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Deprescribing intervention activities mapped to guiding principles for use in general practice: a scoping review.

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Abstract

Objective: To identify and characterise activities for deprescribing used in general practice and map the identified activities to pioneering principles of deprescribing.

Setting: Primary Care.

Data sources: Medline, EMBASE (Ovid), CINAHL, Australian New Zealand Clinical Trials Registry (ANZCTR), Clinicaltrials.gov, ISRCTN registry, OpenGrey, Annals of Family Medicine, BMC Family Practice, Family Practice and Journal of General Practice (BJGP) from inception to the end of April 2020

Study selection: Included studies were original research (RCT, quasi-experimental, cohort study, qualitative and case studies), protocol papers and protocol registrations.

Data extraction: Screening and data extraction was completed by one reviewer; 10% of the studies were independently reviewed by a second reviewer. Coding of full-text articles in NVivo was conducted and mapped to five deprescribing principles.

Results: Fifty studies were included.. The most frequently used activities were: identification of appropriate patients for deprescribing (74%), patient education (48%), GP education (46%), and development and use of a tapering schedule (44%). Six activities did not align with the five deprescribing principles. As such, two principles were added.

Conclusion: Activities and guiding principles for deprescribing should be paired together to allow for accessible and comprehensive guidance for the conduction of deprescribing by GPs. With the variety of deprescribing activities available to GPs, future research is required to determine the most of effective activities to use within each principle. Additionally, research is warranted to test the effectiveness of using deprescribing principles in practice.

Keywords: deprescribing, primary care, general practice

Article summary

- First study to investigate deprescribing activities in general practice.
- First study to map deprescribing activities to guiding principles. The results can be used to guide GPs to operationalise deprescribing principles in a systematic way in clinical practice.
- Effectiveness and outcomes of the identified activities were not examined.

Introduction

The World Health Organisation (WHO) estimates that more than half of all medicines are prescribed inappropriately[1]. "Inappropriate prescribing" can occur when medications are prescribed and taken despite there being no clinical benefit or the risk of taking a medication outweighs the benefit[2]. Each year, 250, 000 Australians are hospitalised as a result of medication errors attributed to inappropriate prescribing[3]. To alleviate this issue, deprescribing, which is the "*planned and supervised process of dose reduction or stopping unnecessary or potentially harmful medication*"[4] is a recommended component of best practice prescribing. Both, prescribing and deprescribing require skillful and careful clinical judgement to balance the risks and benefits of medicines, minimising potential harms and improving patient health outcomes[5]. General practitioners (GPs) prescribe the majority of medications[6] and are well placed to conduct the majority of deprescribing. However, deprescribing is not routinely occurring in clinical practice[5,7].

Evidence suggests that patients are willing to cease unnecessary medications but require empowerment and engagement from their GP to do so, and are likely to leave it to their GP to initiate the deprescribing conversation[8]. However, research has identified many barriers to this occurring, including appointment time constraints, lack of good quality guidelines[7], clinical inertia[9] and not knowing when to deprescribe[10]. When asked about what would assist with their deprescribing role GPs express a desire to have support and work in collaboration with other healthcare professionals[7], have ready access to non-pharmacological options and resources, and decision making systems and tools[11] to enable them to regularly and confidently conduct deprescribing.

Activities to support GPs to deprescribe have been investigated, though only one systematic review has focused on deprescribing by GPs in primary care. This review by Dills et al.[12] found three effective activities for successful deprescribing: 1. pharmacist-physician collaboration for conducting medication reviews; 2. giving clinicians intensive education about deprescribing, and; 3. intensive education for patients about chronic disease management and potentially inappropriate medicines (PIM)[12]. Most of the included studies were set in long-term care, assisted living and outpatients, which are commonly considered to fall outside the definition of primary care. Further, only six of the fifty-eight studies were conducted in general practice. Though GPs do practice in these settings, the effectiveness of the identified activities may not be generalisable to GPs practicing specifically within the general practice setting.

Isenor et al.[13] recently explored deprescribing activities in primary care, which included pharmacy, general practice, and allied health. Results of this scoping review revealed that checklists, algorithms, leaflets, patient finder tools, goal setting tools and prompts or cues in the form of reports, letters, posters or electronic medical record alerts were most frequently used to support deprescribing. These activities were often used in conjunction to form interventions to change GP and patient behaviour. This suggests that deprescribing interventions are multifaceted and employ a variety of techniques to encourage deprescribing at the patient, clinician and systems levels[13]. Results showed that GPs were the most targeted healthcare professional for intervention, with pharmacists most commonly conducting the deprescribing process. Though

pharmacists may play an important role in deprescribing, what activities GPs are using in practice remains unclear.

It is also important to consider how deprescribing activities are being used in practice as this process is essential for successful deprescribing[14]. Research indicates that how deprescribing activities are delivered has previously been underreported in deprescribing trials, making it challenging to apply deprescribing evidence into clinical practice[15]. In the absence of a gold standard deprescribing process, Woodward's 5 principles of deprescribing offers a strong framework and are core to the deprescribing process[16]. The 5 principles of deprescribing consists of: 1. review all current medications; 2. identify medications to be targeted for cessation; 3. plan a deprescribing regimen; 4. plan in partnership with patient and carers, and; 5. frequent review and support (see figure 1)[4]. Woodward's principles were the first deprescribing guiding principles described in the literature and state that deprescribing should be a collaboration between the prescriber and patient, with subsequent adaptations placing an even greater emphasis on the importance of patient-centered care[16,17]. The principles were developed with corresponding deprescribing activities, however whether deprescribing interventions are following these recommendations is not known.

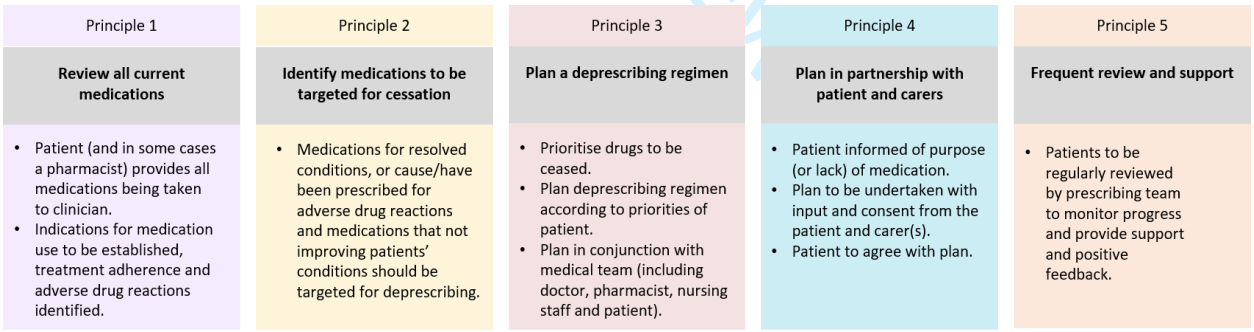

Figure 1. Woodward's 5 principles for deprescribing[4].

To date, research has focused on deprescribing activities or in adapting deprescribing principles, independently, rather than consolidating the two for use in practice. Further, to our knowledge, no reviews have looked specifically at deprescribing activities and principles in general practice. Examining activities and principles together may help to identify areas of the deprescribing process that require attention and provide a comprehensive and accessible knowledge base for

GPs, to support and inform their decision making around deprescribing. As scoping reviews have become a popular, rigorous and transparent method for providing in-depth and comprehensive coverage of the literature[18] we conducted a scoping review to provide an up-to-date and inclusive look at deprescribing activities in general practice and map them to a well-known set of deprescribing principles. Specifically, we aimed to: 1. provide a summary of the deprescribing literature across all medical conditions presenting to general practice; 2. map the activities to Woodward's 5 principles of deprescribing, and; 3. identify any key deprescribing activities being tested in general practice interventions.

Method

Search strategy

Methodology was decided upon in April 2020 via discussion between authors. A research librarian at the University of Melbourne was consulted to develop search terms and methods. Studies were identified by searching electronic databases Medline, EMBASE (Ovid), CINAHL, Australian New Zealand Clinical Trials Registry (ANZCTR), Clinicaltrials.gov, ISRCTN registry and OpenGrey from inception to the end of April 2020. Hand searches of four primary care journals (Annals of Family Medicine, BMC Family Practice, Family Practice and Journal of General Practice (BJGP) was conducted. The following key concepts were searched for: general practice or primary health care or general practice or general practitioner or primary care professional, medic* or drug* or pill* or tablet* or treatment*, discontinu* or reduc* or terminat* or taper or cease or cessation or stop taking or stop using or deprescrib* or deprescrip*. The full search activity is shown in Appendix A.

Participants

Studies that focused on adults attending general practice and/or health care professionals in general practice were included, regardless of primary diagnosis, type of healthcare professional delivering care, country in which study took place or year published. Studies were excluded if they were not conducted with human participants, or participants were younger than 18 years of age.

Setting

Studies were eligible for inclusion if they were set in general practice (i.e. participants were recruited from, or deprescribing was conducted in, a general practice clinic), and if the

medication being deprescribed was one that was taken orally. Studies were excluded if they did not describe the activities of the deprescribing intervention. Studies were also excluded if they focused prescribing/deprescribing prevalence or adherence/non-adherence.

Types of studies

Studies were included if they were original research (RCT, quasi-experimental, cohort study, qualitative and case studies). Systematic reviews and meta-analyses were included for handsearching purposes. Protocol papers and protocol registrations were included as they describe interventions that are being prepared for trial. Where the full protocol paper was available, this took precedence over the protocol registration record. Articles were excluded if they were non-empirical research (editorials, guidelines/guideline development, commentaries, opinions, letters, factsheets, clinical education activities). Conference abstracts were also excluded as they do not always include in-depth intervention descriptions. Studies were also excluded if the focus of the article was not a deprescribing intervention. Study quality was not formally assessed and was not an inclusion criteria as this is not a requirement of scoping reviews[19].

Study selection

One reviewer (AC) reviewed all titles and abstracts for eligibility and 10% of titles and abstracts were separately reviewed by a second reviewer (CKH) for agreement. The eligible full-text of articles were downloaded into the COVIDENCE web-based screening and data extraction tool[20]. Two reviewers (AC and CKH) independently evaluated 10% of the full-text articles to decide if they meet the inclusion/exclusion criteria. Five articles required discussion between the two reviewers to resolve disagreement about inclusion. Consultation with a third reviewer was not needed as agreement between the reviewing authors was reached. AC then reviewed all remaining full-text articles for inclusion. A data extraction form was developed to gather the following information for all included studies: author(s), country and year of publication, study type, population, setting, methodology, primary medical condition, medication to be deprescribed, comparator information and study results. To extract information about the deprescribing activities used in the interventions, full-text articles were uploaded into NViVo[21] and coded by AC.

Categorisation of the results

Initial reason for medication prescription targeted for deprescribing was categorised by the International Classification of Diseases 11th Revision (ICD-11)[22] where possible. To create order for the complex material found in the included studies, intervention activities were categorised into "who", "what", "how" and "where". Specifically, "what" activities were mapped to the 5 principles as these are the activities that most pertain to the conduction of deprescribing. For patients, GPs, allied health and eTools that were categorized under "who", were further classified as "lead" or "support. A lead role was assigned if they initiated and oversaw the deprescribing process. A support role was assigned if they were not the initiator or overseer, but were involved in the deprescribing process. eTools were categorised under "who" as they were used in place of a person to conduct deprescribing activities. Any activities not mapped to the 5 principles were grouped together to determine if they contained common traits to form additional principles. Additional principles were named for when the activities mapped to them took place within the original 5 principles.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Ethics approval statement

Not applicable.

Results

The search yielded a total of 4927 articles, 3759 after duplicates were removed. Review of titles and abstracts led to the retrieval of 82 full-text articles for assessment. Of these, 50 empirical research studies were included (see Appendix B for individual study characteristics). Figure 2 shows the flow of articles through the search and eligibility screening process.

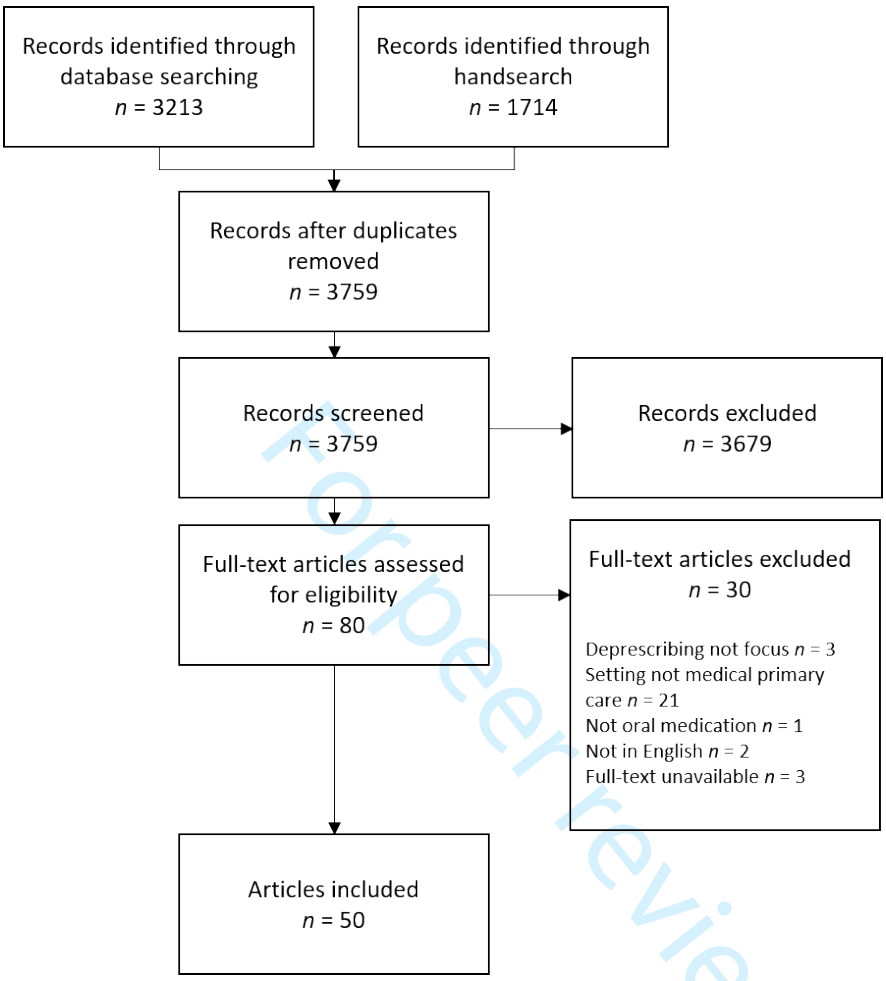

Figure 2. PRISMA flow diagram showing results of search and process of selecting articles for deprescribing scoping review.

Included articles were published between 1983 and 2020, with an increase in publication rates in the last 5 years (Table 1). Research was primarily conducted in the United Kingdom (*n* = 9 [18%]), The Netherlands (*n* = 7 [14%]), and the United States of America (*n* = 7 [14%]). 19 studies specifically targeted older patients (aged 60 years and older)[23–41].

Most studies were randomised controlled trials (RCTs) (*n* = 32 [64%]) and aimed to reduce polypharmacy (*n* = 16 [32%]) and benzodiazepine use (*n* = 14 [28%]). Definitions of polypharmacy varied between studies, ranging from two or more medications[23] to 15 or more medications[24]. Two studies did not specify what the target medication was initially prescribed for – one focused on falls prevention, the other long-term use[25,42]. In a third of the studies, the target

medication was initially prescribed for the treatment of mental illness. The most common reason for deprescribing was medications deemed as PIM (n = 26 [52%]. Some studies specifically targeted a subset of PIM (for example, long-term use) which is presented as an individual reason for deprescribing.

Table 1. Characteristics of publications on deprescribing activities.

Characteristic	n = 50	% of 50
Type of article		
Randomised Controlled Trial*	32	64%
Quasi-experimental design	11	22%
Cohort studies	4	8%
Feasibility studies	2	4%
Case-controlled studies	1	2%
Country of origin		
United Kingdom	9	18%
Netherlands	7	14%
Spain	6	12%
Australia	5	10%
Canada	4	8%
Ireland	3	6%
New Zealand	2	4%
France	2	4%
Portugal	1	2%
Switzerland	1	2%
Germany	1	2%
Scotland	1	2%
Multiple locations	1	2%
Year of publication		
<1999	4	8%
2000-2005	5	10%

2006-2010	4	8%
2011-2015	7	14%
2016-2020	30	60%
ICD 11 Category		
Mental illnesses	17	34%
Digestive illnesses	5	10%
Nervous system	3	6%
General symptoms	3	6%
Multimorbidity	3	6%
Circulatory	2	4%
Sleep wake disorders	2	4%
Infectious	1	2%
Other	4	8%
Initial reason for prescription not given**	10	20%
Specific medication targeted for deprescription		
Polypharmacy	16	32%
Benzodiazepines	14	28%
Antidepressants	6	12%
Proton Pump Inhibitors	5	10%
Opioids	3	6%
Antihypertensives	2	4%
Psychotropics	1	2%
Antibiotics	1	2%
Anticholinergics	1	2%
Mirabegon (Urinary incontinence)	1	2%
Reason for deprescription		
Potentially inappropriate medication	26	52%
Long-term use	19	38%
Adverse side effects	4	8%
Exploration of alternative treatment	1	2%

NB. *Of the included RCTs, 10 were protocol papers and 11 were protocol registrations. **These studies targeted polypharmacy, therefore initial reason for the prescription of multiple medications was not specified.

Activities and principles of deprescribing

Deprescribing activities and principles were applied across populations, diagnoses and medication types. Overall, 17 activities were identified and were mapped to seven principles. Six activities did not fit within the original 5 principles. To incorporate the remaining activities two additional principles were created: principle 0: engage practice staff in education and appropriate identification of patients and principle 6: provide feedback to staff about deprescribing occurrences within the practice. Principle 0 included five activities which occurred prior to activities mapped to Woodward's 5 principles. Principle 6 included one activity which occurred after the 5 principles.

Unsurprisingly, GPs and patients were heavily involved in the deprescribing process. Activities of deprescribing were administered in several different ways including medical records and documents. Finally, deprescribing activities were mainly carried out in the general practice clinic. Figure 3 shows the deprescribing activities mapped to the corresponding principle along with who is involved in the deprescribing process, how activities and principles might be administered and where they take place. Figure 4 presents Woodward's 5 principles with the addition of principle 0 and principle 6.

