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A systems approach to identifying the challenges of implementing deprescribing in older adults across different health care settings and countries: a narrative review

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Abstract

Introduction: There is increasing recognition of the need for deprescribing of inappropriate medications in older adults. However, efforts to encourage implementation of deprescribing in clinical practice have resulted in mixed results across settings and countries.

Area covered: Searches were conducted in PubMed, Embase and Google Scholar in June 2019. Reference lists, citation checking, and personal reference libraries were also utilised. Studies capturing the main challenges of, and opportunities for, implementing deprescribing into clinical

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Declaration of Interest

The authors have no relevant affiliations or financial involvement with any organisation or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

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practice across selected health care settings internationally, and international deprescribing-orientated policies were included and summarised in this narrative review.

Expert Opinion: Deprescribing intervention studies are inherently heterogeneous because of the complexity of interventions employed and often do not reflect the real-world. Further research investigating enhanced implementation of deprescribing into clinical practice and across health care settings is required. Process evaluations in deprescribing intervention studies are needed to determine the contextual factors that are important to the translation of the interventions in the real-world. Deprescribing interventions may need to be individually tailored to target the unique barriers and opportunities to deprescribing in different clinical settings. Introduction of national policies to encourage deprescribing may be beneficial, but need to be evaluated to determine if there are any unintended consequences.

Keywords

Deprescribing; Deprescribing in practice; Medication withdrawal; Older adults; Policies; Polypharmacy

1. Introduction

There is increasing recognition of the need for implementing deprescribing of medications for which the risk outweighs the benefit in the individual [1]. While deprescribing may be appropriate for any individual, efforts to inform the evidence base on deprescribing have predominantly targeted older adults with multimorbidity (≥2 chronic diseases) and polypharmacy (≥5 or more regularly prescribed medications) and, in whom there is limited direct clinical trial evidence of drug efficacy and an increased risk of adverse drug events (ADEs) [2]. Deprescribing is an important step in the prescribing process and may be the appropriate clinical decision to reduce medication related harm [3] and lead to clinical benefits in older adults [4]. However, there are major barriers to implementing deprescribing interventions into routine daily practice. The aim of this narrative review is to discuss the main challenges of, and opportunities for, implementing deprescribing into clinical practice across various international health care settings. This review will provide an overview of common deprescribing interventions, including enablers and barriers to implementing deprescribing across settings (e.g. primary, secondary, residential care facilities) and current deprescribing polices in place internationally.

2. Methods

We conducted non-systematic searches of key databases including PubMed, Embase and Google Scholar from inception to 30th June 2019 for articles that addressed deprescribing, enablers and barriers to implementing deprescribing across health care settings and countries. Searches were conducted using keyword searches (e.g. ‘deprescribing’, ‘withdrawal’, ‘cessation’, ‘implementation’ and ‘policies’). Reference lists and citations, and personal reference libraries were also utilised. We searched for studies that covered the following topics based on prior literature and the authors’ expertise in the deprescribing field: importance of deprescribing in older adults, evaluation of deprescribing interventions, enablers and barriers that influence implementation of deprescribing across health care

settings and current deprescribing polices across countries. The four-level model by Reid et al. [5] was used to classify the opportunities and barriers for implementing deprescribing across the health care system. The section on international deprescribing-orientated policies were based on a search of grey literature, expert opinion and authors' experience. For the grey literature search, the first 10 pages of search results in Google and Google Scholar was used.

3. What is deprescribing and why is it important in older adults?

For the purpose of this review, deprescribing is defined as the process of withdrawal or dose reduction of a medication which is considered inappropriate in an individual [6,7]. Inappropriate medications are those where the likely harms outweigh the likely benefits (which includes high risk and unnecessary medications) or where the medication doesn't align with the care goals of the individual [6,8].The word deprescribing was first proposed in 2003 by Michael Woodward, an Australian clinician, to promote the review and reduction of burdensome medication in clinical practice to achieve better health outcomes for older adults [9]. The need for advancing research to inform the evidence on safety and efficacy of deprescribing and to explore the implementation of deprescribing into routine clinical practice is of major international importance across health care settings given that, globally, polypharmacy is increasing in older adults [10]. A recent Australian study found that, from 2006–2017, the prevalence of polypharmacy in older adults increased from 33.2% to 36.2% [11]. Similar trends have been observed in other countries. A study of Scottish primary care data of over 300 000 patients showed that, from 1995 to 2010, the proportion of patients prescribed five or more medications increased from 11.4% to 20.8% [12]. Similarly, in the US, from 1994 to 2014, the proportion of older adults talking five or more medications has tripled, from 13.8% to 42.4% [13].

The use of potentially inappropriate medications (PIMs), that is, where the actual or potential harms of therapy outweigh the benefits (including high risk and unnecessary medications) [8], in older adults is also consistently high across different health care settings. Approximately one in five medications taken by older adults in primary care is inappropriate, and almost 50% of people living in residential care facilities have been exposed to a PIM [14,15]. The prevalence of PIMs in older inpatients was found to range from 53.2% to 89.8% [16]. This is of major concern as the consequences of PIMs in older adults include medication burden, reduced quality of life, falls, confusion, hospitalisation and death [3]. Additionally, PIMs contribute to health care cost for both the patient and the health care system [17]. For this reason, deprescribing is required to improve outcomes for older adults and reduce health service use.

