: a qualitative study.

- Scand J Prim Health Care. 2015;33(2):107–14. <https://doi.org/10.3109/02813432.2015.1041829>.
35. Thillainadesan J, Gnjidic D, Green S, et al. Impact of deprescribing interventions in older hospitalised patients on prescribing and clinical outcomes: a systematic review of randomised trials. *Drugs Aging*. 2018;35(4):303–19. <https://doi.org/10.1007/s40266-018-0536-4>.
  36. Career Pathway. <https://web.archive.org/web/20150718060947/http://www.rcpi.ie/article.php?locID=1.6.197.415>. Accessed 15 Aug 2022.
  37. Atkins L, Francis J, Islam R, et al. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implem Sci*. 2017;12(1):77. <https://doi.org/10.1186/s13012-017-0605-9>.
  38. Ailabouni NJ, Nishtala PS, Mangin D, et al. General practitioners' insight into deprescribing for the multimorbid older individual: a qualitative study. *Int J Clin Pract*. 2016;70(3):261–76. <https://doi.org/10.1111/ijcp.12780>.
  39. Noble H, Mitchell G. What is grounded theory? *Evid Based Nurs*. 2016;19(2):34–5. <https://doi.org/10.1136/eb-2016-102306>.
  40. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19(6):349–57. <https://doi.org/10.1093/intqhc/mzm042>.
  41. Gallagher P, Ryan C, Byrne S, et al. STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment). Consensus validation. *Int J Clin Pharmacol Ther*. 2008;46(2):72–83. <https://doi.org/10.5414/cpp46072>.
  42. Hanlon JT, Schmadler KE, Samsa GP, et al. A method for assessing drug therapy appropriateness. *J Clin Epidemiol*. 1992;45(10):1045–51. [https://doi.org/10.1016/0895-4356\(92\)90144-C](https://doi.org/10.1016/0895-4356(92)90144-C).
  43. Deprescribing Guidelines and Algorithms. <https://deprescribing.org/resources/deprescribing-guidelines-algorithms/>. Accessed 16 Oct 2021.
  44. Lindsay J, Dooley M, Martin J, et al. The development and evaluation of an oncological palliative care deprescribing guideline: the "OncPal deprescribing guideline." *Support Care Cancer*. 2015;23(1):71–8. <https://doi.org/10.1007/s00520-014-2322-0>.
  45. Reeve E. Deprescribing tools: a review of the types of tools available to aid deprescribing in clinical practice. *J Pharm Pract Res*. 2020;50(1):98–107. <https://doi.org/10.1002/jppr.1626>.
  46. Smith H, Miller K, Barnett N, et al. Person-centred care including deprescribing for older people. *Pharmacy*. 2019. <https://doi.org/10.3390/pharmacy7030101>.
  47. Scottish Government Polypharmacy Model of Care Group. Polypharmacy Guidance, Realistic Prescribing. Scottish Government; 2018. 3rd ed. <https://www.therapeutics.scot.nhs.uk/wp-content/uploads/2018/04/Polypharmacy-Guidance-2018.pdf>. Accessed 13 Sep 2019.
  48. Boockvar KS, Santos SL, Kushniruk A, et al. Medication reconciliation: barriers and facilitators from the perspectives of resident physicians and pharmacists. *J Hosp Med*. 2011;6(6):329–37. <https://doi.org/10.1002/jhm.891>.
  49. Scott I, Hilmer S, Reeve E, et al. Reducing inappropriate polypharmacy the process of deprescribing. *JAMA Intern Med*. 2015;75(5):827–34. <https://doi.org/10.1001/jamainternmed.2015.0324>.
  50. Day hospital. <https://naashospital.ie/departments/dayhospt/>. Accessed 15 Aug 2022.
  51. Dipanda M, Barben J, Nuémi G, et al. Changes in treatment of very elderly patients six weeks after discharge from geriatrics department. *Geriatrics*. 2020. <https://doi.org/10.3390/geriatrics5030044>.
  52. Healthmail. <https://www.ehealthireland.ie/a2i-hids-programme/healthmail/>. Accessed 15 Aug 2022.
  53. King, R., Rabino, S. ACB calculator. <http://www.acbcalc.com/>. Accessed 10 Feb 2022.
  54. Awad A, Hanna O. 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*. 2019;14(6): e0218174. <https://doi.org/10.1371/journal.pone.0218174>.
  55. Reeve E, Thompson W, Farrell B. Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. *Eur J Intern Med*. 2017;38:3–11.
  56. Lee JK, Alshehri S, Kutbi HI, et al. Optimizing pharmacotherapy in elderly patients: the role of pharmacists. *Integr Pharm Res Pract*. 2015;4:101–11. <https://doi.org/10.2147/IPRP.S70404>.
  57. Fritsch MA, Shelton PS. Geriatric polypharmacy: pharmacist as key facilitator in assessing for falls risk: 2019 update. *Clin Geriatr Med*. 2019;35(2):185–204. <https://doi.org/10.1016/j.cger.2019.01.010>.
  58. Garattini L, Padula A, Freemantle N. Do European pharmacists really have to trespass on medicine? *Eur J Health Econ*. 2021;22(1):1–4. <https://doi.org/10.1007/s10198-020-01185-w>.
  59. Hoy S. Pharmacist involvement in fall prevention. *Am J Health Syst Pharm*. 2010;67(16):1312. <https://doi.org/10.2146/ajhp100048>.
  60. Chu ZR. Preventing in-patient falls: the nurse's pivotal role. *Nursing*. 2017;47(3):24–30. <https://doi.org/10.1097/01.NURSE.0000512872.83762.69>.
  61. Wright D, Scott S, Buck JEA. Role of nurses in supporting proactive deprescribing. *Nurs Stand*. 2019. <https://doi.org/10.7748/ns.2019.e11249>.
  62. Galazzi A, Lusignani M, Chiarelli MT, et al. Attitudes towards polypharmacy and medication withdrawal among older inpatients in Italy. *Int J Clin Pharm*. 2016;38(2):454–61. <https://doi.org/10.1007/s11096-016-0279-4>.
  63. Reeve E, Wiese MD, Hendrix I, et al. People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to Deprescribe. *J Am Geriatr Soc*. 2013;61(9):1508–14. <https://doi.org/10.1111/jgs.12418>.
  64. Martin P, Tannenbaum C. A realist evaluation of patients' decisions to deprescribe in the EMPOWER trial. *BMJ Open*. 2017;7(4): e015959. <https://doi.org/10.1136/bmjopen-2017-015959>.
  65. Michie S, Atkins L, West R. The behaviour change wheel: a guide to designing interventions. 1st ed. Great Britain: Silverback Publishing; 2014.
  66. Seppala LJ, van der Velde N, Masud T, et al. EuGMS task and finish group on fall-risk-increasing drugs (FRIDs): position on knowledge dissemination, management, and future research. *Drugs Aging*. 2019;36(4):299–307. <https://doi.org/10.1007/s40266-018-0622-7>.
  67. Reeve E, Moriarty F, Nahas R, et al. A narrative review of the safety concerns of deprescribing in older adults and strategies to mitigate potential harms. *Expert Opin Drug Saf*. 2018;17(1):39–49. <https://doi.org/10.1080/14740338.2018.1397625>.

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