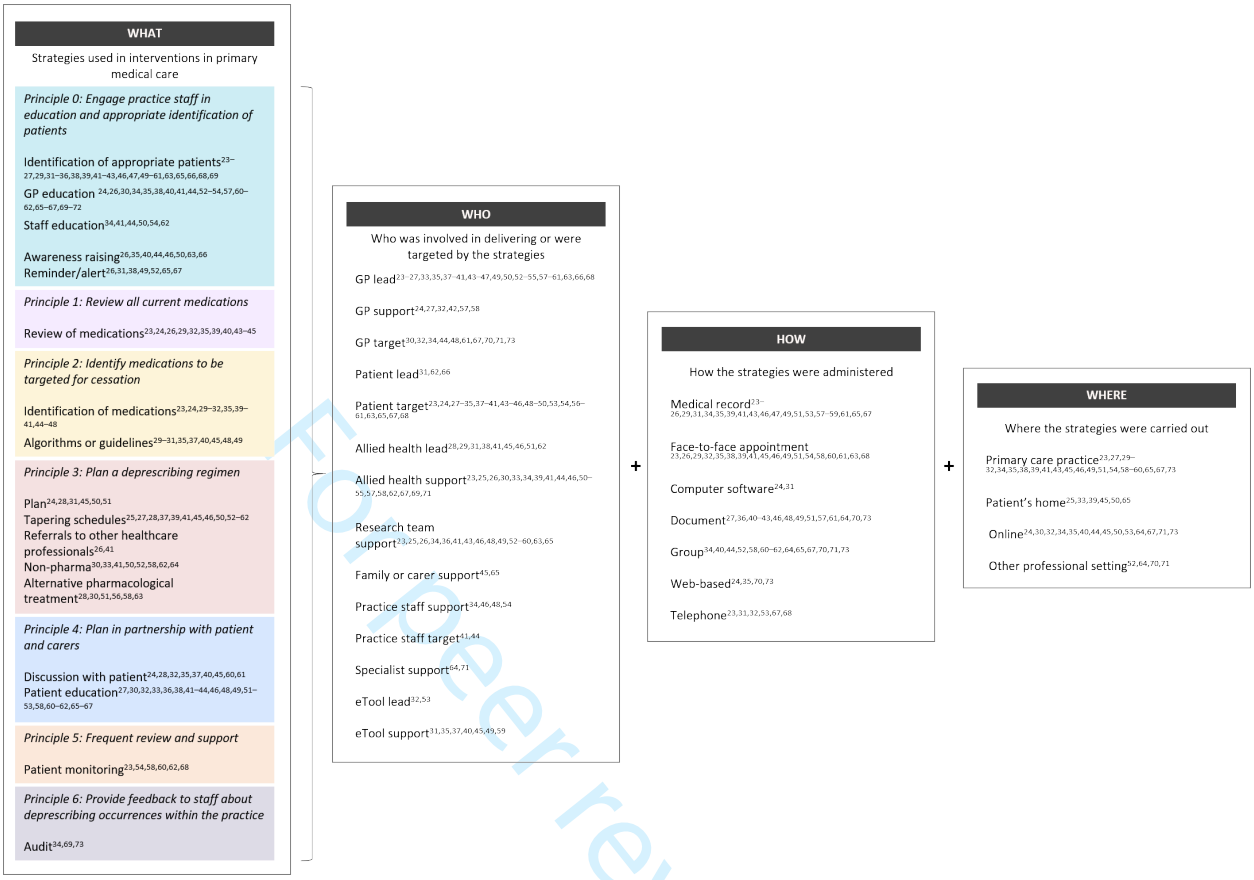

Figure 3. Deprescribing activities mapped to corresponding principles.

Principle 1: Review of all current medications

A review of all medications was conducted in eleven studies[23,24,26,29,32,35,39,40,43–45] and was the only activity mapped to Principle 1. GPs most commonly lead this activity[23,24,26,35,39,40,43–45] with pharmacists[29] and eTools[32,] also given a lead role.

Principle 2: Identify medications to be targeted for cessation

Identification of medications for cessation was conducted in 15 studies[23,24,29–32,35,39–41,44–48]. This was led mostly by GPs (n = 12)[24,30,31,35,37,39–41,44–49] with a pharmacist[29] and an eTool[32] leading three further studies. In one study leadership of identifying medications was shared by a GP, practice nurse or pharmacist[46]. Identifying the medications for cessation was were often supported by algorithms (n = 9) that used information from the review of medications in Principle 1 and made recommendations for which medications to target for deprescribing[29–31,35,37,40,45,48,49]. Five studies incorporated the algorithm in an eTool[31,35,37,40,45].

Principle 3: Plan a deprescribing regimen

Documented plans for deprescribing were made in six studies[24,28,31,45,50,51]. A variety of healthcare professionals were involved in this process including pharmacist leads[28,31], an eTool[24], a nurse[51] and a GP[50]. In one study, a deprescribing plan was developed by a GP, pharmacist and an eTool[45]. Tapering schedules were widely used (n = 22)[25,27,28,37,39,41,45,46,50,52–62] and were delivered by GPs[27,37,39,45,46,50,54,61] and pharmacists[28]. A pharmacist, GP and nurse were responsible for tapering schedules in one study[62]. eTools were utilised in two studies[53,59]. In 10 studies researchers developed and disseminated the tapering schedule to participants[25,41,49,52,55–58,60,63]. Referrals to other healthcare professionals[26,41], non-pharmacological options[30,33,41,50,52,58,62,64] and alternative pharmacological options[28,30,51,56,58,63] were also mapped under Principle 3. These activities were used to support patients to deprescribe after receiving a tapering or deprescribing plan. Non-pharmacological options included guided mindfulness based cognitive therapy[50], and exercise programs[62].

Principle 4: Plan in partnership with patient and carers

Patients were included in the deprescribing discussions in 10 studies[24,28,32,35,37,40,45,60,61]. A deprescribing decision aid was used as a tool in one study to facilitate the deprescribing discussion[50]. Carers were included in two studies, though only one involved them in the deprescribing discussion[45]. GPs alone conducted discussions with patients in five studies[24,29,30,37,60,61], and were aided by an eTool in three studies[32,35,40] and a pharmacist in one study[28]. In one study GPs and pharmacists were supported by an eTool to discuss deprescribing with patients[45].

Patient education was also a commonly occurring activity (n = 24)[27,30,32,33,36,38,41–44,46,48,49,51–53,58,60–62,65–67] and occurred in a variety of ways including receiving a letter in the mail[29], advice from their GP[27] and internet modules[53]. As this was most often conducted during an appointment with a GP, this activity could be seen as one conducted under Principle 4.

Principle 5: Frequent review and support

Six studies reported five different approaches to monitoring patients after the deprescribing process was intiated[23,54,58,60,62,68]. Monitoring involved follow-up telephone appointments[23,68]; follow up in person appointments which focused on the provision of positive reinforcement[60], tracking of physiological responses to deprescribing (for example, blood pressure and cholesterol checks)[54,62] and completion of case reports[58].

Principle 0: Engage practice staff in education and appropriate identification of patients and Principle 6: Provide feedback to staff about deprescribing occurrences within the practice

Five activities were mapped to "Principle 0: Engage practice staff in education and appropriate identification of patients". This included the most frequently occurring activities found across all of the studies: identifying patients and GP education. Awareness raising of deprescribing amongst healthcare professionals and reminders and alerts for clinicians were also mapped to this principle. Each of these activities appear to be tasks that GPs, other healthcare professionals and primary care clinics should complete prior patient appointments and medication management occurs. Identification of appropriate patients who were eligible for deprescribing occurred in the majority of studies (n = 37)[23–27,29,31–36,38,39,41–43,46,47,49–61,63,65,66,68,69]. Though this may have occurred as study participant selection, it was included as an element of deprescribing as GPs need to know which patients to initiate the deprescribing discussions with. GP education occurred in almost half of the studies (n = 23)[24,26,30,34,35,38,40,41,44,52–54,57,60–62,65–67,69–72], and was conducted prior to any patient contact and therefore before deprescribing commenced. GP education was delivered in a variety of ways including workshops[26], training videos[24] and as part of GP medical training[64,71]. Practice staff education occurred less frequently[34,41,44,50,54,62] and typically involved staff being invited to attend the education provided to GPs, rather than delivery of separate or tailored training for other members of the practice team. Awareness raising was achieved in general practices through practice recruitment and training in study protocols, practice sign up and participant recruitment (n = 8)[26,35,40,44,46,50,63,66]. Seven studies[26,31,38,49,52,65,67] used reminders or alerts in patient medical records to notify GPs that a patient with an upcoming appointment required a medication review.

The only element mapped to Principle 6 was the auditing of deprescribing occurrences in practice researchers in three studies[34,69,73].

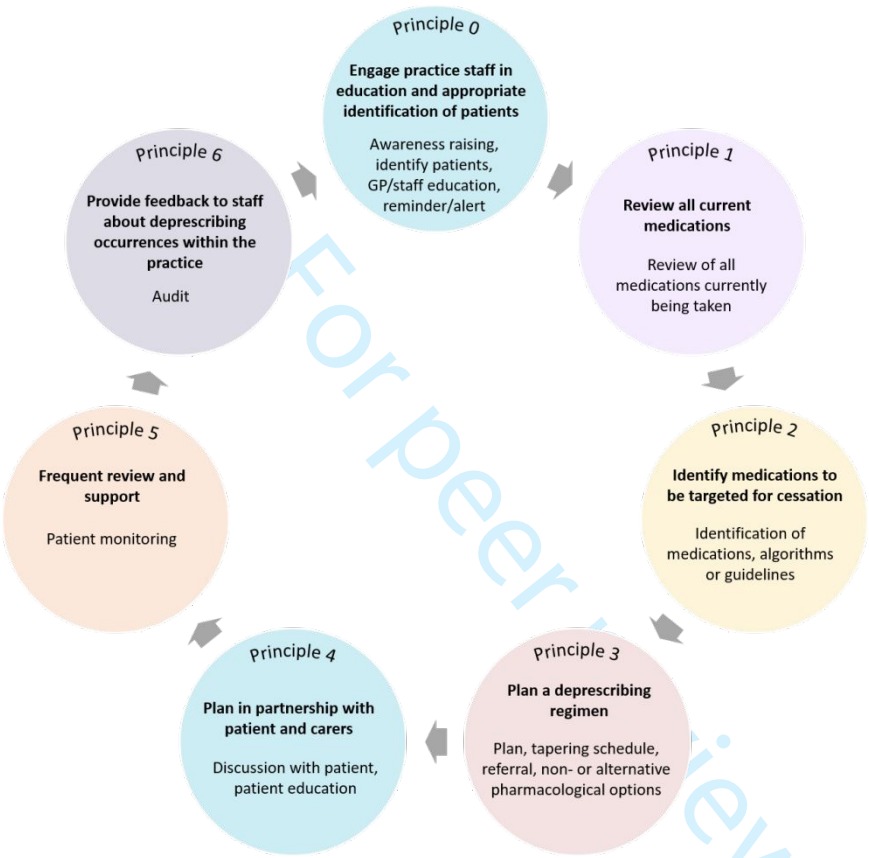

Figure 4. Expanded principles of deprescribing.

Key deprescribing activities

Four deprescribing activities were the most commonly used in the 50 reviewed studies: 1. 74% of studies used identification of appropriate patients; 48% used patient education; 46% used GP education, and; 44% used a tapering schedule. These activities appear to be key for the deprescribing process. Identification of these key activities may guide the development of future deprescribing interventions in general practice as well as provide a quick reference for GPs to apply deprescribing activities in clinical practice.

Discussion

Deprescribing is critical to addressing the well recognised problem of inappropriate medicine use, but is currently underperformed in general practice. In looking to assist GPs to engage in deprescribing this scoping review amalgamated deprescribing activities being used in general practice with pioneering principles of deprescribing. This may provide GPs with a comprehensive and accessible knowledge base for when to use the deprescribing activities principles in clinical practice.

Two principles were added to Woodward's original 5 principles of deprescribing[4] addressing an area of concern in the literature regarding the lack of GP initiated deprescribing. Principle 0 encompassed activities aimed at helping GPs to initiate the deprescribing conversation. Auditing activities mapped to Principle 6 may also complement Principle 0 as auditing information allows staff to improve professional practice[74]. Providing GPs with information about their own deprescribing practices may improve initiation of the deprescribing process.

The most frequently occurring activities were identifying appropriate patients for deprescribing, patient and GP education and the use of tapering schedules. Identifying which patients require deprescribing was classified as a deprescribing activity in the current study, however it was not specifically used as part of deprescribing interventions in the included studies. Though this activity was used as part of study eligibility, this activity may be important for the initiation of the deprescribing process for GPs and warrants further testing.

Our findings are consistent with previous literature that has found heterogeneity in the deprescribing process. In particular, paired with the findings from Dills et al.[12], the current review adds support to education for GPs and patients being critical components of the deprescribing process. However, identifying appropriate patients for deprescribing has not previously been specified as deprescribing activity to be used in practice and highlights a current gap in the literature.

Focusing on deprescribing conducted solely in general practice yielded different findings to previous literature. We found that 32% of included studies focused on polypharmacy compared other reviews that included a wide array of primary care settings (for example, 65% of studies in

the scoping review by Isenor et al.[21]). Traditionally, polypharmacy is an issue for older adults aged 65 year and older. As general practice is most commonly attended by adults aged 20 to 64[75] this age difference may be reflected in the current results. Such differences in population and medication suggest that deprescribing activities may also be different within the general practice setting. Previous research has also suggested pharmacists as leaders of the deprescribing process, however when focusing on general practice, GPs were overwhelming responsible with other healthcare professionals in supporting roles. GPs may be logical leaders for deprescribing, though they may require support from others. This is in line with Woodward's 5 principles where it was envisaged that GPs and pharmacists are supported by nurses and other healthcare professionals in prescribing and deprescribing[2].

Strengths and limitations

Both a limitation and strength, this review included protocol papers and protocol registrations. As deprescribing is only emerging in the literature, we thought it important to see what activities are currently being used or will be used in general practice. Protocol papers and protocol registrations are required to describe the interventions that they aim to test, however, they do not report on the actual tested intervention therefore some activities may have been missed.

An assessment of bias was not conducted on the included studies. The most common study designs included in this review was RCTs which suggests that bias may be limited, however, more than half (n = 18) of the RCTs were described in protocol papers only. As scoping reviews allow for the inclusion of a wider range of literature, including protocol papers minimalised the risk of missing relevant interventions. Further, a rigorous search was conducted which included three electronic databases, three clinical trials registries, a grey literature database and a hand search. This has allowed for a diverse set of literature to be identified in a robust and reproducible manner. Finally, previous literature has focused on studies conducted from 2002 to the present, possibly due to "deprescribing" only having been coined as a term in 2003. As medication discontinuation is not a recent concept, the current review may have captured some previously missed deprescribing activities.

Implications for research and practice

This scoping review has provided an overview of what activities are being used in deprescribing and operationalised them into a framework of principles of deprescribing, however guidance is still needed for how GPs might select activities for different patients and medication type. The adapted principles presented in the current study and the activities mapped to them should be tested and evaluated in practice. Additionally, the methods for identifying patients who have need for deprescribing should be investigated. Finally, the inclusion of carers and family members in the deprescribing process both in practice and in future research should be emphasised.

Conclusion

GPs are in a unique position to deprescribe unnecessary medication but are not systematically doing so. Evidenced based deprescribing activities and principles to guide deprescribing have yet to be combined to develop a comprehensive but easy to use guide to support GPs to deprescribe. This scoping review was the first to amalgamate deprescribing activities and pioneering deprescribing principles resulting in two additional principles. The guiding principles helped to capture the variety of deprescribing activities that currently exist in the literature and has highlighted which areas of the deprescribing process require further attention. Further, the activities included within each principle can provide guidance for GPs on how they can initiate and carry out the deprescribing process. The current findings may provide a starting point by offering a selection of deprescribing options to use in practice.