There is increasing evidence for the benefits and safety of deprescribing. For example, a Cochrane review assessed the benefits and harms of deprescribing long-term proton pump inhibitor in adults [18]. A reduction in pill burden was observed, however, evidence on clinical outcomes is lacking [18]. Van Leeuwen et al. conducted a Cochrane review of antipsychotic withdrawal in people with dementia and showed that antipsychotic medications can be deprescribed without harm resulting in no change to Behavioural and Psychological Symptoms of Dementia (BPSD) [19]. A systematic review of benzodiazepine

deprescribing clinical trials targeting patients and/or health care practitioners, in a range of settings, reported success rates between 27.0% and 80.0% [20]. The evidence for the clinical effectiveness of deprescribing interventions is also growing [4]. A meta-analysis of non-randomized studies found deprescribing interventions to reduce polypharmacy were associated with a significant decrease in mortality (OR 0.32, 95% CI: 0.17, 0.60) [4]. However, efforts to encourage the implementation of deprescribing in clinical practice continue to be hindered by the lack of high-quality robust trials to inform the evidence on safety and efficacy. On the other hand, there is a lack of robust evidence for prescribing medication in patients with multimorbidity and frailty as these patients are routinely excluded from clinical trials. Furthermore, to facilitate future meta-analyses, a consensus on which deprescribing outcomes should be evaluated, and to what extent deprescribing outcomes should align with primary outcomes used to study medication efficacy and safety is needed. Recent efforts to develop a core outcome set in trials of medication review could be adapted to future deprescribing trials [21,22].

4. Evaluation of deprescribing interventions

Deprescribing is a complex health care intervention consisting of “a number of components, which may act both independently and inter-dependently”[23]. Deprescribing interventions commonly include at least two health care stakeholders, the primary care physician (or other health care professional) and the patient and/or their representative(s). Multidisciplinary interventions have additional dimensions of complexity, as they involve multiple health care professionals (commonly primary care physicians, pharmacists and nurses) across different organisational levels and health care settings [24]. In practice, withdrawing medications cannot occur in isolation and often includes/involves different stakeholders and other wider multifactorial influences. There is, therefore, a need to consider all the components, across different levels and settings that can influence the implementation of deprescribing interventions.

To date, deprescribing interventions trialled include pharmacist-led medication reviews, physician-led interventions, prescriber education programmes, direct-to-patient education, multidisciplinary interventions and clinical decision support systems [4,24]. However, the routine implementation of interventions is limited, meaning the long term benefits associated with the intervention are often not sustainable, or clinically meaningful [1]. For example, an Australian study found that the effect of a multifaceted intervention involving regular psychotropic medication audit, benchmarking and feedback, nursing staff education and interdisciplinary medication review, reduced psychotropic prescribing in residential care facilities [25]. In the short term, the intervention led to significant reduction in the use of antipsychotic medications from 20.3% to 18.6%, but, in the longer term, this was not sustained, as the prevalence of people using antipsychotic medications returned to baseline levels after 12 months [25]. Deprescribing interventions investigated in a research setting may not be translatable, as the studies tend to be conducted in well-resourced settings and attract participants who are keen on practice change for deprescribing which results in selection bias. While continued testing of deprescribing interventions in the research setting (for outcomes) is important these need to be tied in with process evaluations to advance understanding of what factors influence the implementation of deprescribing into routine

practice. To date, there has been limited number of process evaluation embedded within deprescribing intervention studies. One example of a recent process evaluation study was conducted as part of a randomised control trial evaluating the effects of a multidisciplinary medication review in residential aged care and involved mixed methods (questionnaires, interviews, and document analysis) [26].

Several systematic reviews have shown that there is resistance to deprescribing in routine clinical practice [8,27,28]. For example, a systematic review of deprescribing studies conducted in primary care setting showed that psychotropic medications and proton-pump inhibitors were the classes with the lowest success rate in withdrawal, despite intense intervention and increasing evidence to safety stop these medications [28]. Therefore, a more holistic approach to practice change is needed, including identifying and addressing contextual barriers, which may hinder deprescribing.

5. Enablers and barriers that influence the implementation of deprescribing across health care settings

It is important to evaluate what would facilitate or impede deprescribing in older adults to ensure translation and sustainability in real-world settings [5]. Adopting the four-level model by Reid et al. [5], the opportunities and barriers for implementing deprescribing can arise at different levels of the health care system: 1) individuals and the public; 2) health care professionals; 3) health care organisation; and 4) environment (e.g. regulatory, policy, financial). Figure 1 describes the enablers and barriers which may influence the implementation of deprescribing across the four levels of the health care system. The barriers at each of the levels are not standalone and they likely compound each other. For example, lack of incentives, remuneration and minimal time to conduct activities required for deprescribing are compounded by a lack of education approaches and existing guidelines to support deprescribing [8,29]. While there are commonalities to the enablers and barriers that influence deprescribing in different settings, there are also some setting specific considerations. The following sections discuss enablers and barriers that may influence deprescribing in primary care, secondary care and residential care facilities (also known as care homes, long-term care facilities, and residential aged-care facilities).

5.1 Deprescribing in primary care

Primary care is often the first point of contact in any health care system, and includes general practice, dentists, and community pharmacies. In the context of deprescribing, primary care is extremely important, given the majority of medications are prescribed in this setting: in England, for example, around 1.1 billion medications are prescribed in primary care annually – and that figure is expected to increase [30]. Prescribing in primary care also accounts for the largest medication expenditure in the health care sector, although, in recent years, the costs of medications prescribed in the hospital sector has increased at a greater rate than primary care spending [30]. Given the importance of the primary care setting in medication initiation, review and supply, it is no surprise that many deprescribing studies have focused on this area, with the majority of studies exploring the role of the primary care physician in deprescribing [8].