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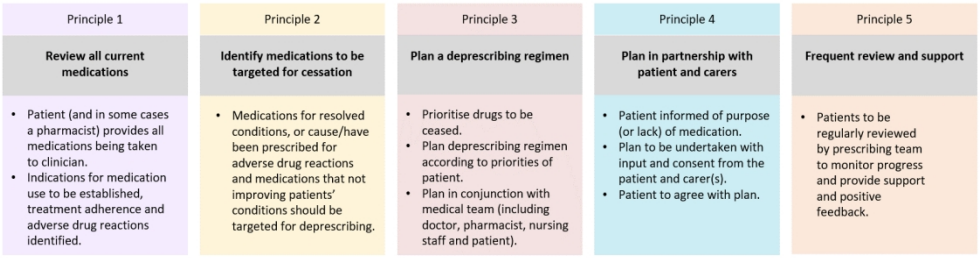

Figure 1. Woodward's 5 principles for deprescribing

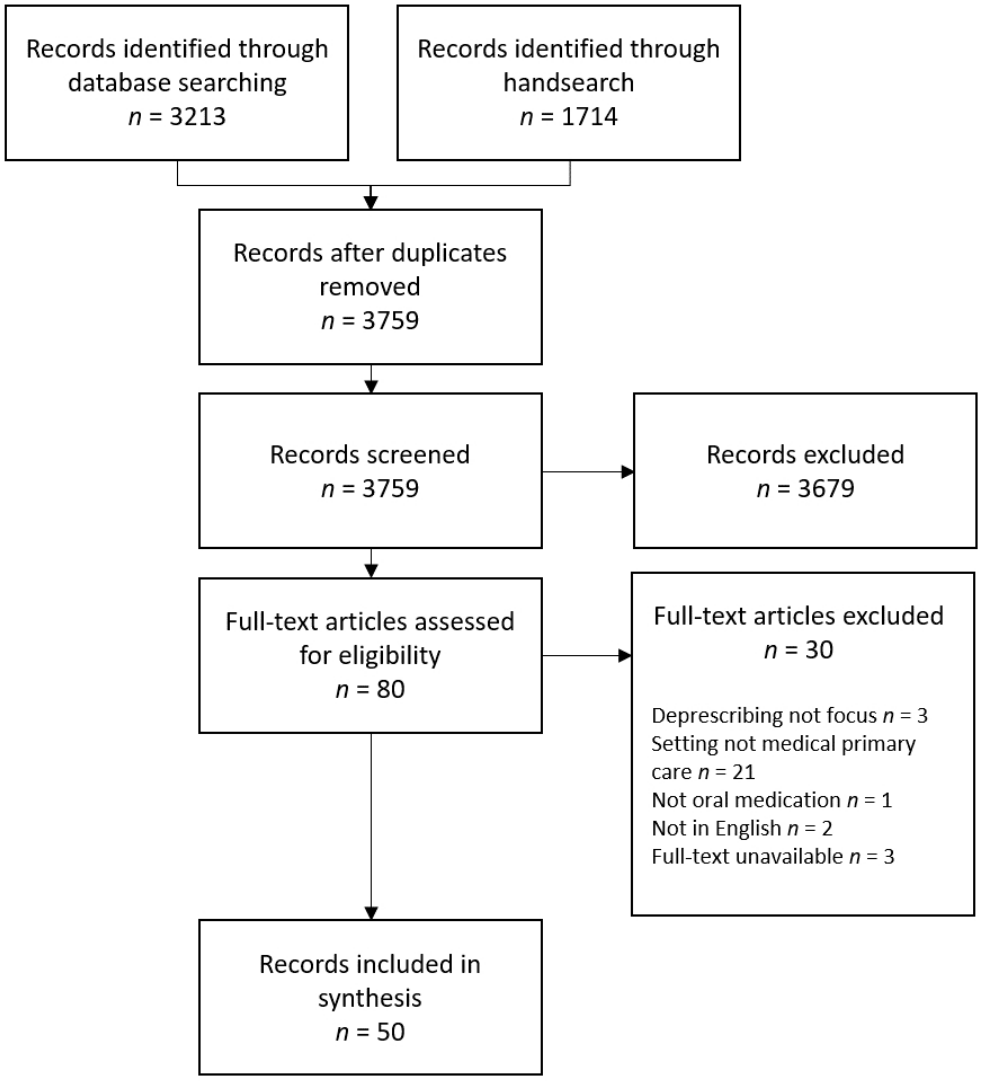

Figure 2. PRISMA flow diagram showing results of search and process of selecting articles for deprescribing scoping review

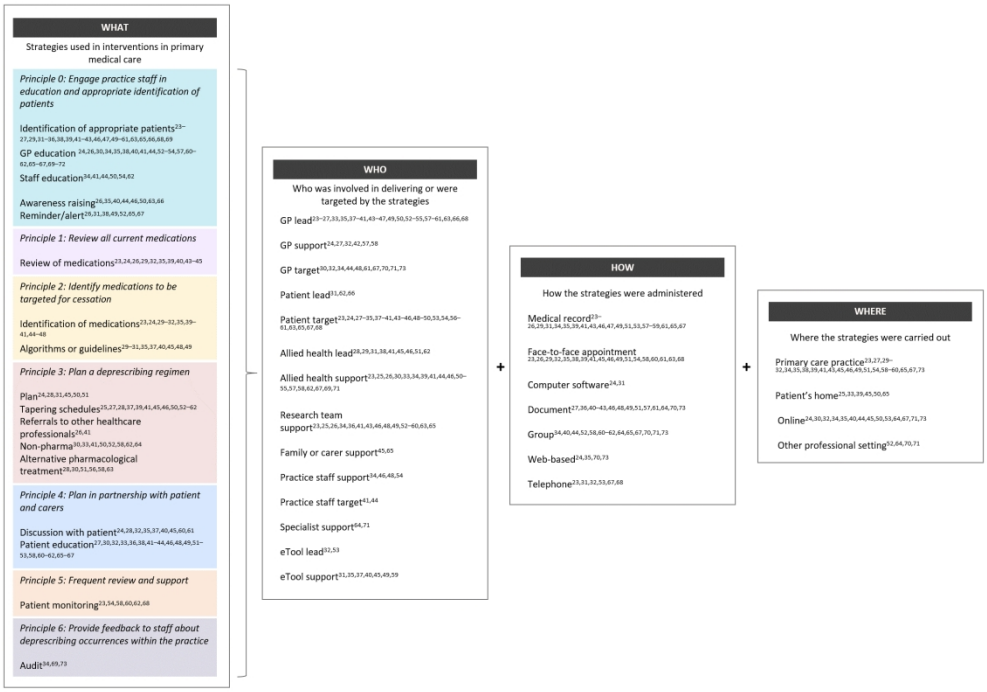

Figure 3. Deprescribing activities mapped to corresponding principles

Figure 4. Expanded principles of deprescribing

Appendices

Appendix A: Search strategy and results

Steps	Search terms – Embase | 6.5.20	Hits
1	Primary medical care/	103586
2	General practice/	84531
3	Primary health care/	65513
4	General practitioner/	102079
5	Primary care professional.ti,ab,kw.	64
6	1 or 2 or 3 or 4 or 5	313405
7	Controlled clinical trial/ or randomized controlled trial/ or clinical trial/ or controlled trial/	7962376
8	Pragmatic trial/	721
9	(Quasi adj experimental).mp.	17466
10	Cohort studies/	438040
11	(Observational adj (study or studies)).mp.	245170
12	Longitudinal study/	139512
13	Cross-sectional study/	345327

14	Retrospective study/	911739
15	Prospective study/	598500
16	(Epidemiolog* adj (study or studies)).mp.	118700
17	Case control studies/	116468
18	Case adj2 study or case report/	2908439
19	qualitative analysis/ or qualitative research/	131936
20	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19	12064177
21	((medic* or drug* or pill* or tablet* or treatment*) adj3 (Discontinu* or reduc* or terminat* or taper*)).mp.	294378
22	((medic* or drug* or pill* or tablet* or treatment*) adj3 (cease or cessation*)).mp.	16411
23	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj taking)).mp.	851
24	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj using)).mp.	243
25	((medic* or drug* or pill* or tablet* or treatment*) adj3 (deprescrip* or de-prescrip* or deprescrib* or de-prescrib*)).mp.	448
26	23 or 24 or 25	1535

27	Remove duplicates from 26	1515
28	21 or 22	309129
29	27 or 28	310335
30	6 and 20 and 29	2250
31	limit 30 to (human and english language and (adult <18 to 64 years> or aged <65+ years>))	1550
32	(hospital or outpatient or ambulatory or (residential adj care) or (aged adj care) or pharmacy or emergency).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	2953816
33	(smoking or tobacco or nicotine or (smoking adj1 cessation)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	587497
34	(book or conference or letter or opinion or comment* or editorial or factsheet*).pt.	6300831
35	32 or 33 or 34	8739730
36	31 not 35	637

Steps	Search terms – Medline | 6.5.20	Hits
1	Primary health care/ or family practice/ or general practice/	136245
2	General practitioner.mp.	19309
3	Primary care professional.ti,ab,kw.	51
4	1 or 2 or 3	149115
5	543390	543390
6	Clinical Trials as Topic/ or Randomized Controlled Trials as Topic/	319688
7	Pragmatic Clinical Trials as Topic/mt [Methods]	82
8	(Quasi adj experimental).mp.	13017
9	(cohort adj (study or studies)).mp.	389354
10	(Observational adj (study or studies)).mp.	159188
11	Longitudinal Studies/mt [Methods]	176
12	Cross-Sectional Studies/mt [Methods]	215
13	Retrospective Studies/mt [Methods]	11
14	Prospective Studies/mt [Methods]	11
15	Epidemiologic Studies/	8295

16	Case-control studies/	282232
17	case report/	2094945
18	(Case adj2 study).mp.	177140
19	qualitative research/	53822
20	5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19	3832590
21	((medic* or drug* or pill* or tablet* or treatment*) adj3 (Discontinu* or reduc* or terminat* or taper*)).mp.	144504
22	((medic* or drug* or pill* or tablet* or treatment*) adj3 (cease or cessation*)).mp.	10858
23	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj taking)).mp.	471
24	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj using)).mp.	145
25	((medic* or drug* or pill* or tablet* or treatment*) adj3 (deprescrip* or de-prescrip* or deprescrib* or de-prescrib*)).mp.	285
26	23 or 24 or 25	896
27	Remove duplicates from 26	892
28	21 or 22	154520

29	27 or 28	155239
30	6 and 20 and 29	516
31	limit 30 to (english language and humans and ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)"))	367
32	(hospital or outpatient or ambulatory or (residential adj care) or (aged adj care) or pharmacy or emergency).mp.	1640940
33	(smoking or tobacco or nicotine or (smoking adj1 cessation)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	363328
34	(book or conference or letter or opinion or comment* or editorial or factsheet*).pt.	1837575
35	32 or 33 or 34	3746464
36	31 not 35	228

Steps	Search terms – CINAHL	
S1	Deprescribe or deprescribing or ‘reducing medicines’ or deprescription	728
S2	discontinuation OR discontinue OR discontinued	22,817
S3	(MH "Reducing Agents") OR reduction of OR reducing OR reduce OR reduced OR reduction	601,471
S4	(MH "Treatment Termination") OR (terminate or termination)	16,321
S5	tapering OR taper	2,369
S6	cessation OR cease	37,820
S7	stop* n1 us* OR stop* n1 tak*	1,924
S8	medication* OR medicine* OR drug* OR pill* OR tablet* OR treatment*	1,957,097
S9	(MH "Primary Health Care") or (MH "Physicians, Family") or (MH "Family Practice")	101,934
S10	(MH "Randomized Controlled Trials") OR (MH "Crossover Design") OR (MH "Empirical Research") OR (MH "Experimental Studies") OR (MH "Community Trials") OR (MH "Controlled Before-After Studies") OR (MH "Double-Blind Studies") OR (MH "Factorial Design") OR (MH "Historically Controlled Study") OR (MH "Nonrandomized Trials") OR (MH "One-Shot Case Study") OR (MH "Pretest-Posttest Design") OR (MH "Pretest-Posttest Control Group Design") OR (MH "Single-Blind	964,575

	Studies") OR (MH "Case Control Studies") OR (MH "Population-Based Case Control") OR (MH "Matched Case Control") OR (MH "Correlational Studies") OR (MH "Cross Sectional Studies") OR (MH "Triple-Blind Studies") OR (MH "Qualitative Studies") OR (MH "Quantitative Studies") OR (MH "Quasi-Experimental Studies") OR (MH "Retrospective Design") OR (MH "Repeated Measures")	
S11	(MH "Survey Research") OR (MH "Physiological Studies") OR (MH "Pilot Studies") OR (MH "Exploratory Research") OR (MH "Formative Evaluation Research") OR (MH "Summative Evaluation Research") OR (MH "Descriptive Research") OR (MH "Case Studies") OR (MH "Behavioral Research")	254,970
S12	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	665,101
S13	S10 OR S11	1,106,257
S14	S8 N3 S12	313,689
S15	(S8 n3 S12) AND (S9 AND S13 AND S14) Limiters - English Language; Human; Age Groups: Adult: 19-44 years, Middle Aged: 45-64 years, Aged: 65+ years, Aged, 80 and over, All Adult	1,055
S16	(MH "Hospitals") OR (MH "Hospital Units") OR (MH "Poison Control Centers") OR (MH "Laboratories") OR (MH "Tissue Banks") OR (MH "Intensive Care Units") OR (MH "Delivery Rooms") OR (MH "Intensive Care Units, Pediatric") OR (MH "Nurseries, Hospital") OR (MH "Operating Rooms") OR (MH "Libraries, Hospital") OR (MH "Food Service Department") OR (MH "Engineering and Maintenance Department") OR (MH "GI Laboratories") OR (MH "Health Information Management Service") OR (MH "Housekeeping	149,781

	Department") OR (MH "Information Systems Department") OR (MH "Intravenous Therapy Department") OR (MH "Laundry Department") OR (MH "Clinical Laboratories") OR (MH "Ambulatory Care Facilities")	
S17	(MH "Smoking Cessation") OR (MH "Smoking") OR (MH "Smoking Cessation Assistance (Iowa NIC)") OR (MH "Smoking Cessation Programs")	77,210
S18	editorial OR book OR conference OR letter OR opinion OR comment* OR factsheet*	465,382
S19	S16 OR S17 OR S18	682,220
S20	S15 not s19	860
	Source types = academic journals (853), dissertations (4)	857

Steps	Search terms – ANZCTR	
1	Deprescribe general practice (basic search)	4
2	deprescribe primary care (basic search)	4
3	Deprescription general practice (basic search)	0
4	Deprescription primary care (basic search)	0
5	Taper general practice (basic search)	6
6	Taper primary care (basic search)	4

7	Cease general practice (basic search)	5
8	Cease primary care (basic search)	14
9	Cessation general practice (basic search)	23
10	Cessation primary care (basic search)	35
11	Withdrawal general practice (basic search)	9
12	Withdrawal primary care (basic search)	33
13	Termination general practice (basic search)	1
14	Termination primary care (basic search)	3
15	Reduce general practice (basic search)	150
16	Reduce primary care (basic search)	429
17	Discontinue general practice (basic search)	4
18	Discontinue primary care (basic search)	6
	Total	731

Steps	Search terms – Clinicaltrials.gov	
1	Intervention: Deprescribe, Location terms: general practice,	3
2	Deprescribe, deprescribing (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	14
3	Deprescription general practice, family practice, family medicine, general medicine, medicine general	0
4	Deprescription (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	0
5	Taper, tapering, general practice (basic search)	0
6	Taper, tapering (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	14
7	Cease, stops, quit, general practice (basic search)	13
8	Cease, stops, quit (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	20
9	Cessation general practice (basic search)	63
10	Cessation (Condition or disease) primary care, physician, primary health care (auto synonyms search) (other terms)	45
11	Withdrawal, retired, withdraw, withdrawn general practice (basic search)	14

12	Withdrawal (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	52
13	Termination general practice (basic search)	2
14	Termination (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	9
15	Reduce general practice (basic search)	95
16	Reduce (Condition or disease) primary care, physician, primary health care (auto synonyms search) (other terms)	102
17	Discontinue general practice (basic search)	9
18	Discontinue, discontinuations, discontinued, discontinuous (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	7
	Total	462

Steps	Search terms – ISRCTN registry	
1	Deprescribe (interventions) “general practice” (text)	0
2	deprescribe “primary care”	0
3	Deprescription “general practice”	0
4	Deprescription “primary care”	0
5	Taper “general practice”	2
6	Taper “primary care”	5
7	Cease “general practice”	1
8	Cease “primary care”	4
9	Cessation “general practice”	15
10	Cessation “primary care”	36
11	Withdrawal “general practice”	3
12	Withdrawal “primary care”	17
13	Termination “general practice”	2
14	Termination “primary care”	3
15	Reduce “general practice”	35

16	Reduce “primary care”	101
17	Discontinue “general practice”	3
18	Discontinue “primary care”	11
	Total	238

Steps	Search terms – OpenGrey	
1	(reduce OR reduction OR terminat* OR deprescri* OR withdraw* OR discontinu* OR ceas* OR cessation OR stop*) AND ("general practice" OR "primary care") lang:"en"	60

Steps	Search terms – World Health Organization International Clinical Trials Registry Platform (WHO ICTRP)	
	5.5.20 Important information related to the COVID-19 outbreak! Due to heavy traffic generated by the COVID-19 outbreak, the ICTRP Search Portal is not accessible from outside WHO temporarily. Please subscribe to the ICTRP listserv if you wish to be notified when the search portal is working again. Information on how to subscribe can be found on the same page below.	
1	deprescri*	55
2	Withdraw*	
3	Taper*	
4	Discontinu*	
5	Ceas* or cessation	
6	Stop* adj taking	
7	Stop* adj using	
8	Terminat*	
9	Reduc*	

Steps	Search terms – Annals of family medicine 25.5.20	
1	Deprescribing, deprescribed, deprescribe, deprescription. ti,ab	11
2	Medication or medicine or withdraw or withdrawal. ti,ab	16
3	Medication withdrawn. ti,ab	4
4	Drug withdraw or withdrawal. ti,ab	18
5	Medication or medicine and taper. ti,ab	1
6	Drug taper. ti,ab	1
7	Medication and discontinuation or discontinue or discontinuing. ti,ab	10
8	Medication discontinue. ti,ab	6
9	Medication cessation. ti,ab	31
10	Medication or medicine and termination or terminate. ti,ab	6
11	Medication reduction. Ti,ab	139
	Total	243

Steps	Search terms – BMC Family Practice 25.5.20	
1	Deprescribing, deprescribe, deprescription. kw	11
2	Medication withdraw*. kw	149
3	Drug withdraw*. kw	112
4	Medication taper*.kw	17
5	Drug taper. kw	16
6	Medication discontinu*. kw	124
7	Medication cessation. kw	121
8	Medication terminat*. kw	32
9	Medication reduction. kw	360
	Total	943

Steps	Search terms – Family Practice 25.5.20	
1	Deprescribing, deprescribe, deprescription.	9
2	Withdrawal. ti	5
3	Medication taper	17
4	Medication discontinuation	184
5	Medication cessation. ti	0
6	Termination. ti	0
7	Reduction. ti	8
	Total	223

Steps	Search terms – BJGP 25.5.20	
1	Deprescribing, deprescribed, deprescribe, deprescription. ti,ab	12
2	Medication withdrawal. ti	53
3	Medication taper. ti	52
4	Medication discontinuation. ti	54
5	Medication cessation. ti	75
6	Medication termination. ti	60
	Total	306

Appendix B: Table of study characteristics

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Anderson et al. (2019), Australia	Controlled pre-post	20 GPs and 145 patients aged 65+ years with polypharmacy (Int *n* = 78, Con *n* = 67)	No. of agreed regular medications deprescribed	Polypharmacy (5+regularly prescribed medications)	Training workshop for GPs. Deprescribing consultation between GP and patient for medication review. Additional support for medication review by pharmacist at GPs discretion.	Usual care
Bashir et al. (1994), UK	Controlled evaluation	109 adult patients who were chronic BZD users (Int *n* = 51, Con *n* = 58)	Psychiatric disorder (GHQ-12), BZD withdrawal symptoms (benzodiazepine withdrawal questionnaire)	BZD	GP advises patient about risks of BZD, reducing and stopping BZD and provides self-help booklet (contains advice on stopping).	No intervention
Bayliss et al. (2020), USA	Protocol for a cluster RCT	Target of 4800 patients aged 65+ years with polypharmacy and Alzheimer's, MCI or dementia	No. of chronic medications, no. of PIMs.	Polypharmacy (5+ chronic medications)	Patients: Informational brochure (about discontinuing PIMs, benefits of taking fewer medicines and the rPATDcog) mailed to patients. Encouraged to visit GP to discuss discontinuation. Clinicians: educational presentation about deprescribing, complete PPMD assessment, 12 tip sheets with suggested language and approaches for discontinuation, notification in electronic appointment schedule that patient has been sent brochure.	Usual care (waitlist control)
Campbell et al. (1999), New Zealand	RCT	93 patients aged 65+ years taking psychotropics (Int 1 *n* = 24, Int 2 *n* = 24, Int 3 *n* = 21, Con *n* = 24)	No. of falls	BZD, hypnotics, antidepressants or tranquiliser medication	Intervention 1: gradual withdrawal plus a home-based exercise program. Intervention 2: gradual withdrawal only. Intervention 3: home-based exercise program only.	Usual care
Campbell. (2020), USA	Protocol registration for Cluster RCT	Target of 344 older adult patients with cognitive decline	Change in Cognitive Composite Score	Anticholinergics	Pharmacist based intervention which involves shared decision making between pharmacist, physician and patient to personalise deprescribing (tapering and/or alternative treatment).	Usual care + information re: risks of polypharmacy sent via post
Campins et al. (2016), Spain	RCT	503 patients aged 70+ years with polypharmacy (Int *n* = 252, Con *n* = 246)	No. of recommendations and changes implemented, prescribed drugs, restarted drugs, primary care and ED hospitalisations and death	Polypharmacy (8+ medications)	Medication review by clinical pharmacist using an algorithm. Discussion between pharmacist and physician about recommendation from the review to create final set of recommendations. Recommendations then discussed with patient with final agreement for changes made between patient and physician.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Clyne et al. (2015), Ireland	Cluster RCT	196 patients aged 70 years being prescribed a PIM (Int *n* = 99, Con *n* = 97)	Proportion of patients with PIM drugs, mean number of PIM drugs per group	Various (prescribed 1+ potentially inappropriate drugs on a repeat basis)	GPs: academic detailing session with a pharmacist. Patients: medication review with web-based algorithms for identification and treatment options.	Usual care with simple list summarising PIM
Cormack et al. (1994). UK	RCT	209 patients aged between 34 and 102 years taking benzodiazepines for at least 6 months (Int 1 *n* = 65, Int 2 *n* = 75, Con *n* = 69)	Benzodiazepine consumption	BZD	Intervention 1: Letter from GP asking patients to try reducing or stopping medication. Intervention 2: Letter from GP asking patients to try reducing or stopping medication and four information sheets giving advice about reducing medication, sent at monthly intervals.	No intervention
Cossette et al. (2019), Canada	Implementation pilot study	65 patients aged 65+ years taking PIM	No. of patients with a change in at least 1 medication, no. of changed medications per patient	Various	Computer alerts for selected PIMs in patients' medical records. Pharmacist reviewed alerts and developed and provided patients physician with a treatment plan.	N/A
Etherton-Beer et al. (2019), Australia	Protocol registration for a RCT	Target of 750 patients aged 18 years and older with dementia	Emergency presentation and/ or unplanned admission to hospital	Polypharmacy (5+ medications)	Web-based application which can be used as a tool for collaborative medication review between GP, pharmacist and patient.	Waitlist control
Fernandez-Liz et al. (2018). Spain	Controlled before and after trial	1932 patients aged 18 years and older with a mirabegron prescription for overactive bladder	Medication discontinuation (percentage of change from baseline to 12 month follow-up)	Mirabegron	Information and training for healthcare professionals, distributed to all GPs. A structured strategy for medication management (medication review and prioritising). Monthly intervention monitoring (feedback to all GPs).	No intervention
Fournier et al. (2020). France	Protocol registration for a Cluster RCT	Target of 34000 patients taking PPIs and their GPs	Proportion of patients achieving 50% decrease in PPI medication	PIM	GP and patient receive information related to PPI deprescribing. GP receives an algorithm related to PPI deprescribing via letter.	No intervention
Fried et al. (2017). USA	RCT	128 veterans aged 65 years and older with polypharmacy (Int *n* = 64, Con *n* = 64)	Patient assessment of shared decision making and clinician -patient communication	Polypharmacy (7+ medications)	Two web applications which gather medications data and evaluates medication appropriateness. Uses algorithms embedded in the web applications. Generates a report with recommendations regarding medications.	Usual care and usual care plus telephone assessment

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Giblin et al. (1983). UK	Non-randomised intervention	20 elderly patients with sleep issues (Int *n* = 10, Con *n* = 10)	Number of nights tablets taken	BZD and other hypnotics	All patients (including control) told to stop taking medication. 4 sessions with HCP. Relaxation technique taught in first session and practised at subsequent sessions. Written information about sleep issues was discussed in sessions. General advice regarding withdrawal effects and keeping a positive attitude during cessation.	Told to stop taking medication. No other intervention.
Gorgels et al. (2005). Netherlands	Prospective controlled intervention	2425 patients with anxiety and/or insomnia taking long-term BZD (3+ months) (Int n = 1707, Con n = 1821)	No. of prescribed daily dosages (PDD) and the percentage of subjects without prescription (quitters)	BZD	Letter sent to patient from GP, containing advice to gradually discontinue BZD use, followed by a written invitation to arrange an appointment with the GP 3 months later, to evaluate actual BZD use.	Usual care
Heather et al. (2004). UK	RCT	284 patients with long-term (6+ months) BZD use (Int 1 *n* = 98, Int 2 *n* = 93, Con *n* = 93)	Change in BZD intake before and after the intervention (6 months)	BZD	Intervention 1: patients sent a letter inviting them to see their GP for a medication review. Patients given written guidelines which included benefits of reducing medication and a timetable for withdrawal, a self-help booklet (regarding stopping) and a leaflet about sleeping problems. Intervention 2: patients sent a letter asking them to consider cutting down on or stopping medication.	Usual care
Holliday et al. (2017). Australia	Before and after study	58 GP registrars	Reduction of hypothetical opioid prescribing and change in proportion of hypothetical opioid management responses on two clinical vignettes	Opioids	90-minute face-to-face educational session as part of a day-long educational workshop. Attendees given selected papers as prereading as well as post-workshop resources on pain management strategies.	N/A
Jager et al. (2017). Germany	Cluster-RCT	21 GPs (Int *n* = 10, Con *n* = 11) and 273 patients aged 50 years and older with 3 chronic diseases (Int *n* = 143, Con *n* = 130)	Change in the degree to which the 3 recommendations (a) structured medication counselling, (b) the use of medication lists, and (c) structured medication reviews to reduce potentially inappropriate medication) have been implemented into practice	Potentially inappropriate medication (4+ medications)	4-hour workshop for practice teams, GPs and medical assistants. Medical assistants trained to complete brown bag reviews. GPs trained in using online resources and a checklist for medication review. After workshop, GPS organised a team meeting to discuss how to implement the recommendations. Posters encouraging patients to being their medication list with them were placed in clinics. Patients received reminders to being medication to appointments and an information tool was loaded onto a PC tablet.	GPs in control group were informed about general aim of study. GPs were aware of patients in need for intensified care in their practice

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Johnson et al. (2012). Scotland	Cohort study (prospective)	2691 patients aged 18 years and older being prescribed the same antidepressant for ≥2 years	Changes in Defined Daily Doses	Antidepressants (Selective Serotonin Reuptake Inhibitors)	A specifically designed data extraction tool identified patients prescribed an antidepressant. GPs used a standardised review form to conduct a medication review.	N/A
Jungo et al. (2019). Switzerland	Protocol for a Cluster-RCT	Targeted of 320 patients aged 65 years and older with multimorbidity and polypharmacy	Medication appropriateness (under-prescribing, over-prescribing, drug interactions)	Polypharmacy (5+ medications)	Intervention group GPs watch an instruction video and read training material. GPs conduct a systematic medication review (which includes the use of a web-based clinical decision support system (CDSS)). The CDSS uses algorithms to generate recommendations for the GP about patient's medication which is aimed at allowing patients and GPs to engage in a shared-decision making process about the patient's medication intake.	Sham intervention consisting of a medication discussion (in accordance with usual care) between patient and GP
Kendrick et al. (2019). UK	Protocol registration for a RCT	Target of 402 patients aged 18 years and older who are not depressed, anxious or under psychiatric care	Depressive symptoms at 6 month follow-up	Antidepressants	Practitioner intervention consists of online education and information modules with printable resources. Patient intervention consists of online education and information modules. Practices in intervention arm given access to online education and information and an induction to the study either face-to-face or online. Patients will meet with GP or practice nurse on an "as needed" basis. Telephone support will be provided by a psychologist to patients.	Control arm practices will be informed that patients are potentially eligible for antidepressant tapering and their medical records will be flagged. Patients asked to make an appointment as part of usual care to see their GP or practice nurse for a review
Krol et al. (2014). Netherlands	Cluster RCT	20 GPs and 113 of their patients aged 18 years and older prescribed PPIs for gastro-oesophageal reflux disease (Int n = 59, Con n = 50)	No. of patients who had stopped or reduced PPI prescription dose at 12 and 20 weeks after intervention	PPIs	Information leaflet about updated recommendations about the clinical management of dyspepsia and reducing PIM was sent to patients from intervention group GPs. Patients chose whether or not make an appointment with their GP. GPs received brief education on updated guidelines for clinical management of dyspepsia from one of the research team.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Kuyken et al. (2015). UK	RCT	424 patients aged 18 years and older and in full or partial remission from major depressive disorder (Int n = 212, Con n = 212)	Time from randomisation to relapse/recurrence	Antidepressants	Mindfulness-based Cognitive Therapy (MBCT) groups delivered by therapists. Involved 8 x 2.25-hour group sessions over consecutive weeks, with up to four refresher sessions held in the year following the end of the 8 core sessions. Participants encouraged to taper and discontinue antidepressant medication. GPs and participant given guideline information about typical tapering/discontinuation. Approximately halfway through MBCT sessions, GPs received letters from research team and trial GP prompting them to discuss tapering regime. Another letter was sent at the completion of the 8 sessions to ensure a tapering regime was in place. Patients also received letters encouraging them to taper.	Doctors asked to meet with patient regularly to review medication. Patients were encouraged to adhere to medication for the full length of the trial by sending them letters signed by the chief investigator and their GP after each follow-up. Patients told that the trial was seeking to compare staying on ADM for 2 years w, taking part in mindfulness classes and stopping ADM
Linsky et al. (2020). USA	Protocol registration for a RCT	Target of 6800 Veterans taking one of the following target medications: gabapentin, Insulin, Sulfonylurea, PPIs	Deprescribing vs not (non-refill in the 6 months following primary care appointment or reduction in total daily dose)	PIM (specifically: Gabapentin, Insulin, Sulfonylurea, PPIs)	Patients sent a medication brochure designed to educate and activate patients to deprescribe PIM by consulting their healthcare provider.	Not specified
Llor et al. (2017). Spain	Protocol for a RCT	Target of 480 patients aged between 18 to 75 years with uncomplicated acute respiratory tract infections who had taken antibiotics for <3 days (Int n = 240, Con n = 240)	Duration of severe symptoms	Antibiotics	Discontinuation of antibiotic medication.	Continued antibiotic treatment

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Luymes et al. (2018). Netherlands	Cluster RCT	1067 patients aged between 40 years and 70 years without established CVD, using PIM (Intention to treat int *n* = 492, Per-protocol intervention int *n* = 319, Con *n* = 575)	Difference in the increase in predicted (10-year) CVD risk in the per-protocol (PP) population	Antihypertensive and/or lipid-lowering drugs	GPs and practice nurses received a 2-hour workshop on the intervention. Patients attended clinic where the nurse advised them to discuss deprescribing their preventive cardiovascular medication with their GP. GPs followed a predefined deprescribing guideline and were advised to follow the recommendations of the Dutch guideline for cardiovascular risk for (re-)initiation of medication.	Usual care
Magin et al. (2018a). Australia	Protocol registration for an observational cohort and evaluation study	Target of 624 Australian GP registrars in terms 1 and 2 of their vocational training program	Frequency of benzodiazepine prescription	BZD and related drugs	GP registrars receive 1. Pre- and post- workshop educational resources (journal articles) provided by email; 2. 40-minute face-to-face group session with an educational presentation; 3. 1-hour webinar for supervisors; 4. Registrar-supervisor dyad case-based discussions.	Usual educational which will include some education in benzodiazepine use
Magin et al. (2018b). Australia	Protocol registration for an observational cohort and evaluation study	Target of 624 Australian GP registrars in terms 1 and 2 of their vocational training program	Change in the no. of medicines deprescribed per 100 consultations with patients aged 65 years or older and change in no. of medicines from established PIM lists	PIM and polypharmacy (no. of drugs not specified)	GP registrars receive 1. Pre- and post- workshop educational resources (journal articles) provided by email; 2. 40-minute face-to-face group session with an educational presentation; 3. 1-hour webinar for supervisors; 4. Registrar-supervisor dyad case-based discussions.	Usual educational which will include some education in deprescribing medicines in older patients
Mangin et al. (2008). New Zealand	Protocol registration for a RCT	Target of 330 patients aged between 18 to 75 years with depression and taking ADM for at least 12 months	Depression recurrence	Antidepressants	Placebo masked tapered cessation. Medication will be tapered over a month to placebo which will continue for 18 months. Dose of active drug in each capsule will be halved each week for the first four weeks then discontinued.	Continuation of maintenance ADM treatment. Medication will be encapsulated as a powder which look identical to the taper/placebo arm

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
McCarthy et al. (2017). Ireland	Protocol for a cluster RCT	Target of 30 GP practices and 450 patients aged 65 years and older with multimorbidity and polypharmacy	Proportion of patients with any PIM and mean no. of repeat medications	Polypharmacy (15+ repeat medications)	GPs receive: 1. Training videos for performing a medication review, describing the evidence on polypharmacy, common PIM in older people, multimorbidity and treatment burden and guidance on establishing treatment burden and supporting patients to express their priorities; 3. An online medication review template. Medication changes at the discretion of the prescribing GP.	Usual care
Mercier-Guyon et al. (2004). France	RCT	81 patients aged between 25 to 55 years taking BZD for the treatment of an anxiety disorder	Extent of withdrawal symptoms over the treatment period (6 weeks)	BZD	Patients given captodiamine (3 x 50mg tablets per day), a sedative and anxiolytic. In the following 2 weeks, each participant was individually weaned from BZD treatment. Each participant was instructed to reduce BZD consumption to nothing within this time with a proposed regimen of half the dose in the first week, followed by a quarter dose in the second week. Participants could discontinue faster if they wished. Captodiamine was continued in the absence of BZD then all treatment was discontinued at the final study visit.	Placebo
Miller et al. (2019). Canada	Protocol registration for a quasi-experimental, interrupted time series design and evaluation	Target of 80 patients aged 18 years and older with chronic pain and taking opioid medications	Changes in opioid use, pain severity, pain interference and occurrence of adverse events	Opioids	Academic detailing sessions for GPs and nurse practitioners (conducted by a pharmacist) focusing on opioid deprescribing. Pharmacist and healthcare professionals develop a patient-centered opioid taper schedule which includes follow-up at 2 to 4 week intervals. Patients receive a self-management intervention which consists of 2 visits per week over 6 weeks: 1 visit is a 1.5-hour group education session, the 2nd visit is a 30-minute one-on-one session of individually tailored to support implementation of self-management plans and an exercise program.	N/A
Monteiro et al. (2017). Portugal	Protocol registration for a cluster RCT	Target of 280 aged 65 years and older taking PIM (specifically BZD and non-BZD hypnotics)	Change in BZD and non-BZD hypnotic consumption at 3, 6, 12 months	Benzodiazepines and Non-benzodiazepine hypnotics	Intervention group GPs given a guide on deprescribing in the form of an electronic tool, designed to support clinical decisions. Tool includes information on prescribing, deprescribing and an interactive tapering regime.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Murie et al. (2012). UK	Intervention study	166 patients aged 18 years and older with gastro-oesophageal reflux disease and nonulcerative dyspepsia taking PPIs long term (minimum of 2 consecutive months repeat prescription)	No. of patients that successfully reduce or stop taking PPIs	PPIs	Patients attended a 20-minute clinic appointment with a specialised nurse where they received verbal and written educational information about their condition, alternative treatment options, and risk factor management. Patients assisted in formulating specific action plans to reduce and/or stop PPI use. Additional appointments were offered according individual needs. Patients also offered a prescription for alternative medication.	N/A
Muskens et al. (2013). Netherlands	Protocol for a cluster RCT	146 patients with a prescription for antidepressants for at least 9 months	Successful discontinuation of antidepressant use	Antidepressants	GP received a letter stating that the patient does not meet criteria for a depressive or anxiety disorder in past 6 months, as well as an information sheet with current guidelines on antidepressant tapering, a suggested tapering regime and information. Gradual tapering program is based on the dosage and half-life of the individual antidepressant.	Usual care
Oude Voshaar et al. (2003). Netherlands	RCT	180 long-term (use for at least 3 months with a prescribed amount of at least 60 days consumption) (Int 1 n = 73, Int 2 n = 73, Con n = 34)	Proportion of patients who successfully discontinued long-term BZD use	BZD	Intervention 1: Patients not already taking diazepam were transferred to an equivalent dose for 2 weeks and then reduced by 25% each week for 4 weeks (at a weekly visit). Dose could be divided into two steps of 12.5% for 4 days in the last week. GP completed a case record form which monitored progress and any adverse events. Intervention 2: intervention 1 combined with 5 weekly x 2-hour group cognitive behavioural therapy sessions (commenced halfway through tapering period). Sessions were led by a psychologist.	Usual care
Saffar et al. (2018). USA	Protocol registration for a cluster RCT and formative evaluation	Target of 1500 veterans	Proportion of days PPIs are prescribed in the 12 months following the index visit	PPIs	PPI deprescribing program that includes alerts to clinical pharmacy specialist and primary care providers. Alerts inform them of patients who meet criteria for PPI deprescription and who are scheduled for an upcoming appointment.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Sheppard et al. (2018). UK	Protocol for a RCT	Target of 540 patients aged ≥80 years receiving antihypertensive medications with compelling indication for medication continuation	Proportion of participants with clinically acceptable blood pressure levels at 12-week follow-up	Antihypertensives	GPs review antihypertensive medication regimen and decide which medication should be removed (decision informed by existing guidelines and patients comorbidities). Reduction of one medication will be in reverse of an algorithm for older patients. GPs or other healthcare professional will closely monitor participant's response to medication reduction. All participants have at least one routine safety follow-up visit, with additional visits as needed. Participants will also be given the option to self-monitor their blood pressure at home.	Usual care
Sonnichsen et al. (2016). Germany, UK, Austria, Italy	Protocol for a cluster RCT	Target of 325 GPs and 3575 patients aged 75 years with multimorbidity	Composite endpoint of first non-elective hospital admission or death during the observation period	Polypharmacy (8+ medications)	GPs will be given access to an electronic medication review tool called the PRIMA-eDS decision support tool. The tool analyses patient information and produces recommendations for drug discontinuation or modification.	Usual care. GPs asked to record medication and other data for patients at the same time points as the intervention group
Sullivan et al (2020). USA	Nested case-control study	2409 patients aged 18 years and older with long-term opioid use (two consectutive quarters of opioid prescriptions with ≥60 day supply) and a daily dose of≥ 50 mg morphine equivalent (MME)) (Int n = 894, Con n = 3576)	Opioid dose in each calendar quarter was the moving average of the current and immediately preceding quarter's average daily MME	Opioids	Opioid taper plans documented by primary care providers in the electronic health record	Patients without sustained taper (matched controls)