At the provider level, there are several barriers and facilitators to deprescribing. A qualitative study conducted in the UK explored how primary care physicians make prescribing decisions for patients with multimorbidity, and found that primary care physicians preferred to 'maintain the status quo' rather than rationalise medications in patients with significant polypharmacy [31]. Other factors intrinsic to the primary care physician that act as barriers to deprescribing include: knowledge limitations which negatively impacted primary care physicians' confidence to deprescribe, primary care physicians' perceptions that their patients would be resistant to deprescribing, fear that deprescribing discussion would be interpreted as a withdrawal of care, fear that deprescribing would result in return of symptoms or withdrawal effects, and beliefs that medications generally cause few serious effects [32]. On the other hand, enablers of deprescribing include primary care physicians' perception that the risk of medication continuation exceed the risk of deprescribing, interventions to raise awareness into his/her prescribing, the confidence to stop therapy or deviate from guidelines, work experience, skills and training, computerised clinical decision support systems to reduce inappropriate medication use and improve patient involvement, and dialogue with patients [8,32,33].

Factors that influence deprescribing extrinsic to the primary care physician include the work setting, patient, and health system [8]. The limited time to review and discontinue medications is often cited as the most influential restraint [8,31]. Several studies have reported patients and their caregivers to be the barriers to deprescribing [8,29,34]. At this individual patient level, there is a high hypothetical willingness to have a medication deprescribed when a physician says it is possible [35]. However, patient/caregiver attitudes and beliefs about their medications, such as a belief that their medications are appropriate (believing the medication is still necessary/beneficial, lack of knowledge/concern about the risks) may serve as a barrier to deprescribing. The lack of knowledge concerning the purpose of medications among patients can hinder discussion about deprescribing [36]. Patients/caregivers have also expressed fears about negative outcomes after medication withdrawal and uncertainty about the process [27,34,37,38]. Overall, there seems to be a lack of public knowledge and experience of deprescribing as a regular part of good care [39].

Gillespie and colleagues conducted a systematic review of the factors that influence deprescribing in a primary care context [32]. The review demonstrated that working in primary care is often a dichotomy when it comes to delivering deprescribing initiatives. From one perspective, primary care physicians are often considered the gatekeepers of care – particularly regarding medication management and form trust and build relationships with their patients. As such, this trusting relationship can facilitate primary care physicians to understand and assess the individual patient context with regards to goals, values and preferences that are critical to any deprescribing approach [40]. However, on the other hand, when medications are started in secondary care, there is an increased risk of poor communication between different health care professionals, and it is not clear who holds overall responsibility for the medication. In some cases, it was noted that the medical culture appears to encourage prescribing and foster inertia to continue prescribing [8]. There is also a reported hierarchy between primary care physicians and specialists working in secondary care, whereby the primary care providers felt unable to question prescribing decisions, even

if it meant supplying medications with no clear indication, or where there was questionable benefit [8,29,32,34,41,42].

5.2 Deprescribing in secondary care

Deprescribing in secondary care is particularly important as studies consistently show an increase in number of medications and prevalence of polypharmacy from hospital admission to discharge, even when excluding short term medications [16,43]. While this may be a result of the need for additional long-term medications to manage chronic conditions, research indicates that the prevalence of PIMs remain consistent or increases during hospitalisation [16,44]. For example, Ni Chronin and colleagues found an increase in prevalence of taking one or more PIM(s) from 54.8% to 60.8% from admission to discharge [44]. Similarly, Todd and Holmes found the total numbers of medications used by cancer patients increased from 8.8 to 10.3, and 11.6 to 12.1 from admission to discharge, across UK and US hospital sites respectively [45]. Additionally, an investigation into deprescribing activities during hospitalisation in the UK found that 0.6% of medications were deprescribed and, of these, 84.1% were reactive (e.g. in response to an ADR) and 15.9% were proactive (discontinuing a medicine if future gains are unlikely to outweigh future harms) [46]. Overall, there is a clear opportunity to optimise medication use during hospitalisation which is currently not being fully exploited.

There is limited research exploring the barriers to, and enablers of, deprescribing in the secondary care setting, however, some setting specific barriers may occur. Hospitalisation is characterised by presentation of an acute problem. This may lead to a culture of initiating medication and make other activities (such as deprescribing) a lower priority. Inertia in work practice and reluctance to question a colleague's prescribing decisions likely perpetuates continuation of medications taken prior to admission without review. This may be compounded with fragmentation of care and difficulties accessing complete medical and medication histories [8,44,47]. Hospital clinicians may also perceive that changing regular medications (where not directly linked to reason for admission) is not their responsibility [48]. Junior physicians in the hospital setting (who usually chart prescriptions) have reported limited confidence in their knowledge of geriatric pharmacology and ability to review medications [48]. They felt it was not their responsibility to conduct deprescribing, instead pointing to pharmacists, senior consultants and the patient's regular primary care physician as being responsible [48]. Additionally, admission may be too short to implement changes (e.g. complete tapering regimens) and there is a lack of formal follow-up and support procedures to enable completion of a deprescribing process [44,47]. Indeed, medications intentionally deprescribed during admission may be accidentally restarted following discharge [49].