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Towle et al. (2006). UK	Intervention study	369 patients aged 70 years and older with a repeat BZD prescription	No. of pts on a repeat prescription for a benzo between baseline and the end of the study period (3 years)	BZD	A new prescribing policy was agreed upon with GPs and implemented into practice. Included initiation of a voluntary ban on prescribing BZD, maximum 28 day prescribing interval, agreement on a withdrawal protocol, issuing all new diazepam prescriptions in the 2mg formulation. New protocol was promoted via posters displayed in the practice and all staff were educated about systems to minimise inappropriate prescriptions. Patients considered for withdrawal received a letter informing them of the withdrawal policy and encouraged them to make an appointment with their GP. At review, GP conducted a structured interview which included information about the withdrawal policy, general support and non-pharmacological alternatives to coping with stress or insomnia. Patients had their BZD inactivated from repeat prescription. Each BZD was converted to an equivalent diazepam dose and then reduced at a rate considered appropriate. All prescriptions issued on acute prescription. Withdrawal regimens generally kept to a maximum of 8 weeks per prescription. Withdrawal chart and prescription prepared by pharmacist and recorded in patient medical records. Patients received a copy of the withdrawal regimen.	N/A
Vejar et al. (2013). USA	Before and after study (Quality improvement project)	1580 manual chart audits and 903 patient surveys. Patients aged between 51 years to 102 years	Documentation of medication reconciliation, percentage of patients bringing medication to appointment, reduction of potentially dangerous over the counter medications, reduction in the use of the duplicate medications and potential drug–drug interactions was desired	PIM (Diphenhydramine, Tylenol PM, naproxen, ibuprofen, other)	Improving medication reconciliation by: • Reminder to patients to bring medications to clinic visit. • Medication management educational flyers for patients in exam rooms. Education for patients regarding over the counter medications. Patients completed a detailed questionnaire. Medical assistant supported patient education and data collection. • Provider education one-on-ones, email, and at meetings in group settings. • Reminders to provider to document medication reconciliation in each exam room and via medical records. • Training for providers for new medical record system.	N/A

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Vicens et al. (2006). Spain	RCT	139 patients aged between 14 years to 75 years taking a BZD at least 5 times a week for over a year (Int n = 73, Con n = 66)	BZD use at 12 month (success, no use or no more than once every 15 days; reduced, at least a 50% reduction in initial dose; failure, no change or a decrease smaller than 50%)	BZD	A 15-20 minute interview with a standardised message (about BZD use and withdrawal. Patients underwent a stepwise dose reduction with control visits every 15 days. The dose was reduced between 10 and 25% of the initial dose fortnightly. Follow-up appointments lasted 10 minutes. GPs given a 2-hour training workshop regarding the administration of questionnaire, structured interview ang tapering guidelines.	Usual care and informed of the convenience of reducing the use of BZD
Vicens et al. (2016). Spain	Cluster RCT	75 GPs and 532 patients aged between 18 years and 80 years taking BZD daily for at least 6 months (Int 1 n = 191, Int 2 n = 168, Con n = 173)	BZD cessation (defined as no prescription in the last 6m)	BZD	GPs attended a 2-hour workshop on BZD discontinuation. Patients in each group received an initial structured educational interview with individualised stepped dose reduction (either intervention 1 or 2). • Intervention 1: structured intervention with stepped dose reduction and follow-up visits (SIF). Patients scheduled for follow-up appointments with their GPs every 2-3 weeks until end of dose reduction period. • Intervention 2 = structured intervention with written stepped dose reduction (SIW). Patients received written instructions with reinforcing information and tailored gradual dose-reduction until cessation. Gradual taper consisted of 10-25% reduction in the daily dose every 2-3 weeks.	Usual care
Vicens et al. (2019). Spain	Protocol for a Cluster RCT	Target of 638 GPs (319 in each arm)	GPs' DHD defined daily dosage per 1000 inhabitants per day) of BZDs at 12 months after the training workshop.	BZD	Multifactorial intervention consisting of 3 parts: 1. 2-hour educational workshop training for GPs which includes rationale for prescribing BZDs and strategies for deprescribing long-term BZD use. 2. Monthly audit and feedback for participating GPs. 3. GPs will be given general BZD information (rationales for and effective strategies for discontinuation etc) via a training and support web page.	Usual care
Walsh et al. (2010). Ireland	Prospective cohort study (randomised selection of study participants)	50 patients aged 65 years and older receiving repeat prescriptions for 2 or more medications	Total number of medications actually taken, total number of medications appearing on patient computerised record	Polypharmacy (2+ medications)	Patients were contacted by telephone to invite them to attend a review. The 10-minute medication review comprising of updating actual medications being taken by patients, errors in dosage, inappropriate medications being taken, etc. Patients were informed that all over the counter preparations could interact with prescribed medication. Patients attended a follow-up appointment with their GP following any change to medication. Four weeks following review, telephone contact was made with patients.	Not specified

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Walsh et al (2016). Canada	Quality improvement project	46 patients aged 18 years and older taking PPOs for 8 weeks	PPI reassessment at 10 weeks after visit (determined by patient chart review) and primary care provider perceptions of tool and processes	PPIs	An electronic medical record alert advised primary care provider of an upcoming appointment with an eligible patient. Appointments were usual periodic health examinations. A PPI deprescribing tool document containing guidelines and information regarding PPIs was uploaded into the patient's medical record as a second reminder and to assist with reassessment and deprescribing process. Patients received a handout to help them understand the harms associated with long-term PPIs use and provided guidance on the tapering process, which was also uploaded into their medical record.	N/A
Wentink et al. (2019). Netherlands	Protocol for a cluster RCT	Target of 138 patients 18 years and older	Full discontinuation of antidepressant medication (= 0 mg) within 6 months after starting the intervention	Antidepressants	SPD + MBCT: • Supported protocolised discontinuation (SPD) intervention = Patients will make a personal tapering schedule with their GP. Also offered supportive meetings with a mental health assistant. Patients advised to discontinue medication within 6 months. • Mindfulness based cognitive therapy (MBCT) intervention = sessions 1-4 take place on a weekly basis, and session 5-8 on a fortnightly basis. Each session lasts for 2.5 hours with a 6-hour silent day between session 6 and 7. Participants also instructed to practice mindfulness for approximately 30 minutes a day. Participants receive a link to download guided meditations and yoga exercises for home practice and psycho-education about depression and the pros and cons of stopping antidepressants. The mental health assistant will receive basic information about discontinuation guidance.	SPD only
Zitman et al. (2001). Netherlandsd	Placebo controlled study	230 patients aged 18 years and older with major depressive disorder and chronic BZD use (daily for use for at least 3 months)	Long-term effect of the discontinuation program	BZD	3 Phase discontinuation: 1. change to equivalent dose of diazepam; 2. subsequent randomisation to either 20mg of paroxetine or placebo (patients with a low depression score went onto phase 3); 3. gradual reduction of diazepam. Daily dose was reduced by 25% in week 1 and 2, the remaining 50% was tapered off in 4 steps of 12.5% in weeks 3 and 4. Patients continued treatment with study medication for 2 weeks, followed by 3 weeks of no psychotropic medication.	Transfer to diazepam, then placebo

BZD = Benzodiazepine.
ED = Emergency Department.
GHQ = General Health Questionnaire. Measure of current mental health. Goldberg.
RCT = Randomised Controlled Trial.
MCI = Mild Cognitive Impairment.
PIM = Potentially Inappropriate Medication.
rPATDcog = Patients' Attitudes Towards Deprescribing for cognitive impairment.
PPMD = Prescribers' Perceptions of Medication Discontinuation.
PPI = Proton Pump Inhibitors
CVD = cardiovascular disease

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	2-3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4-5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Appendix A
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	N/A
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A – included as a limitation on page 17
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7-8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Appendix B and 8-15
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8-15
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-15
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	16
Limitations	20	Discuss the limitations of the scoping review process.	17
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	18
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	19

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

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Deprescribing intervention activities mapped to guiding principles for use in general practice: a scoping review.

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Deprescribing intervention activities mapped to guiding principles for use in general practice: a scoping review.

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Abstract

Objective: To identify and characterise activities for deprescribing used in general practice and map the identified activities to pioneering principles of deprescribing.

Setting: Primary Care.

Data sources: Medline, EMBASE (Ovid), CINAHL, Australian New Zealand Clinical Trials Registry (ANZCTR), Clinicaltrials.gov, ISRCTN registry, OpenGrey, Annals of Family Medicine, BMC Family Practice, Family Practice and Journal of General Practice (BJGP) from inception to the end of June 2021.

Study selection: Included studies were original research (RCT, quasi-experimental, cohort study, qualitative and case studies), protocol papers and protocol registrations.

Data extraction: Screening and data extraction was completed by one reviewer; 10% of the studies were independently reviewed by a second reviewer. Coding of full-text articles in NVivo was conducted and mapped to five deprescribing principles.

Results: Fifty studies were included. The most frequently used activities were: identification of appropriate patients for deprescribing (76%), patient education (50%), GP education (48%), and development and use of a tapering schedule (38%). Six activities did not align with the five deprescribing principles. As such, two principles(engage practice staff in education and appropriate identification of patients and provide feedback to staff about deprescribing occurrences within the practice) were added.

Conclusion: Activities and guiding principles for deprescribing should be paired together to provide an accessible and comprehensive guide to deprescribing by GPs. The addition of two principles suggests that practice staff and practice management teams may play an instrumental role in sustaining deprescribing processes within clinical practice. Future research is required to determine the most of effective activities to use within each principle and by whom.
Keywords: deprescribing, primary care, general practice

Strengths and limitations of this study

- First study to investigate deprescribing activities in general practice.
- First study to map deprescribing activities to guiding principles.
- This study utilised a robust, up-to-date and comprehensive search strategy.
- Critical appraisal of studies was not conducted.
- Effectiveness and outcomes of the identified activities were not examined.

Introduction

The World Health Organisation (WHO) estimates that half of all medicines prescribed worldwide are done so inappropriately[1]. "Inappropriate medication use (IMU)" can occur when medications are prescribed and taken despite there being no clinical benefit or the risk of taking a medication outweighs the benefit[2]. IMU is often linked with polypharmacy where patients with multiple health issues are prescribed multiple medications placing them at increased risk of adverse reactions and interactions[3]. It is estimated that 20%-30% of the general population experience harmful events due to IMU and polypharmacy resulting in hospitalisation and increased risk of mortality[4,5].Deprescribing ("*the planned and supervised process of dose reduction or stopping unnecessary or potentially harmful medication*"[6]) is a recommended

component of best practice prescribing which can address the issues of IMU and polypharmacy. Both, prescribing and deprescribing require skillful and careful clinical judgement to balance the risks and benefits of medicines, minimising potential harms and improving patient health outcomes[7]. General practitioners (GPs) prescribe the majority of medications[8] and are well placed to conduct the majority of deprescribing. However, deprescribing is not routinely occurring in clinical practice[7,9].

Evidence suggests that patients are willing to cease unnecessary medications but require empowerment and engagement from their GP to do so, and are likely to leave it to their GP to initiate the deprescribing conversation[10]. However, research has identified a number of barriers to this occurring, including appointment time constraints, lack of good quality guidelines[9], clinical inertia[11] and not knowing when to deprescribe[12]. When asked about what would assist with their deprescribing role GPs express a desire to have support and work in collaboration with other healthcare professionals[9], have ready access to non-pharmacological options and resources, and decision making systems and tools[13] to enable them to regularly and confidently conduct deprescribing.

Activities to support GPs to deprescribe have been investigated, though only one systematic review has focused on deprescribing by GPs in primary care. This review by Dills et al.[14] found three effective activities for successful deprescribing: 1. pharmacist-physician collaboration for conducting medication reviews; 2. giving clinicians intensive education about deprescribing, and; 3. providing individual patients with information about chronic disease management and IMU (for example, pharmacological and lifestyle advice and alternative options for treatment[14]. Most of the included studies were set in long-term care, assisted living and outpatients, which are commonly considered to fall outside the definition of primary care. Further, only six of the fifty-eight studies were conducted in general practice. Though GPs do practice in these settings, the effectiveness of the identified activities may not be generalisable to GPs practicing specifically within the general practice setting.

Isenor et al.[15] recently explored deprescribing activities in primary care, which included pharmacy, general practice, and allied health. Results of this scoping review revealed that

checklists, algorithms, leaflets, patient finder tools, goal setting tools and prompts or cues in the form of reports, letters, posters or electronic medical record alerts were most frequently used to support deprescribing. These activities were often used in conjunction, to form interventions to change GP and patient behaviour. This suggests that deprescribing interventions are multifaceted and employ a variety of techniques to encourage deprescribing at the patient, clinician and systems levels[13]. Results showed that GPs were the most targeted healthcare professional for intervention, with pharmacists most commonly conducting the deprescribing process. Though pharmacists may play an important role in deprescribing, what activities GPs are using in practice remains unclear.

It is also important to consider how deprescribing activities are being used in practice as this process is essential for successful deprescribing[16]. Research indicates that how deprescribing activities are delivered has previously been underreported in deprescribing trials, making it challenging to apply deprescribing evidence into clinical practice[17]. In the absence of a gold standard deprescribing process, Woodward's 5 principles of deprescribing offers a strong framework and are core to the deprescribing process[18]. The 5 principles of deprescribing consists of: 1. review all current medications; 2. identify medications to be targeted for cessation; 3. plan a deprescribing regimen; 4. plan in partnership with patient and carers, and; 5. frequent review and support (see figure 1)[6]. Woodward's principles were the first deprescribing guiding principles described in the literature and state that deprescribing should be a collaboration between the prescriber and patient, with subsequent adaptations placing an even greater emphasis on the importance of patient-centered care[18,19]. The principles were developed with corresponding deprescribing activities, however whether deprescribing interventions are following these recommendations is not known.

Figure 1. Woodward's 5 principles for deprescribing[6].

To date, research has focused on deprescribing activities or adapting deprescribing principles, independently, rather than consolidating the two for use in practice. Further, to our knowledge, no reviews have looked specifically at deprescribing activities and principles in general practice. Examining activities and principles together may help to identify areas of the deprescribing

process that require attention and provide a comprehensive and accessible knowledge base for GPs, to support and inform their decision making around deprescribing. As scoping reviews have become a popular, rigorous and transparent method for providing in-depth and comprehensive coverage of the literature[18] we conducted a scoping review to provide an up-to-date and inclusive look at deprescribing activities in general practice and map them to a well-known set of deprescribing principles. Specifically, we aimed to: 1. provide a summary of the deprescribing literature across all medical conditions presenting to general practice; 2. map the activities to Woodward's 5 principles of deprescribing, and; 3. identify any key deprescribing activities being tested in general practice interventions.

Method

Search strategy

Methodology was decided upon in April 2020 via discussion between authors. A research librarian at the University of Melbourne was consulted to develop search terms and methods. Studies were identified by searching electronic databases Medline, EMBASE (Ovid), CINAHL, Australian New Zealand Clinical Trials Registry (ANZCTR), Clinicaltrials.gov, ISRCTN registry and OpenGrey from inception to the end of June 2021. Handsearches of four primary care journals (Annals of Family Medicine, BMC Family Practice, Family Practice and Journal of General Practice (BJGP) were conducted using the search function provided by the journal websites. See table 1 for key concepts for searching and ,appendix A for full search activity).

Table 1. Key concepts for searching.

Concept	Keywords
Primary care	general practice or primary health care or general practice or general practitioner or primary care professional
Deprescribing	discontinu* or reduc* or terminat* or taper or cease or cessation or stop taking or stop using or deprescrib* or deprescrip*
Medication	medic* or drug* or pill* or tablet* or treatment*

Participants

Studies that focused on adults attending general practice and/or health care professionals in general practice were included, regardless of the primary diagnosis, type of healthcare professional delivering care, country in which study took place or year published. Studies were excluded if they were not conducted with human participants. Studies focusing on participants younger than 18 years of age were also excluded due to the unique nature of deprescribing medications in pediatric populations (for example see Begum & Tomlin[20]).

Setting

Studies were eligible for inclusion if they were set in general practice (i.e. participants were recruited from, or deprescribing was conducted in, a general practice clinic), and if the medication being deprescribed was one that was taken orally. Studies where patients were recruited from general practice but the majority of the deprescribing process was conducted in the patients' home or other setting was excluded. Studies that did not describe the activities of the deprescribing intervention and if they focused on prescribing/deprescribing prevalence or adherence/non-adherence were excluded.

Types of studies

Studies were included if they were original research (RCT, quasi-experimental, cohort study, qualitative and case studies). Systematic reviews and meta-analyses were included for handsearching purposes. Protocol papers and protocol registrations were included as they describe interventions that are being prepared for trial. Where the full protocol paper was available, this took precedence over the protocol registration record. Articles were excluded if they were non-empirical research (editorials, guidelines/guideline development, commentaries, opinions, letters, factsheets, clinical education activities). Conference abstracts were also excluded as they often lack in-depth intervention descriptions. Studies were excluded if a deprescribing intervention was not the focus. Study quality was not formally assessed and was not an inclusion criteria as this is not a requirement of scoping reviews[21].

Study selection

One reviewer (AC) reviewed all titles and abstracts for eligibility and 10% of titles and abstracts were separately reviewed by a second reviewer (CKH) for agreement. The eligible full-text of articles were downloaded into the COVIDENCE web-based screening and data extraction tool[20]. Two reviewers (AC and CKH) independently evaluated 10% of the full-text articles to decide if

they meet the inclusion/exclusion criteria. Five articles required discussion between the two reviewers to resolve disagreement about inclusion. Consultation with a third reviewer was not needed as agreement between the reviewing authors was reached. AC then reviewed all remaining full-text articles for inclusion. A data extraction form was developed to gather the following information for all included studies: author(s), country and year of publication, study type, population, setting, methodology, primary medical condition, medication to be deprescribed, comparator information and study results. To extract information about the deprescribing activities used in the interventions, full-text articles were uploaded into NVivo[22] and coded by AC.

Categorisation of the results

Initial reason for medication prescription targeted for deprescribing was categorised by the International Classification of Diseases 11th Revision (ICD-11)[23] where possible. To create order for the complex material found in the included studies, intervention activities were categorised into "who", "what", "how" and "where". Specifically, "what" activities were mapped to the 5 principles as these are the activities that most pertain to the deprescribing process. For patients, GPs, allied health and eTools that were categorized under "who", were further classified as "lead" or "support. A lead role was assigned if they initiated and oversaw the deprescribing process. A support role indicated they were not the initiator or overseer, but were involved in the deprescribing process. eTools were categorised under "who" as they were used in place of a person to conduct deprescribing activities. Any activities not mapped to the 5 principles were grouped together to determine if they contained common traits to form additional principles. Additional principles were named for when the mapped activities took place within the original 5 principles.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Ethics approval

Not applicable.

Results

The search yielded a total of 5107 articles, 3785 after duplicates were removed. Review of titles and abstracts led to the retrieval of 84 full-text articles for assessment. Of these, 50 empirical research studies were included (see appendix B for individual study characteristics). Figure 2 shows the flow of articles through the search and eligibility screening process.

Figure 2. PRISMA flow diagram showing results of search and process of selecting articles for deprescribing scoping review.

Included articles were published between 1983 and 2021, with an increase in publication rates in the last 5 years (Table 2). Research was primarily conducted in the United Kingdom (*n* = 9 [18%]), The Netherlands (*n* = 7 [14%]), and the United States of America (*n* = 7 [14%]). 20 studies specifically targeted older patients (aged 60 years and older)[24–43].

Most studies were randomised controlled trials (RCTs) (*n* = 31 [62%]) and aimed to reduce polypharmacy (*n* = 16 [32%]) and benzodiazepine use (*n* = 14 [28%]). Definitions of polypharmacy varied between studies, ranging from ≥2 medications[24] to ≥15 medications[25]. Two studies did not specify what the target medication was initially prescribed for – one focused on falls prevention, the other long-term use[26,44]. In a third of the studies, the target medication was initially prescribed for the treatment of mental illness. The most common reason for deprescribing was medications deemed as IMU (*n* = 26 [52%]. Some studies specifically targeted a subset of IMU (for example, long-term use) which is presented as an individual reason for deprescribing.

Table 2. Characteristics of publications on deprescribing activities.

Characteristic	*n* = 50	% of 50
Type of article		
Randomised Controlled Trial*	31	62%
Quasi-experimental design	11	22%
Cohort studies	4	8%
Feasibility studies	3	6%
Case-controlled studies	1	2%

Country of origin		
United Kingdom	9	18%
Netherlands	7	14%
United States	7	14%
Spain	6	12%
Australia	4	8%
Canada	4	8%
Ireland	4	8%
New Zealand	2	4%
France	2	4%
Portugal	1	2%
Switzerland	1	2%
Germany	1	2%
Scotland	1	2%
Multiple locations	1	2%
Year of publication		
<1999	4	8%
2000-2005	5	10%
2006-2010	4	8%
2011-2015	7	14%
2016-2021	31	60%
ICD 11 Category		
Mental illnesses	17	33%
Digestive illnesses	5	10%
Multimorbidity	4	8%
Nervous system	2	4%
General symptoms	3	6%
Circulatory	2	4%
Sleep wake disorders	2	4%
Infectious	1	2%

Other	4	8%
Initial reason for prescription not given**	10	20%
Specific medication targeted for deprescription		
Polypharmacy	16	32%
Benzodiazepines	14	28%
Antidepressants	6	12%
Proton Pump Inhibitors	5	10%
Opioids	3	6%
Antihypertensives	2	4%
Psychotropics	1	2%
Antibiotics	1	2%
Anticholinergics	1	2%
Mirabegon (Urinary incontinence)	1	2%
Reason for deprescription		
Inappropriate medication use	27	53%
Long-term use	19	37%
Adverse side effects	4	8%
Exploration of alternative treatment	1	2%

NB. *Of the included RCTs, 10 were protocol papers and 11 were protocol registrations. **These studies targeted polypharmacy, therefore initial reason for the prescription of multiple medications was not specified.

Activities and principles of deprescribing

Deprescribing activities and principles were applied across populations, diagnoses and medication types. Overall, 17 activities were identified and were mapped to seven principles. Six activities did not fit within the original 5 principles, therefore two additional principles were created: principle 0: engage practice staff in education and appropriate identification of patients and principle 6: provide feedback to staff about deprescribing occurrences within the practice. Principle 0 included five activities which occurred prior to activities mapped to Woodward's 5 principles. Principle 6 included one activity which occurred after the 5 principles.

Unsurprisingly, GPs and patients were heavily involved in the deprescribing process. Activities of deprescribing were administered in several different ways including medical records and documents. Deprescribing activities were mainly carried out in the general practice clinic. Figure 3 shows the deprescribing activities mapped to the corresponding principle including who is involved in the deprescribing process, how activities and principles might be administered and where they take place. Figure 4 presents Woodward's 5 principles with the addition of principle 0 and principle 6.

Figure 3. Deprescribing activities mapped to corresponding principles.

Principle 1: Review of all current medications

A review of all medications was conducted in eleven studies[24,25,27,30,33,36,40,41,43,45,46] and was the only activity mapped to Principle 1. GPs most commonly lead this activity[24,25,27,36,40,41,43,45,46], with pharmacists[30], and eTools[33] also given a lead role.

Principle 2: Identify medications to be targeted for cessation

Identification of medications for cessation was conducted in 15 studies[24,25,30–33,36,40–43,46–49]. This was led mostly by GPs (n = 13)[25,31,32,36,38,40–42,46–50] with a pharmacist[30] and an eTool[33] leading two further studies. In one study leadership of identifying medications was shared by a GP, practice nurse or pharmacist[47]. Identifying the medications for cessation was were often supported by algorithms (n = 9) that used information from the review of medications in Principle 1 and made recommendations for which medications to target for deprescribing[30–32,36,38,41,43,49,50]. Four studies incorporated the algorithm in an eTool[32,36,38,41].

Principle 3: Plan a deprescribing regimen

Documented plans for deprescribing were made in five studies[25,29,32,51,52]. A variety of healthcare professionals were involved in this process including pharmacist leads[29,32], an eTool[25], a nurse[52] and a GP[51]. Tapering schedules were widely used (n = 19)[26,28,29,38,40,42,47,51,53–63] and were delivered by GPs[28,38,40,47,51,55,62] and pharmacists[29]. A pharmacist, GP and nurse were responsible for tapering schedules in one study[63]. eTools were utilised in two studies[54,60]. In 10 studies researchers developed and disseminated the tapering schedule to participants[26,42,50,53,56–59,61,64].

Referrals to other healthcare professionals[27,42], non-pharmacological options[31,34,42,51,53,59,63,65] and alternative pharmacological options[29,31,52,57,59,64] were also mapped under Principle 3. These activities were used to support patients to deprescribe after receiving a tapering or deprescribing plan. Non-pharmacological options included guided mindfulness based cognitive therapy[51], and exercise programs[63].

Principle 4: Plan in partnership with patient and carers

Patients were included in the deprescribing discussions in eight studies[25,29,33,36,38,41,61,62]. A deprescribing decision aid was used as a tool in one study to facilitate the deprescribing discussion[51]. Carers were included in one study, though they were not involved in the deprescribing discussion. GPs conducted discussions with patients in six studies[25,30,31,38,61,62], and were aided by an eTool in three studies[33,36,41] and a pharmacist in one study[29].

Patient education was also a commonly occurring strategy (n = 25)[28,31,33,34,37,39,42,44–47,49,50,52–54,59,61–63,66–69]. Education consisted of advice and information about when and how to reduce medications delivered in a variety of ways including receiving a letter in the mail[29], advice from their GP[28]. One study used internet modules[54] to extend this information by providing material on dealing with withdrawal symptoms and relapse, overcoming fear of stopping and staying well.

Principle 5: Frequent review and support

Six studies reported five different approaches to monitoring patients after the deprescribing process was intiated[24,55,59,61,63,69]. Monitoring involved follow-up telephone appointments[24,69]; follow up in person appointments which focused on the provision of positive reinforcement[61], tracking of physiological responses to deprescribing (for example, blood pressure and cholesterol checks)[55,63] and completion of case reports[59]. Follow-up timeframes ranged from 2 days[69] to 6 months[55] following enrolment in the study. Patients attended up to four[59,61] follow-up visits over the course of the intervention. Three studies did not specify when follow-up visits occurred and four did not specify the number of follow-visits included in the intervention.

Principle 0: Engage practice staff in education and appropriate identification of patients and Principle 6: Provide feedback to staff about deprescribing occurrences within the practice

Five activities were mapped to "Principle 0: Engage practice staff in education and appropriate identification of patients", including the most frequently occurring activities found across all of the studies: identifying patients and GP education. Awareness raising of deprescribing amongst healthcare professionals and reminders and alerts for clinicians were also mapped to this principle. Each of these activities appear to be tasks that GPs, other healthcare professionals and general practice clinics should complete before patient appointments and medication management occurs. Identification of appropriate patients who were eligible for deprescribing occurred in most studies (n = 38)[24–28,30,32–37,39,40,42–45,47,48,50–62,64,66,67,69,70]. Though this may have occurred as study participant selection, it was included as an activity of deprescribing as GPs need to know which patients to initiate the deprescribing discussions with. GP education occurred in almost half of the studies (n = 24)[25,27,31,35,36,39,41–43,46,53–55,58,61–63,66–68,70–73], and was conducted prior to any patient contact and therefore before deprescribing commenced. GP education was delivered in a variety of ways including workshops[27], training videos[25,43] and as part of GP medical training[65,72]. Practice staff education occurred less frequently[35,42,43,46,51,55,63] and typically involved staff being invited to attend the education provided to GPs, rather than delivery of separate or tailored training. Awareness raising was achieved in general practices through practice recruitment and training in study protocols, practice sign-up and participant recruitment (n = 9)[27,36,41,43,46,47,51,64,67]. Eight studies[27,32,39,43,50,53,66,68] used reminders or alerts mostly via patient medical records to notify GPs that a patient with an upcoming appointment required a medication review.

The only activity mapped to Principle 6 was the auditing of deprescribing occurrences in practice researchers in three studies[35,70,74]. One study provided practices with comparisons of quality of care against agreed-upon standards of practice in the form of a report at unspecified intervals[35]. Two studies utilised monthly reports given to GPs with one including intervention monitoring information[70] and the other providing information regarding GP benzodiazepine prescriptions[74].

Figure 4. Adapted deprescribing principles based on Woodward's 5 principles of deprescribing.

Key deprescribing activities

Four deprescribing activities were the most commonly used in the 50 reviewed studies: 1. 76% of studies used identification of appropriate patients; 50% used patient education; 48% used GP education, and; 4. 38% used a tapering schedule. Identification of these key activities may guide the development of future deprescribing interventions in general practice as well as provide a quick reference for GPs of deprescribing activities in clinical practice.

Discussion

Deprescribing is critical to addressing the well recognised problem of IMU, but is currently underperformed in general practice. In looking to assist GPs to engage in deprescribing this, scoping review amalgamated deprescribing activities being used in general practice with pioneering principles of deprescribing. This may provide GPs with a comprehensive and accessible knowledge base for when to use deprescribing activities principles in clinical practice.

Two principles were added to Woodward's original 5 principles of deprescribing[4] addressing an area of concern in the literature regarding the lack of GP initiated deprescribing. Principle 0 encompassed activities aimed at helping GPs to initiate the deprescribing conversation. Auditing activities mapped to Principle 6 may also complement Principle 0 as auditing information allows staff to improve professional practice[75]. Providing GPs with information about their own deprescribing practices may improve initiation of the deprescribing process.

The most frequently occurring activities were identifying appropriate patients for deprescribing, patient and GP education and utilising tapering schedules. Identifying which patients require deprescribing was classified as a deprescribing activity in the current study. Though this activity was used as part of study eligibility, this may be important for the initiation of the deprescribing process for GPs and warrants further testing.

Our findings are consistent with previous literature that has found heterogeneity in the deprescribing process. In particular, the current review adds support for GP and patient education

being critical components of the deprescribing process as suggested by Dills et al[14]. However, identifying appropriate patients for deprescribing has not previously been specified as deprescribing activity to be used in practice and highlights a current gap in the literature.

Focusing on deprescribing conducted solely in general practice yielded different findings to previous literature. We found that 32% of included studies focused on polypharmacy compared other reviews that included a wide array of primary care settings (for example, 65% of studies in the scoping review by Isenor et al.[15]). Traditionally, polypharmacy is an issue for patients aged 65 year and older. As general practice is most commonly attended by adults aged 20 to 64[75] this age difference may be reflected in the current results. Such differences in population and medication suggest that deprescribing activities may also be different within the general practice setting. Previous research has also suggested pharmacists as leaders of the deprescribing process, however when focusing on general practice, GPs were overwhelming responsible with other healthcare professionals in supporting roles. GPs may be logical leaders for deprescribing, though they may require support from others.

Strengths and limitations

Both a limitation and strength, this review included protocol papers and protocol registrations. As deprescribing is only emerging in the literature, we thought it important to see what activities are currently being used or will be used in general practice. Protocol papers and registrations are required to describe the intended intervention rather than the actual tested intervention therefore some activities may have been missed.

An assessment of bias was not conducted on the included studies. The most common study designs included in this review was RCTs which suggests that bias may be limited, however, most (n = 21) of the RCTs were described in protocol registrations or protocol papers only. As scoping reviews allow for the inclusion of a wider range of literature the inclusion of protocols minimalised the risk of missing relevant interventions. Further, a rigorous search was conducted, allowing for a diverse set of literature to be identified in a robust and reproducible manner. Finally, previous literature has focused on studies conducted from 2002 to 2020, possibly due to "deprescribing" only having been coined as a term in 2003. As medication discontinuation is not

a recent concept, the current review may have captured some previously missed deprescribing activities.

Implications for research and practice

The addition of Principle 0 and Principle 6 suggests that the deprescribing process can be implemented and conducted in clinical practice cyclically, potentially creating a self-sustaining process. To preserve this "deprescribing loop", a whole of practice approach may be needed. Certainly, the activities mapped to the additional principles indicate that commencement of deprescribing is in the hands of not only the GP, but also the wider practice staff who may play an essential role in supporting the GP and patient to initiate deprescribing. In particular practice staff will most likely be required to take on the role of identifying appropriate patients for deprescribing. Currently, research teams are heavily involved in conducting this activity however, outside of the research setting and in clinical practice this task will need to be assigned to nominated practice staff for this important step to be carried out.

This scoping review has provided an overview of what activities are being used in deprescribing and operationalised them into a framework principles of deprescribing, however guidance is still needed for how GPs might select activities for different patients and medication type. This may also assist in identifying roles for practice staff and management.

Finally, as evidence based deprescribing principles are still lacking, the adapted principles presented in the current study should be tested and evaluated in practice. In particular, the cyclical nature of the described deprescribing process should be tested for feasibility.

Conclusion

Evidenced based deprescribing activities and principles to guide deprescribing have yet to be combined to develop a comprehensive but easy to use guide to support GPs to deprescribe. This scoping review was the first to amalgamate deprescribing activities and pioneering deprescribing principles resulting in two additional principles. The guiding principles helped to capture the variety of deprescribing activities that currently exist in the literature and has highlighted which areas of the deprescribing process require further attention. Further, the activities included within

each principle can provide guidance for GPs, practice staff and practice management teams on how they can contribute to the deprescribing process. The current findings may provide a starting point by offering a selection of deprescribing options to use in practice.

Footnotes

Author Contributions: All authors (AC, CKH, SF, EM, JG) contributed to the conceptualisation and design of the study. AC and CKH performed screening. AC performed data extraction and synthesis which was reviewed by JG and CKH. AC drafted the manuscript. JG and CKH revised early drafts and all authors revised later drafts.