Despite these barriers, opportunities do exist for deprescribing in hospital [50]. Complete medication histories and medication reconciliation is required on admission to hospital, with increasing evidence and support for the role of the pharmacist in conducting these activities [51]. Access to a multidisciplinary team and ability to consult specialists, as well as the time and availability of the patient and their representative(s) may facilitate deprescribing discussions and decisions. A recent review found computerised clinical decision support

systems (CCDSS) to be effective in reducing the prescribing of PIMs in hospitals [33]. However, the evidence on the effectiveness of CCDSS on deprescribing is limited and more research is needed on implementation, sustainability and generalisability [33,52]. Thillainadesan and colleagues recently conducted a systematic review of interventions to promote deprescribing in hospitals [53]. Nine randomised controlled trials were found with a mixture of intervention types, including those led by pharmacists, physicians and multidisciplinary teams. Most studies were able to reduce the number of medications and/or PIMs during hospitalisation, however, the authors noted that greater evidence was required on translation, implementation and sustainability of deprescribing interventions in hospital as well as limited data on clinical outcomes assessed [53].

Another opportunity to support deprescribing in acute care is establishing treatment goals with the patient and their representatives. International studies found that almost 90% of older inpatients are willing to have a medication deprescribed [54–57]. Complex decisions routinely occur in hospital, with discussion of competing interests, high risk interventions and consideration of life expectancy and goals of treatment. There is also the opportunity for close short-term monitoring with clear procedures for accessing laboratory and physiological parameters. Finally, hospitalisation may be a direct result of medication harm, providing a clear impetus to deprescribe [58,59].

5.3 Deprescribing in residential care facilities

Meaningful deprescribing in residential care facilities is of major importance [60]. Older adults living in residential care facilities are at a high risk of ADEs, including impaired cognition, falls, and hospitalisations [61,62]. Despite recommendations to avoid PIMs in older adults living in residential care facilities, studies consistently document high use. A systematic review of 48 observational studies of residents aged ≥60 years, showed that PIM use increased from 30.3% in studies conducted during 1990–1999 to 49.8% in studies conducted after 2005 [15]. Peri et al [61] reviewed residents' medication charts in 15 US residential care facilities and found that 47% of residents received at least one PIM, while among residents in Australia, 81.4% of the participants had been exposed to a PIM [63]. Particular concern has been raised about the use of psychotropic medications, including antipsychotics, hypnotics and anxiolytics in residents of care facilities. The current estimates of the prevalence of psychotropic mediations in residential care facilities are high: 48% in the UK [64], 61% in Australia [65] and over 60% in the United States [66].

There has been a substantial research effort to improve the appropriate use of medications in residential care facilities, often involving medication review conducted by pharmacists [67]. A study by Wouters et al. [68] reported the effect of a multidisciplinary intervention – a medication review conducted by a physician and pharmacist – on reducing inappropriate medication use in residential care facilities in the Netherlands. The impact was relatively limited with the discontinuation of at least one PIM in 39.1% of residents in the intervention group and 29.5% in the control group. Similarly, Westbury et al [69] conducted a 6-month multifactorial intervention trial to reduce inappropriate antipsychotic and benzodiazepine prescribing in residential care facilities in Australia. The intervention was delivered by pharmacists and included psychotropic medication audit and feedback, staff education, and

interdisciplinary case review at baseline and 3 months. While it was an important undertaking, the impact was limited, as the proportion of residents prescribed antipsychotics declined from 21.6% [95% CI, 20.4, 22.9%] to 18.9% [95% CI, 17.7, 20.1%]), and that of residents regularly prescribed benzodiazepines from 22.2% [95% CI, 21.0,23.5%] to 17.6% [95% CI, 16.5, 18.7%] [69].

As evidenced by limited success of deprescribing interventions, several barriers appear to be associated with the implementation of deprescribing in residential care facilities, with a unique influence of organisational culture [29,70]. Important barriers to deprescribing include staff perceptions of limited resources to provide non-pharmacological alternatives and resistance from residents and their representatives [71]. In a follow-up study of the withdrawal of antipsychotics in residential care facilities using a multifaceted intervention, the Halting Antipsychotic use in Long Term care (HALT) trial, it was found that nurses were the most common drivers of re-prescribing (63%), followed by family members (40%) [72]. Several qualitative studies report that primary care physicians felt ‘pressured to prescribe’ psychotropic medications by on-site staff [71,73] with reports of inadequate staff levels and training causing a reliance on psychotropic medications and hindered deprescribing [71]. Common enablers include organisational support for pharmacy-led medication review, residential care facilities managers communicating messages to team members (residential care facility staff, health care professionals and managers) about appropriate prescribing and the use of non-pharmacological alternatives, and the involvement of residents and their representatives in prescribing decisions [71,74].

To aid implementation of deprescribing in residential care facilities a whole system approach that addresses key barriers is required. Successful implementation of deprescribing in residential care facilities can be achieved by improving team work among staff and health care professionals through multidisciplinary team meetings on prescribing [75]. The involvement of all residential care facility staff in the identification and discussion of residents’ goals for medication may enable partnerships to be formed to facilitate deprescribing [76]. The availability of resources and endorsement by the manager to support deprescribing interventions, such as pharmacy-led medication review, is needed [26]. Also, staff require adequate support and training so that they can implement person-centred approaches to achieve deprescribing.

Much of the research to date has focused on medication review which attempts to influence prescribing after it has taken place and is external to the primary prescriber [77]. An alternative approach is for pharmacists to adopt the role of prescribing in collaboration with the primary care physician. In addition, future deprescribing interventions should incorporate an interprofessional team-centered approach involving the individual, their representative, residential care facility staff and physicians where the pharmacist have a critical role [78]. A UK trial is investigating the effectiveness of an intervention in which pharmacists integrated within residential care facilities assume responsibility for medication management, including deprescribing [79].

6. International deprescribing policies across countries

There are increasing efforts to introduce deprescribing polices at a population level to reduce use of inappropriate or unnecessary medications. Similar to challenges in implementing deprescribing in clinical practice, it is difficult to identify opportunities to embed successful deprescribing polices within current health care systems. Some policies, such as the Australian National Medicines Policy, have a broad scope focused on providing guidance on appropriate medication use [80]. In contrast, other international policies tend to focus on specific medications, such as psychotropic medications and opioids [81] (Table 1). In addition, a number of policies have been implemented to reduce PIMs, including: prescription monitoring and rescheduling, however, these policies may increase substitutions to other inappropriate medications; removal of coverage, which can lead to increased costs but not necessarily reduced use; and pay-for-performance, which has limited efficacy [81]. This section summaries current example of policy approaches that may enable deprescribing in Canada, United States, Europe and Australia. The authors chose to focus on Canada, United States, Europe and Australia because collectively they have been at the forefront of deprescribing initiatives over the last 20 years.

6.1 Deprescribing policies in Canada

While policies relating to medication approval and licencing in Canada are federal, health care administration is delivered through 13 different and unique provincial and territorial health jurisdictions [82]. This provides a range of comparable and contrasting approaches to implementation of policies, regulations and systems designed to improve medication appropriateness and potentially facilitate deprescribing.

Subsidy of approved medications is a common element across all health jurisdictions, designed to promote access to appropriate medications. However, policies and subsidies across Canada differ. People aged ≥65 years receive approved medications at a subsidised rate, however, a complex combination of provincial and/or private insurance coverage, means access is not equal. Several jurisdictions have employed additional regulations to promote appropriate use by restricting subsidy or limiting availability. For example, restricting subsidy of proton pump inhibitors (PPIs) until other medications have been tried and failed limits their initiation. Similarly, excluding Z-drugs from subsidy restricts access. However, regulations like these focus on preventing initiation, rather than specifically deprescribing of inappropriate medications. In contrast, restricting subsidy for continuation of a medication can promote deprescribing. For example, in Quebec continued subsidy of a PPI after the initial 90-day supply is only possible if the patient is reviewed by their primary care physician. While implementing policies designed to constrain access through financially restricting coverage, it is important to consider how restriction can have different effects in different contexts, potentially causing minority groups to be disadvantaged.

A number of policies designed to promote appropriate medication use in primary care have been implemented throughout Canada. Some jurisdictions provide billing codes for primary care physicians to review medications, while others do not. Similarly, only some jurisdictions promote collaboration between community pharmacists and primary care physicians in a number of different ways including funding “refusal to fill” or the provision

of evidence based pharmaceutical opinions [83]. Evidence shows pharmaceutical opinions – evidence-based communication to recommend deprescribing to the primary care physician- and patient engagement can reduce the use of PIMs by 43% within six months [84] . As such, Newfoundland and Labrador changed pharmacists scope of practice and funding to support pharmaceutical opinions to facilitate community pharmacists and primary care physicians to work together [85]. Medication reviews or MedsCheck services are included to varying degrees in pharmacists scope of practice for many health jurisdictions [83] although in practice, these services often focus on medication adherence rather than deprescribing. Comprehensive approaches are supported in a small number of jurisdictions, with systems funding multidisciplinary teams to review medications within family medicine clinics. These policies have led to deprescribing being an integral component of some family medicine clinics and quality improvement initiatives [86]. As with medication subsidy, availability of services between and within health jurisdictions are complicated by different offerings from private health insurance companies.

Direct-to-patient education about the benefits and harms of benzodiazepines in community dwelling older adults produced a 23% reduction in benzodiazepine use in Quebec [87]. Inspired by this result, the Manitoba government, in a unique collaboration between policy and research, adapted the educational materials to encompass the benefits and harms of opioids. A population level randomised controlled trial is currently evaluating the effect of direct-to-patient education on the reduction of opioids for chronic non-cancer pain [88].

Residential care facilities are supported by a number of policies and interventions. Many health jurisdictions require pharmacists to provide medication reviews at regular intervals. While medication appropriateness is a focus, this often involves deprescribing. Furthermore, the federally funded Canadian Foundation of Healthcare Improvement, in collaboration with provincial and territory governments is implementing antipsychotic reduction collaboratives across Canada[89]. Whilst initially focused on antipsychotics, there is potential for this collaborative approach to be expanded to deprescribing other PIMs.

6.2 Deprescribing policies in United States

The United States (U.S.) health care system contains a patchwork of policies, regulations, and incentives to promote appropriate medication use for older adults (albeit recognising that many other policies, regulations, and incentives may effectively work against this goal). Given the complexity of the U.S. health care marketplace and absence of a dominant single payer system, there are few cross-cutting approaches that apply to all older adults. The most notable elements stem largely from policies and programs enacted through or in collaboration with the U.S. Centres for Medicare and Medicaid Services (CMS), which administers the U.S Medicare program. Medicare covers ambulatory and inpatient medical care to the vast majority of U.S. adults age 65 and older and pharmaceutical insurance to a substantial majority. Few of these policies and regulations directly address deprescribing. Rather, the dominant theme is programs that flag use of certain medications in older adults as problematic, regardless of whether use is new or longstanding. Thus, the general incentive for U.S. primary care physicians and health systems is to reduce use of these medications

either through not prescribing them in the first place, or deprescribing among patients already taking such medications.