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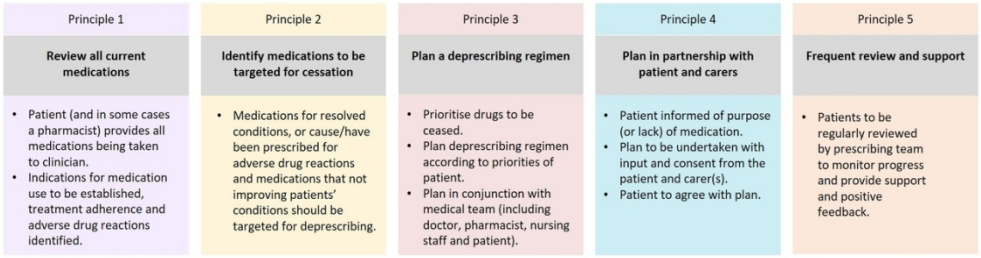
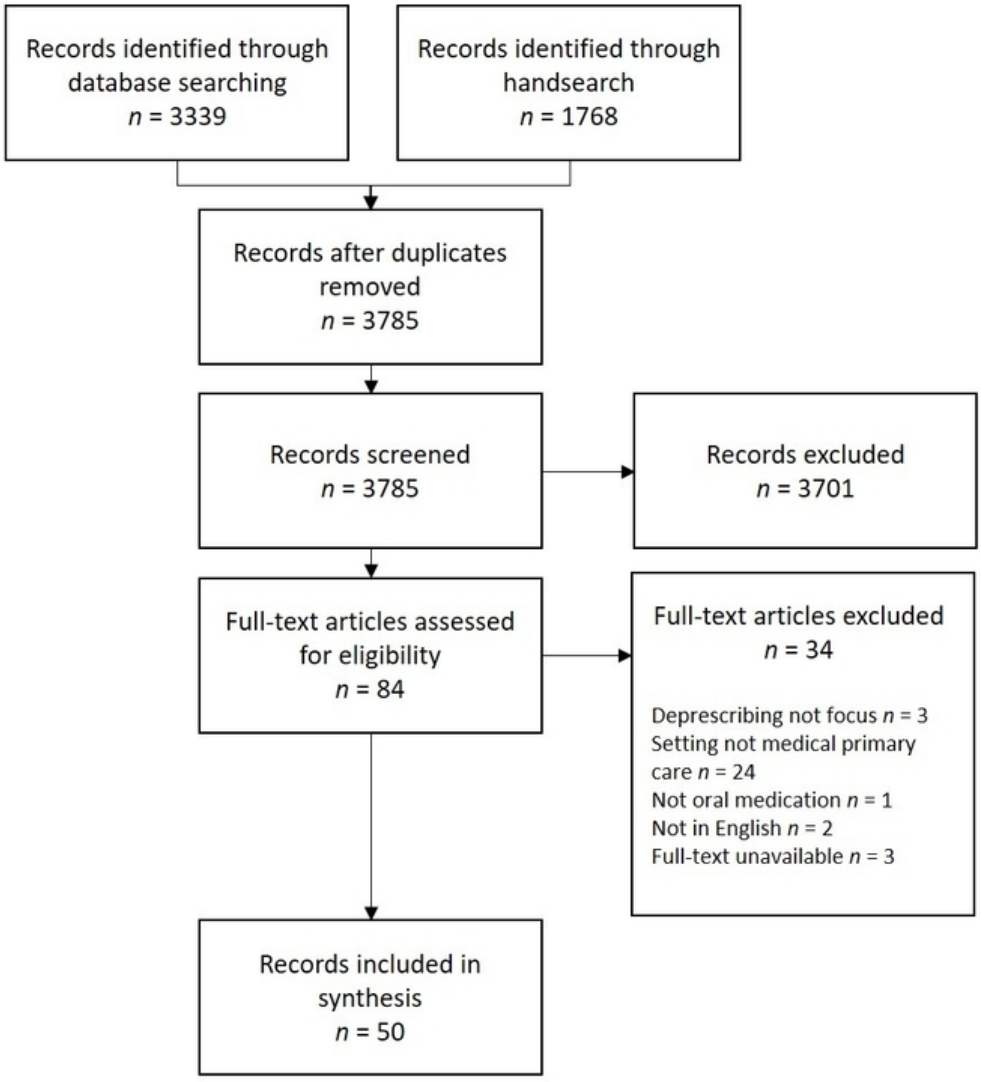


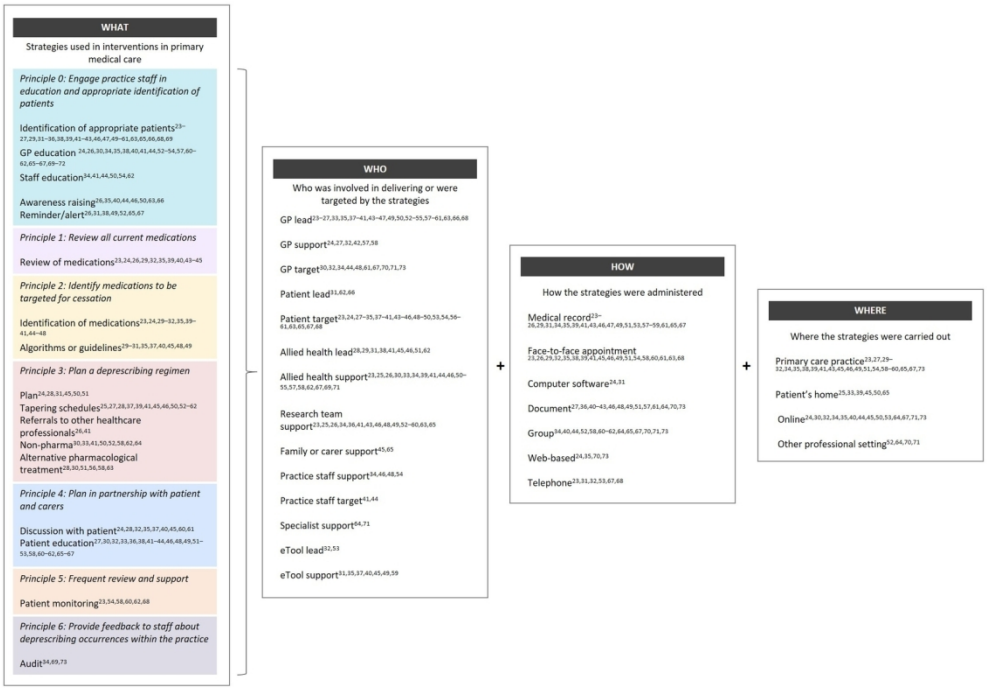
Woodward's 5 principles for deprescribing

110x30mm (300 x 300 DPI)



PRISMA flow diagram showing results of search and process of selecting articles for deprescribing scoping review

56x61mm (300 x 300 DPI)



Deprescribing activities mapped to corresponding principles

140x98mm (300 x 300 DPI)

Adapted deprescribing principles based on Woodward's 5 principles of deprescribing

83x81mm (300 x 300 DPI)

Appendix A: Search strategy and hits

Database search

Steps	Search terms – Embase	Hits
1	Primary medical care/	103586
2	General practice/	84531
3	Primary health care/	65513
4	General practitioner/	102079
5	Primary care professional.ti,ab,kw.	64
6	1 or 2 or 3 or 4 or 5	313405
7	Controlled clinical trial/ or randomized controlled trial/ or clinical trial/ or controlled trial/	7962376
8	Pragmatic trial/	721
9	(Quasi adj experimental).mp.	17466
10	Cohort studies/	438040
11	(Observational adj (study or studies)).mp.	245170
12	Longitudinal study/	139512
13	Cross-sectional study/	345327
14	Retrospective study/	911739
15	Prospective study/	598500
16	(Epidemiolog* adj (study or studies)).mp.	118700
17	Case control studies/	116468
18	Case adj2 study or case report/	2908439
19	qualitative analysis/ or qualitative research/	131936
20	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19	12064177
21	((medic* or drug* or pill* or tablet* or treatment*) adj3 (Discontinu* or reduc* or terminat* or taper*)).mp.	294378
22	((medic* or drug* or pill* or tablet* or treatment*) adj3 (cease or cessation*)).mp.	16411
23	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj taking)).mp.	851

24	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj using)).mp.	243
25	((medic* or drug* or pill* or tablet* or treatment*) adj3 (deprescrip* or de-prescrip* or deprescrib* or de-prescrib*)).mp.	448
26	23 or 24 or 25	1535
27	Remove duplicates from 26	1515
28	21 or 22	309129
29	27 or 28	310335
30	6 and 20 and 29	2250
31	limit 30 to (human and english language and (adult <18 to 64 years> or aged <65+ years>))	1550
32	(hospital or outpatient or ambulatory or (residential adj care) or (aged adj care) or pharmacy or emergency).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	2953816
33	(smoking or tobacco or nicotine or (smoking adj1 cessation)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	587497
34	(book or conference or letter or opinion or comment* or editorial or factsheet*).pt.	6300831
35	32 or 33 or 34	8739730
36	31 not 35	637

Steps	Search terms – Medline	Hits
1	Primary health care/ or family practice/ or general practice/	136245
2	General practitioner.mp.	19309
3	Primary care professional.ti,ab,kw.	51
4	1 or 2 or 3	149115
5	543390	543390
6	Clinical Trials as Topic/ or Randomized Controlled Trials as Topic/	319688
7	Pragmatic Clinical Trials as Topic/mt [Methods]	82
8	(Quasi adj experimental).mp.	13017
9	(cohort adj (study or studies)).mp.	389354
10	(Observational adj (study or studies)).mp.	159188
11	Longitudinal Studies/mt [Methods]	176
12	Cross-Sectional Studies/mt [Methods]	215
13	Retrospective Studies/mt [Methods]	11
14	Prospective Studies/mt [Methods]	11
15	Epidemiologic Studies/	8295
16	Case-control studies/	282232
17	case report/	2094945
18	(Case adj2 study).mp.	177140
19	qualitative research/	53822
20	5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19	3832590
21	((medic* or drug* or pill* or tablet* or treatment*) adj3 (Discontinu* or reduc* or terminat* or taper*)).mp.	144504
22	((medic* or drug* or pill* or tablet* or treatment*) adj3 (cease or cessation*)).mp.	10858
23	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj taking)).mp.	471
24	((medic* or drug* or pill* or tablet* or treatment*) adj3 (stop* adj using)).mp.	145
25	((medic* or drug* or pill* or tablet* or treatment*) adj3 (deprescrip* or de-prescrip* or deprescrib* or de-prescrib*)).mp.	285

26	23 or 24 or 25	896
27	Remove duplicates from 26	892
28	21 or 22	154520
29	27 or 28	155239
30	6 and 20 and 29	516
31	limit 30 to (english language and humans and ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)"))	367
32	(hospital or outpatient or ambulatory or (residential adj care) or (aged adj care) or pharmacy or emergency).mp.	1640940
33	(smoking or tobacco or nicotine or (smoking adj1 cessation)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	363328
34	(book or conference or letter or opinion or comment* or editorial or factsheet*).pt.	1837575
35	32 or 33 or 34	3746464
36	31 not 35	228

Steps	Search terms – CINAHL	
S1	Deprescribe or deprescribing or ‘reducing medicines’ or deprescription	728
S2	discontinuation OR discontinue OR discontinued	22,817
S3	(MH "Reducing Agents") OR reduction of OR reducing OR reduce OR reduced OR reduction	601,471
S4	(MH "Treatment Termination") OR (terminate or termination)	16,321
S5	tapering OR taper	2,369
S6	cessation OR cease	37,820
S7	stop* n1 us* OR stop* n1 tak*	1,924
S8	medication* OR medicine* OR drug* OR pill* OR tablet* OR treatment*	1,957,097
S9	(MH "Primary Health Care") or (MH "Physicians, Family") or (MH "Family Practice")	101,934
S10	(MH "Randomized Controlled Trials") OR (MH "Crossover Design") OR (MH "Empirical Research") OR (MH "Experimental Studies") OR (MH "Community Trials") OR (MH "Controlled Before-After Studies") OR (MH "Double-Blind Studies") OR (MH "Factorial Design") OR (MH "Historically Controlled Study") OR (MH "Nonrandomized Trials") OR (MH "One-Shot Case Study") OR (MH "Pretest-Posttest Design") OR (MH "Pretest-Posttest Control Group Design") OR (MH "Single-Blind Studies") OR (MH "Case Control Studies") OR (MH "Population-Based Case Control") OR (MH "Matched Case Control") OR (MH "Correlational Studies") OR (MH "Cross Sectional Studies") OR (MH "Triple-Blind Studies") OR (MH "Qualitative Studies") OR (MH "Quantitative Studies") OR (MH "Quasi-Experimental Studies") OR (MH "Retrospective Design") OR (MH "Repeated Measures")	964,575
S11	(MH "Survey Research") OR (MH "Physiological Studies") OR (MH "Pilot Studies") OR (MH "Exploratory Research") OR (MH "Formative Evaluation Research") OR (MH "Summative Evaluation Research") OR (MH "Descriptive Research") OR (MH "Case Studies") OR (MH "Behavioral Research")	254,970
S12	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	665,101
S13	S10 OR S11	1,106,257
S14	S8 N3 S12	313,689
S15	(S8 n3 S12) AND (S9 AND S13 AND S14) Limiters - English Language; Human; Age Groups: Adult: 19-44 years, Middle Aged: 45-64 years, Aged: 65+ years, Aged, 80 and over, All Adult	1,027
S16	(MH "Hospitals") OR (MH "Hospital Units") OR (MH "Poison Control Centers") OR (MH "Laboratories") OR (MH "Tissue Banks") OR (MH "Intensive Care Units") OR (MH "Delivery Rooms") OR (MH "Intensive Care Units, Pediatric") OR (MH "Nurseries, Hospital") OR (MH "Operating Rooms") OR (MH "Libraries,	149,781

	Hospital") OR (MH "Food Service Department") OR (MH "Engineering and Maintenance Department") OR (MH "GI Laboratories") OR (MH "Health Information Management Service") OR (MH "Housekeeping Department") OR (MH "Information Systems Department") OR (MH "Intravenous Therapy Department") OR (MH "Laundry Department") OR (MH "Clinical Laboratories") OR (MH "Ambulatory Care Facilities")	
S17	(MH "Smoking Cessation") OR (MH "Smoking") OR (MH "Smoking Cessation Assistance (Iowa NIC)") OR (MH "Smoking Cessation Programs")	77,210
S18	editorial OR book OR conference OR letter OR opinion OR comment* OR factsheet*	465,382
S19	S16 OR S17 OR S18	682,220
S20	S15 not s19	872
S21	Source types = academic journals (853), dissertations (4)	857

Steps	Search terms – ANZCTR	
1	Deprescribe general practice (basic search)	5
2	deprescribe primary care (basic search)	5
3	Deprescription general practice (basic search)	0
4	Deprescription primary care (basic search)	0
5	Taper general practice (basic search)	7
6	Taper primary care (basic search)	6
7	Cease general practice (basic search)	7
8	Cease primary care (basic search)	18
9	Cessation general practice (basic search)	26
10	Cessation primary care (basic search)	42
11	Withdrawal general practice (basic search)	10
12	Withdrawal primary care (basic search)	36
13	Termination general practice (basic search)	1
14	Termination primary care (basic search)	4
15	Reduce general practice (basic search)	165
16	Reduce primary care (basic search)	473
17	Discontinue general practice (basic search)	6
18	Discontinue primary care (basic search)	11
	Total	822

Steps	Search terms – Clinicaltrials.gov	
1	Intervention: Deprescribe, Location terms: general practice,	3
2	Deprescribe, deprescribing (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	14
3	Deprescription general practice, family practice, family medicine, general medicine, medicine general	0
4	Deprescription (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	0
5	Taper, tapering, general practice (basic search)	0
6	Taper, tapering (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	14
7	Cease, stops, quit, general practice (basic search)	13
8	Cease, stops, quit (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	20
9	Cessation general practice (basic search)	63
10	Cessation (Condition or disease) primary care, physician, primary health care (auto synonyms search) (other terms)	45
11	Withdrawal, retired, withdraw, withdrawn general practice (basic search)	14
12	Withdrawal (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	52
13	Termination general practice (basic search)	2
14	Termination (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	9
15	Reduce general practice (basic search)	95
16	Reduce (Condition or disease) primary care, physician, primary health care (auto synonyms search) (other terms)	102
17	Discontinue general practice (basic search)	9
18	Discontinue, discontinuations, discontinued, discontinuous (Condition or disease) primary care, primary health care (auto synonyms search) (other terms)	7
	Total	462

Steps	Search terms – OpenGrey	
1	(reduce OR reduction OR terminat* OR deprescri* OR withdraw* OR discontinu* OR ceas* OR cessation OR stop*) AND ("general practice" OR "primary care") lang:"en"	61

Handsearch of journals

Steps	Search terms – ISRCTN registry	
1	Deprescribe (interventions) “general practice” (text)	0
2	deprescribe “primary care”	0
3	Deprescription “general practice”	0
4	Deprescription “primary care”	0
5	Taper “general practice”	2
6	Taper “primary care”	5
7	Cease “general practice”	1
8	Cease “primary care”	6
9	Cessation “general practice”	15
10	Cessation “primary care”	38
11	Withdrawal “general practice”	3
12	Withdrawal “primary care”	23
13	Termination “general practice”	2
14	Termination “primary care”	3
15	Reduce “general practice”	41
16	Reduce “primary care”	115
17	Discontinue “general practice”	5
18	Discontinue “primary care”	13
	Total	272

Steps	Search terms – Annals of family medicine 25.5.20	
1	Deprescribing, deprescribed, deprescribe, deprescription. ti,ab	11
2	Medication or medicine or withdraw or withdrawal. ti,ab	19
3	Medication withdrawn. ti,ab	4
4	Drug withdraw or withdrawal. ti,ab	21
5	Medication or medicine and taper. ti,ab	2
6	Drug taper. ti,ab	2
7	Medication and discontinuation or discontinue or discontinuing. ti,ab	11
8	Medication discontinue. ti,ab	6
9	Medication cessation. ti,ab	33
10	Medication or medicine and termination or terminate. ti,ab	8
11	Medication reduction. Ti,ab	151
	Total	268

Steps	Search terms – BMC Family Practice 25.5.20	
1	Deprescribing, deprescribe, deprescription. kw	12
2	Medication withdraw*. kw	150
3	Drug withdraw*. kw	113
4	Medication taper*.kw	18
5	Drug taper. kw	16
6	Medication discontinu*. kw	126
7	Medication cessation. kw	123
8	Medication terminat*. kw	33
9	Medication reduction. kw	363
	Total	962

Steps	Search terms – Family Practice	
1	Deprescribing, deprescribe, deprescription.	9
2	Withdrawal. ti	5
3	Medication taper	17
4	Medication discontinuation	184
5	Medication cessation. ti	0
6	Termination. ti	0
7	Reduction. ti	10
	Total	225

Steps	Search terms – British Journal of General Practice	
1	Deprescribing, deprescribed, deprescribe, deprescription. ti,ab	16
2	Medication withdrawal. ti	55
3	Medication taper. ti	52
4	Medication discontinuation. ti	55
5	Medication cessation. ti	75
6	Medication termination. ti	60
	Total	313