Perhaps the most widely applicable program to reduce inappropriate medication use comprises an overlapping system of quality measurement, which includes several measures related to PIM use in older adults. The dominant systems are the Health Effectiveness Data and Information Set, more commonly known by its acronym HEDIS, and the Merit-Based Incentive Payment System, or MIPS. Collectively these place financial and competitive pressure on health systems and physician groups to perform well on quality measures. The HEDIS measure set includes markers of use of “High-Risk Medications in the Elderly,” which is largely derived by the American Geriatrics Society Beers Criteria of potentially inappropriate medications, and “Potentially Harmful Drug-Disease Interactions in the Elderly”, which track use of medications that are particularly problematic in older adults with dementia, history of falls, or chronic renal failure (National Committee for Quality Assurance, 2019) [90]. Measures in MIPS are generally similar to those in HEDIS, including the use of a “High-Risk Medications in the Elderly” measure [91]. Neither HEDIS nor MIPS currently have much (if any) measures targeted at other common scenarios for deprescribing in older adults, such as overaggressive glycemic and blood pressure control in older adults, or discontinuation of preventive therapies with long lag time to benefit in older adults nearing the end of life [90,91].

Another form of improvement in appropriate medication use lies in decision support and quality measurement programs that are implemented in varying approaches by individual health systems. Their overall focus has traditionally been on flagging specific high-risk medications such as those on the American Geriatrics Society Beers criteria [92], or identifying excessive doses or potential drug-drug interactions. More comprehensive approaches to medication review and optimisation, such as comprehensive medication review by pharmacists, have been hindered by payment models that do not reimburse for such services in most settings. In contrast, closed health systems such as the Department of Veterans Affairs Health Care System (VA) and Kaiser Permanente have been more at the forefront of developing these programs. For the majority of Americans who get their care elsewhere, two government-mandated programs come the closest to individualised medication review that could facilitate deprescribing, although the reality of these programs often falls far short of this goal.

First among these is Medication Therapy Management (MTM) services, which are offered by private prescription drug plans that administer the U.S Medicare Part D prescription drug program [91]. While there is substantial variability in MTM services provided, and new models of “enhanced MTM” are being tested, in general such programs are not robust or explicitly focused on deprescribing. For example, a common type of service is a one-time, telephone-based medication reconciliation review with an older patient, with a report and often non-user-friendly action plan sent to the patient and his or her primary care physician.

Finally, government regulations require the vast majority of residential care facilities in the U.S. should have a pharmacist conduct monthly medication review for their residents. Under these “F-tag” regulations (so named because of regulatory nomenclature), primary care

physicians are expected to gradually reduce the dose of psychotropic and other CNS-acting medications among residents, or justify with recurring documentation why such reduction would be unsafe or inappropriate [93]. Moreover, these regulations have recently expanded to include a blanket requirement that each residents' medication regimen not contain unnecessary medications of any type. Such programs may be effective in some regards – for example, the rate of antipsychotic prescribing in U.S. residential care facilities has dropped by a third between 2011 and 2016, although this impressive reduction in use may also be attributable to concurrent efforts to combat antipsychotic overuse [94]. However, the overall impact of the broader regulations on effective deprescribing is not firmly established.

6.3 Deprescribing Policies in Europe

To promote sustainable health systems, European Union (EU) Commission has established a multidisciplinary and independent Expert Panel to provide advice on effective ways of investing in health care, particularly taking into consideration the growing ageing population (Commission Decision 2012/C 198/06). The Expert Panel promotes research and development of methodologies on appropriateness of care, creation of learning communities to bring together the best expertise, experiences and practices and to measure, benchmark and learn from each other implementing actions in the EU, and finally supports patientś initiatives for engagement in shared decision-making, recognising the importance of patientś goals, values and preferences, informed by high quality information [95].

In this context, several European Commission funded projects have recently addressed the issue of polypharmacy, potentially inappropriate prescribing and, consequently, judicious deprescribing in older adults, exploring how health care management programmes can be implemented to improve medication safety and prevent patient harm by addressing the appropriate use of multiple medications, including deprescribing [96,97]. The European Union's Health Program, a consortium of stakeholders called Project SYMPATHY, which aims to address excessive prescribing and medication non-adherence, including a review of EU polypharmacy polices may provide an insight into potential deprescribing policies [98].

All these projects rely, to a different extent and mainly focusing on the UK perspective, on collaborative and integrative approaches across different care settings. Funded projects include medication reconciliation, medication review, application of tools for detection of potentially inappropriate prescribing (among which the STOPP/START criteria [99], endorsed by European Geriatric Medicine Society, have been widely used across Europe) and use of health information technology with integration of skills from different health care professionals needed to address medical complexity of older adults (i.e. Comprehensive Geriatric Assessment). Essential to this approach is the principle that provides work in partnership with patients to enable shared decision-making regarding medication, which on its turn impacts health related outcomes. This approach combines patient preference and context, clinical judgement and scientific evidence (where it exists) [100,101].

6.4 Deprescribing policies in Australia

Australia has a multi-faceted health care system which is funded by the federal government, through the Medicare scheme, and private providers. Medicare also subsidises a wide range

of prescription pharmaceuticals under the national Pharmaceutical Benefits Scheme (PBS) to improve consumer access to medications [102].

Following a WHO conference in 1985, which called for all member states to establish national medicinal drug policies, formal inquiries into the safe and effective use of medications in older adults were undertaken in Australia [80]. The inquiry resulted in the development of the *National Health Strategy for Quality use of Medicines* in 1992 and the *National Medicines Policy* in 1999. The strategy included a number of recommendations: the implementation of pharmacist-led medication reviews, formation of medication advisory panels, and inclusion of pharmacists in the health care team [103]. Pharmacist-led medication review, also known as the Home Medication Review (HMR) and Residential Medication Management Review (RMMR), became government funded in 1998. Furthermore, it is a requirement for Australian residential care facilities that every resident receives a RMMR as soon as possible after admission and/or on a clinical needs basis [104]. The RMMR and HMR is conducted by an accredited pharmacist who identifies actual and potential causes of medication related problems and presents suggested solutions which may include recommendations for deprescribing, in a written report to the primary care physician. Studies have shown that comprehensive medication reviews conducted by accredited pharmacists in primary and residential care settings have been effective in identifying medication related problems (MRP) (3.6 MRP per HMR, 2.7–3.9 MRP per RMMR) and resulted in high acceptance rates from primary care physicians [105–108].

In addition, the *Guidelines for Medication Management in Aged Care Facilities* were developed in 2002 and later revised in 2012 [104]. The Guidelines outline a partnership approach among on-site staff, visiting staff and residents and/or their representatives to achieve the safe and quality use of medicines and comprise 17 principles, which include a requirement that residential care facilities ensure that residents' medications are regularly evaluated and reviewed by an accredited pharmacists or primary care physician and that they establish and conduct Medication Advisory Committee (MAC) meetings. The goal of MAC meetings is to review and evaluate medication management practices by involving on-site and visiting staff in activities such as development and review of policies and procedures, review of incidents reports such as medication errors and falls, and review of staff educational needs. To date, no efforts have been placed to embed specific deprescribing policies within this approach.

Complementary to initiatives listed above in 2006, the Council of Australian Governments (COAG) established the Australian Commission on Safety and Quality in Health Care (the Commission) to lead and coordinate national improvements in the safety and quality of health care. The Commission developed the National Safety and Quality Health Service (NSQHS) Medication Safety Standard to establish a nationally consistent approach to improve the safety and quality use of medicines. The standard outlines that a patient's medications are reviewed, and an outcome of the review could be deprescribing of a medicine. While, Australia is yet to formulate and implement specific deprescribing policies, efforts had been made to establish a multidisciplinary Australian Deprescribing Network (ADeN), which has led to recommendations for a National Strategic Action plan. This plan

highlights that many of the national policies are outdated and that there are opportunities for a national approach to implement deprescribing within the current health care system [109].

7. Conclusion

The narrative review suggests that there are opportunities to enable the implementation of deprescribing in clinical settings across health care systems. However, this will require a multi-level assessment of the barriers and opportunities to deprescribing to enhance implementation and practice changes. Importantly, implementation of deprescribing interventions needs to carefully consider the unique barriers that may influence sustainable deprescribing in the real-world setting. Finally, while it is encouraging to observe initiatives to develop international policy approaches to deprescribing, we need robust evidence to support the effectiveness of these efforts.

8. Expert opinion

Over the last five years, collective international efforts have been made to raise the awareness and importance of deprescribing in clinical practice. The next steps in the deprescribing field should focus on enhancing implementation and translation of deprescribing into routine clinical practice and across different health care systems. A number of avenues of investigation exist to enable this work. Firstly, the knowledge of the efficacy and safety of withdrawing medication is needed to inform implementation strategies such as deprescribing interventions across settings, development of guidelines, and behavioural and communication strategies. In addition, it will also be important to consistently capture patient-centred outcomes in deprescribing trials [110]. Secondly, deprescribing studies are inherently heterogeneous because of the complexity of interventions employed. As such, these interventions tend to be costly, and may not be practical or sustainable in the real-world setting. In addition, deprescribing intervention studies rarely include process evaluation or implementation components to determine the contextual factors that influence translation of the intervention followed by implementation in the real-world. Thirdly, it is clear that there are significant barriers to implementing deprescribing across levels and settings. One approach could be to firstly identify unique barriers (e.g. time and medical/organisational culture) to all settings and target these barriers systematically to ensure the consistency to implementation of deprescribing in practice. Alternatively, consensus could be reached to focus on one setting to prioritise the implementation of deprescribing. However, the current evidence is mixed in terms of the most suitable setting to implement deprescribing. As discussed in Section 5, arguments could be made that all settings, including primary, secondary and residential care facilities, should be considered to implement deprescribing. One criteria could be to target the setting with the highest rates of inappropriate polypharmacy, which is likely to be residential care facilities or acute care setting. In addition, opportunities and barriers exist at the intersection of the four levels – for example, challenges exist not only within the health care team or within patients/representatives, but in the intersections and communication between them.

To further facilitate the implementation of deprescribing in clinical settings, interventions should focus on multidisciplinary team-centered approaches, involving the individual, their

representatives and health care professionals. Also, approaches to deprescribing need to engage the individual and their representatives to align goals of care. This may help address the individual's resistance to deprescribing by building consensus on withdrawal of inappropriate treatment and to arrive at a shared decision on treatment.

Another approach could be to introduce or adopt existing policies to support deprescribing in clinical practice. However, it would be important to establish the effectiveness of these polices in different contextual settings because policies may have unintended clinical consequences. A recent review found that health care policies designed to promote deprescribing of specific PIMs may have unintended consequences [81]. For example, when alprazolam was rescheduled in Australia the use of it declined significantly, however, there was also an increase in the use of other benzodiazepines and an increase in benzodiazepine related deaths [111,112]. Likewise, prescription monitoring or policies that remove financial coverage for one class of PIMs may drive patients to switch to other inappropriate medications or may increase financial hardship on vulnerable populations [81].

Efforts should be made to explore how national medicines policies could be leveraged to generate real practice change. For instance, deprescribing is now listed in the UK British National Formulary and Australian Medicines Handbook Aged Care Companion [113,114], therefore, other countries could follow this initiative along with considering incentives to enable implementation of deprescribing into practice. Another important area to assist implementation of deprescribing in clinical practice is development of evidence-based deprescribing guidelines [115]. However, as these currently exist as stand alone, medication specific guidelines, their impact on changing medical culture and implementation into regular practice may be limited. To ensure access of deprescribing guidelines in routine practice, a complementary approach may be to incorporate medication-based deprescribing guidelines into drug monograph summaries, and to include deprescribing recommendations with prescribing recommendations in disease-based guidelines.

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Article highlights

- The use of potentially inappropriate medications in older adults is consistently high across different health care settings and deprescribing is an important step to reduce medication related harm and improve outcomes in older adults.
- However, the routine implementation of deprescribing interventions in real-world settings is limited which have resulted in mixed outcomes across settings and countries.
- This narrative review identified the unique barriers and opportunities to deprescribing across the four levels of the health care system and selected countries to identify approaches that may enhance implementation of deprescribing in the real-world.
- Implementation of deprescribing interventions need to be individually tailored to target the unique barriers and opportunities to deprescribing in different clinical settings.
- The knowledge of the efficacy and safety of withdrawing medication is required to inform implementation strategies such as deprescribing interventions across settings.
- Introduction of national policies to encourage deprescribing may be beneficial. However, it would be important to establish the effectiveness of these polices in different contextual settings.

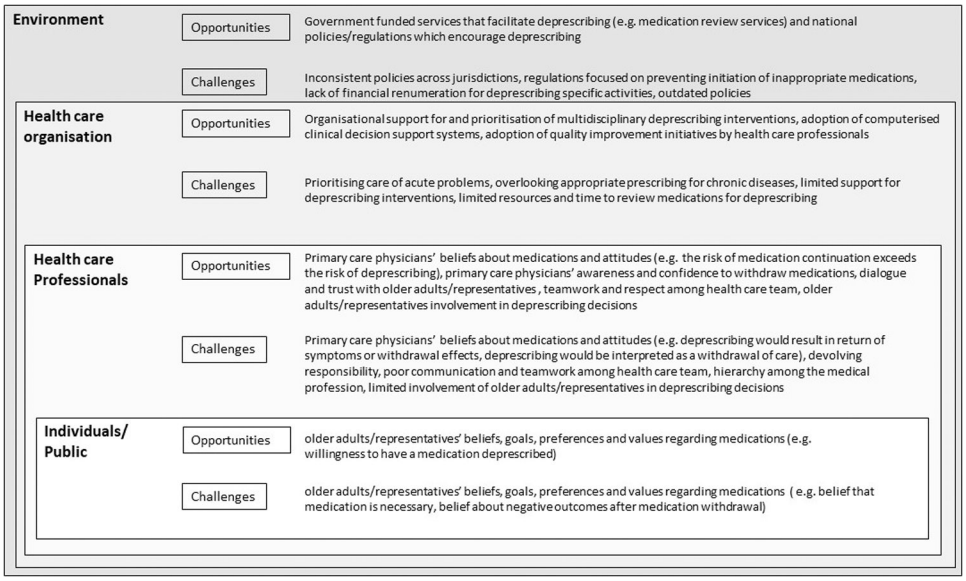

Figure 1.

Enablers and barriers which may influence the implementation of deprescribing across the four levels of the health care system

Table 1:

Types of policies which may encourage or facilitate deprescribing

Type of policy	Examples
National policy/document with recommendations	• National Health Strategy for Quality use of Medicines and National Medicines Policy that promote appropriate prescribing and recommended inclusion of pharmacists within health care team (Australia)
Funding for health care provider led medication review	• Pharmacist-led Home Medication Review (Australia) • Older adults living in residential care facilities are required to receive a Residential Medication Management Review (Australia, USA, Canada) • Individualized medication review by pharmacists (VA, Kaiser Permanente, MTM services,US) (primary care, Canada) • Antipsychotic reduction collaboratives in residential care facilities (Canada *)
Funding and coordination directed to review and develop policies	• Project SYMPATHY: a review of EU polypharmacy polices which aims to address excessive prescribing (Europe)
Alteration/restriction in funding for specific medications	• Continued coverage for PPIs beyond 90 days only after the patient has been reviewed by primary care physician (Canada *) • Excluding Z-drugs from subsidy (Canada *)
Other	• Direct-to-patient education about the benefits and harms of benzodiazepines and opioids (Canada *) • Quality measurement programs focused on potentially inappropriate medications in older adults to incentivise primary care physicians to review or reduce medication (HEDIS, MIPS) (USA) • Gradual reduction of psychotropic/Central Nervous System-acting agents in residents of residential care facilities (USA)

* only in some jurisdictions

HEDIS- Health Effectiveness Data and Information Set; MIPS- Merit-Based Incentive Payment System; MTM- Medication Therapy Management, VA- Veteran Affairs