Appendix B: Table of study characteristics

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Anderson et al. (2019), Australia	Controlled pre-post	20 GPs and 145 patients aged 65+ years with polypharmacy (Int *n* = 78, Con *n* = 67)	No. of agreed regular medications deprescribed	Polypharmacy (5+regularly prescribed medications)	Training workshop for GPs. Deprescribing consultation between GP and patient for medication review. Additional support for medication review by pharmacist at GPs discretion.	Usual care
Bashir et al. (1994), UK	Controlled evaluation	109 adult patients who were chronic BZD users (Int *n* = 51, Con *n* = 58)	Psychiatric disorder (GHQ-12), BZD withdrawal symptoms (benzodiazepine withdrawal questionnaire)	BZD	GP advises patient about risks of BZD, reducing and stopping BZD and provides self-help booklet (contains advice on stopping).	No intervention
Bayliss et al. (2020), USA	Protocol for a cluster RCT	Target of 4800 patients aged 65+ years with polypharmacy and Alzheimer's, MCI or dementia	No. of chronic medications, no. of PIMs.	Polypharmacy (5+ chronic medications)	Patients: Informational brochure (about discontinuing PIMs, benefits of taking fewer medicines and the rPATDcog) mailed to patients. Encouraged to visit GP to discuss discontinuation. Clinicians: educational presentation about deprescribing, complete PPMD assessment, 12 tip sheets with suggested language and approaches for discontinuation, notification in electronic appointment schedule that patient has been sent brochure.	Usual care (waitlist control)
Campbell et al. (1999), New Zealand	RCT	93 patients aged 65+ years taking psychotropics (Int 1 *n* = 24, Int 2 *n* = 24, Int 3 *n* = 21, Con *n* = 24)	No. of falls	BZD, hypnotics, antidepressants or tranquiliser medication	Intervention 1: gradual withdrawal plus a home-based exercise program. Intervention 2: gradual withdrawal only. Intervention 3: home-based exercise program only.	Usual care
Campbell. (2020), USA	Protocol registration for Cluster RCT	Target of 344 older adult patients with cognitive decline	Change in Cognitive Composite Score	Anticholinergics	Pharmacist based intervention which involves shared decision making between pharmacist, physician and patient to personalise deprescribing (tapering and/or alternative treatment).	Usual care + information re: risks of polypharmacy sent via post
Campins et al. (2016), Spain	RCT	503 patients aged 70+ years with polypharmacy (Int *n* = 252, Con *n* = 246)	No. of recommendations and changes implemented, prescribed drugs, restarted drugs, primary care and ED hospitalisations and death	Polypharmacy (8+ medications)	Medication review by clinical pharmacist using an algorithm. Discussion between pharmacist and physician about recommendation from the review to create final set of recommendations. Recommendations then discussed with patient with final agreement for changes made between patient and physician.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Clyne et al. (2015), Ireland	Cluster RCT	196 patients aged 70 years being prescribed a PIM (Int *n* = 99, Con *n* = 97)	Proportion of patients with PIM drugs, mean number of PIM drugs per group	Various (prescribed 1+ potentially inappropriate drugs on a repeat)	GPs: academic detailing session with a pharmacist. Patients: medication review with web-based algorithms for identification and treatment options.	Usual care with simple list summarising PIM
Cormack et al. (1994). UK	RCT	209 patients aged between 34 and 102 years taking benzodiazepines for at least 6 months (Int 1 *n* = 65, Int 2 *n* = 75, Con *n* = 69)	Benzodiazepine consumption	BZD	Intervention 1: Letter from GP asking patients to try reducing or stopping medication. Intervention 2: Letter from GP asking patients to try reducing or stopping medication and four information sheets giving advice about reducing medication, sent at monthly intervals.	No intervention
Cossette et al. (2019), Canada	Implementation pilot study	65 patients aged 65+ years taking PIM	No. of patients with a change in at least 1 medication, no. of changed medications per patient	Various	Computer alerts for selected PIMs in patients' medical records. Pharmacist reviewed alerts and developed and provided patients physician with a treatment plan.	N/A
Fernandez-Liz et al. (2018). Spain	Controlled before and after trial	1932 patients aged 18 years and older with a mirabegron prescription for overactive bladder	Medication discontinuation (percentage of change from baseline to 12 month follow-up)	Mirabegron	Information and training for healthcare professionals, distributed to all GPs. A structured strategy for medication management (medication review and prioritising). Monthly intervention monitoring (feedback to all GPs).	No intervention
Fournier et al. (2020). France	Protocol registration for a Cluster RCT	Target of 34000 patients taking PPIs and their GPs	Proportion of patients achieving 50% decrease in PPI medication	PIM	GP and patient receive information related to PPI deprescribing. GP receives an algorithm related to PPI deprescribing via letter.	No intervention
Fried et al. (2017). USA	RCT	128 veterans aged 65 years and older with polypharmacy (Int *n* = 64, Con *n* = 64)	Patient assessment of shared decision making and clinician -patient communication	Polypharmacy (7+ medications)	Two web applications which gather medications data and evaluates medication appropriateness. Uses algorithms embedded in the web applications. Generates a report with recommendations regarding medications.	Usual care and usual care plus telephone assessment
Giblin et al. (1983). UK	Non-randomised intervention	20 elderly patients with sleep issues (Int *n* = 10, Con *n* = 10)	Number of nights tablets taken	BZD and other hypnotics	All patients (including control) told to stop taking medication. 4 sessions with HCP. Relaxation technique taught in first session and practised at subsequent sessions. Written information about sleep issues was discussed in sessions. General advice regarding withdrawal effects and keeping a positive attitude during cessation.	Told to stop taking medication. No other intervention.

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Gorgels et al. (2005). Netherlands	Prospective controlled intervention	2425 patients with anxiety and/or insomnia taking long-term BZD (3+ months) (Int n = 1707, Con n = 1821)	No. of prescribed daily dosages (PDD) and the percentage of subjects without prescription (quitters)	BZD	Letter sent to patient from GP, containing advice to gradually discontinue BZD use, followed by a written invitation to arrange an appointment with the GP 3 months later, to evaluate actual BZD use.	Usual care
Griever et al.	Protocol for a pragmatic cluster-RCT	Target of 32 practices	Change in PIM prevalence	Potentially inappropriate medication (10+ medications)	Implementation strategies to optimise practice management of patients with complex care needs. Involves primary care practice teams, policy-makers and patient partners forming a collaborative group who will participate in learning sessions. GPs and staff will be provided with audit and feedback information on their patients. Practices form a collaborative where GPs receive education via workshops.	Usual care
Heather et al. (2004). UK	RCT	284 patients with long-term (6+ months) BZD use (Int 1 *n* = 98, Int 2 *n* = 93, Con *n* = 93)	Change in BZD intake before and after the intervention (6 months)	BZD	Intervention 1: patients sent a letter inviting them to see their GP for a medication review. Patients given written guidelines which included benefits of reducing medication and a timetable for withdrawal, a self-help booklet (regarding stopping) and a leaflet about sleeping problems. Intervention 2: patients sent a letter asking them to consider cutting down on or stopping medication.	Usual care
Holliday et al. (2017). Australia	Before and after study	58 GP registrars	Reduction of opioid prescribing and change in proportion of hypothetical opioid management responses on two clinical vignettes	Opioids	90-minute face-to-face educational session as part of a day-long educational workshop. Attendees given selected papers as prereading as well as post-workshop resources on pain management strategies.	N/A
Jager et al. (2017). Germany	Cluster-RCT	21 GPs (Int *n* = 10, Con *n* = 11) and 273 patients aged 50 years and older with 3 chronic diseases (Int *n* = 143, Con *n* = 130)	Change in the degree to which the 3 recommendations (a) structured medication counselling, (b) the use of medication lists, and (c) structured medication reviews to reduce potentially inappropriate medication) have been implemented into practice	Potentially inappropriate medication (4+ medications)	4-hour workshop for practice teams, GPs and medical assistants. Medical assistants trained to complete brown bag reviews. GPs trained in using online resources and a checklist for medication review. After workshop, GPS organised a team meeting to discuss how to implement the recommendations. Posters encouraging patients to being their medication list with them were placed in clinics. Patients received reminders to bring medication to appointments and an information tool was loaded onto a PC tablet.	GPs in control group were informed about general aim of study. GPs were aware of patients in need for intensified care in their practice

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Johnson et al. (2012). Scotland	Cohort study (prospective)	2691 patients aged 18 years and older being prescribed the same antidepressant for ≥2 years	Changes in Defined Daily Doses	Antidepressants (Selective Serotonin Reuptake Inhibitors)	A specifically designed data extraction tool identified patients prescribed an antidepressant. GPs used a standardised review form to conduct a medication review.	N/A
Jungo et al. (2019). Switzerland	Protocol for a Cluster-RCT	Targeted of 320 patients aged 65 years and older with multimorbidity and polypharmacy	Medication appropriateness (under-prescribing, over-prescribing, drug interactions)	Polypharmacy (5+ medications)	Intervention group GPs watch an instruction video and read training material. GPs conduct a systematic medication review (which includes the use of a web-based clinical decision support system (CDSS)). The CDSS uses algorithms to generate recommendations for the GP about patient's medication which is aimed at allowing patients and GPs to engage in a shared-decision making process about the patient's medication intake.	Sham intervention consisting of a medication discussion (in accordance with usual care) between patient and GP
Kendrick et al. (2019). UK	Protocol registration for a RCT	Target of 402 patients aged 18 years and older who are not depressed, anxious or under psychiatric care	Depressive symptoms at 6 month follow-up	Antidepressants	Practitioner intervention consists of online education and information modules with printable resources. Patient intervention consists of online education and information modules. Modules include tapering regimens and information on reducing medications, dealing with relapse and withdrawal symptoms, keeping well, overcoming fear of stopping, and values and goal setting. Practices in intervention arm given access to online education and information and an induction to the study either face-to-face or online. Patients will meet with GP or practice nurse on an "as needed" basis. Telephone support will be provided by a psychologist to patients.	Control arm practices will be informed that patients are potentially eligible for antidepressant tapering and their medical records will be flagged. Patients asked to make an appointment as part of usual care to see their GP or practice nurse for a review
Krol et al. (2014). Netherlands	Cluster RCT	20 GPs and 113 of their patients aged 18 years and older prescribed PPIs for gastro-oesophageal reflux disease (Int n = 59, Con n = 50)	No. of patients who had stopped or reduced PPI prescription dose at 12 and 20 weeks after intervention	PPIs	Information leaflet about updated recommendations about the clinical management of dyspepsia and reducing PIM was sent to patients from intervention group GPs. Patients chose whether or not make an appointment with their GP. GPs received brief education on updated guidelines for clinical management of dyspepsia from one of the research team.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Kuyken et al. (2015). UK	RCT	424 patients aged 18 years and older and in full or partial remission from major depressive disorder (Int n = 212, Con n = 212)	Time from randomisation to relapse/recurrence	Antidepressants	Mindfulness-based Cognitive Therapy (MBCT) groups delivered by therapists. Involved 8 x 2.25-hour group sessions over consecutive weeks, with up to four refresher sessions held in the year following the end of the 8 core sessions. Participants encouraged to taper and discontinue antidepressant medication. GPs and participant given guideline information about typical tapering/discontinuation. Approximately halfway through MBCT sessions, GPs received letters from research team and trial GP prompting them to discuss tapering regime. Another letter was sent at the completion of the 8 sessions to ensure a tapering regime was in place. Patients also received letters encouraging them to taper.	Doctors asked to meet with patient regularly to review medication. Patients were encouraged to adhere to medication for the full length of the trial by sending them letters signed by the chief investigator and their GP after each follow-up. Patients told that the trial was seeking to compare staying on ADM for 2 years w, taking part in mindfulness classes and stopping ADM
Linsky et al. (2020). USA	Protocol registration for a RCT	Target of 6800 Veterans taking one of the following target medications: gabapentin, Insulin, Sulfonylurea, PPIs	Deprescribing vs not (non-refill in the 6 months following primary care appointment or reduction in total daily dose)	PIM (specifically: Gabapentin, Insulin, Sulfonylurea, PPIs)	Patients sent a medication brochure designed to educate and activate patients to deprescribe PIM by consulting their healthcare provider.	Not specified
Llor et al. (2017). Spain	Protocol for a RCT	Target of 480 patients aged between 18 to 75 years with uncomplicated acute respiratory tract infections who had taken antibiotics for <3 days (Int n = 240, Con n = 240)	Duration of severe symptoms	Antibiotics	Discontinuation of antibiotic medication. Patients in the intervention arm were informed of the treatment arm that they had been randomised to and were informed as to what actions to take if symptoms worsened or there was no improvement. Patients were scheduled to attend a baseline visit and subsequent visits at day 2-3, day 14-28 and day 90 for monitoring.	Continued antibiotic treatment

36/bmjopen-2021-052571 on 15 September 2022. Downloaded from

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Luymes et al. (2018). Netherlands	Cluster RCT	1067 patients aged between 40 years and 70 years without established CVD, using PIM (Intention to treat int *n* = 492, Per-protocol intervention int *n* = 319, Con *n* = 575)	Difference in the increase in predicted (10-year) CVD risk in the per-protocol (PP) population	Antihypertensive and/or lipid-lowering drugs	GPs and practice nurses received a 2-hour workshop on the intervention. Patients attended clinic where the nurse advised them to discuss deprescribing their preventive cardiovascular medication with their GP. GPs followed a predefined deprescribing guideline and were advised to follow the recommendations of the Dutch guideline for cardiovascular risk for (re-)initiation of medication.	Usual care
Magin et al. (2018a). Australia	Protocol registration for an observational cohort and evaluation study	Target of 624 Australian GP registrars in terms 1 and 2 of their vocational training program	Frequency of benzodiazepine prescription	BZD and related drugs	GP registrars receive 1. Pre- and post- workshop educational resources (journal articles) provided by email; 2. 40-minute face-to-face group session with an educational presentation; 3. 1-hour webinar for supervisors; 4. Registrar-supervisor dyad case-based discussions.	Usual educational which will include some education in benzodiazepine use
Magin et al. (2018b). Australia	Protocol registration for an observational cohort and evaluation study	Target of 624 Australian GP registrars in terms 1 and 2 of their vocational training program	Change in the no. of medicines deprescribed per 100 consultations with patients aged 65 years or older and change in no. of medicines from established PIM lists	PIM and polypharmacy (no. of drugs not specified)	GP registrars receive 1. Pre- and post- workshop educational resources (journal articles) provided by email; 2. 40-minute face-to-face group session with an educational presentation; 3. 1-hour webinar for supervisors; 4. Registrar-supervisor dyad case-based discussions.	Usual educational which will include some education in deprescribing medicines in older patients
Mangin et al. (2008). New Zealand	Protocol registration for a RCT	Target of 330 patients aged between 18 to 75 years with depression and taking ADM for at least 12 months	Depression recurrence	Antidepressants	Placebo masked tapered cessation. Medication will be tapered over a month to placebo which will continue for 18 months. Dose of active drug in each capsule will be halved each week for the first four weeks then discontinued.	Continuation of maintenance ADM treatment. Medication will be encapsulated as a powder which look identical to the taper/placebo arm

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
McCarthy et al. (2017). Ireland	Protocol for a cluster RCT	Target of 30 GP practices and 450 patients aged 65 years and older with multimorbidity and polypharmacy	Proportion of patients with any PIM and mean no. of repeat medications	Polypharmacy (15+ repeat medications)	GPs receive: 1. Training videos for performing a medication review, describing the evidence on polypharmacy, common PIM in older people, multimorbidity and treatment burden and guidance on establishing treatment burden and supporting patients to express their priorities; 3. An online medication review template. Medication changes at the discretion of the prescribing GP.	Usual care
Mercier-Guyon et al. (2004). France	RCT	81 patients aged between 25 to 55 years taking BZD for the treatment of an anxiety disorder	Extent of withdrawal symptoms over the treatment period (6 weeks)	BZD	Patients given captodiamine (3 x 50mg tablets per day), a sedative and anxiolytic. In the following 2 weeks, each participant was individually weaned from BZD treatment. Each participant was instructed to reduce BZD consumption to nothing within this time with a proposed regimen of half the dose in the first week, followed by a quarter dose in the second week. Participants could discontinue faster if they wished. Captodiamine was continued in the absence of BZD then all treatment was discontinued at the final study visit.	Placebo
Miller et al. (2019). Canada	Protocol registration for a quasi-experimental, interrupted time series design and evaluation	Target of 80 patients aged 18 years and older with chronic pain and taking opioid medications	Changes in opioid use, pain severity, pain interference and occurrence of adverse events	Opioids	Academic detailing sessions for GPs and nurse practitioners (conducted by a pharmacist) focusing on opioid deprescribing. Pharmacist and healthcare professionals develop a patient-centred opioid taper schedule which includes follow-up at 2 to 4 week intervals. Patients receive a self-management intervention which consists of 2 visits per week over 6 weeks: 1 visit is a 1.5-hour group education session, the 2nd visit is a 30-minute one-on-one session of individually tailored to support implementation of self-management plans and an exercise program.	N/A
Monteiro et al. (2017). Portugal	Protocol registration for a cluster RCT	Target of 280 aged 65 years and older taking PIM (specifically BZD and non-BZD hypnotics)	Change in BZD and non-BZD hypnotic consumption at 3, 6, 12 months	Benzodiazepines and Non-benzodiazepine hypnotics	Intervention group GPs given a guide on deprescribing in the form of an electronic tool, designed to support clinical decisions. Tool includes information on prescribing, deprescribing and an interactive tapering regime.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Murie et al. (2012). UK	Intervention study	166 patients aged 18 years and older with gastro-oesophageal reflux disease and nonulcerative dyspepsia taking PPIs long term (minimum of 2 consecutive months repeat prescription)	No. of patients that successfully reduce or stop taking PPIs	PPIs	Patients attended a 20-minute clinic appointment with a specialised nurse where they receive verbal and written educational information about their condition, alternative treatment options and risk factor management. Patients assisted in formulating specific action plans to reduce and/or stop PPI use. Additional appointments were offered according individual needs. Patients also offered a prescription for alternative medication.	N/A
Muskens et al. (2013). Netherlands	Protocol for a cluster RCT	146 patients with a prescription for antidepressants for at least 9 months	Successful discontinuation of antidepressant use	Antidepressants	GP received a letter stating that the patient does not meet criteria for a depressive or anxiety disorder in past 6 months, as well as an information sheet with current guidelines on antidepressant tapering, a suggested tapering regime and information. Gradual tapering program is based on the dosage and half-life of the individual antidepressant.	Usual care
Oude Voshaar et al. (2003). Netherlands	RCT	180 long-term (use for at least 3 months with a prescribed amount of at least 60 days consumption) (Int 1 n = 73, Int 2 n = 73, Con n = 34)	Proportion of patients who successfully discontinued long-term BZD use	BZD	Intervention 1: Patients not already taking diazepam were transferred to an equivalent dose for 2 weeks and then reduced by 25% each week for 4 weeks (at a weekly visit). Dose could be divided into two steps of 12.5% for 4 days in the last week. GP completed a case record form which monitored progress and any adverse events. Intervention 2: intervention 1 combined with 5 weekly x 2-hour group cognitive behavioural therapy sessions (commenced halfway through tapering period). Sessions were led by a psychologist.	Usual care
Rankin et al. (2021). Ireland	Protocol for a pilot study	Target of 12 general practices. No. of GPs not specified. 120 patients (10 patients per site).	Unspecified variables relating to the feasibility of the study and medication appropriateness	Polypharmacy (4+ medications)	Online video for GPs demonstrating how GPs can improve polypharmacy during appointments with patients. Video contains information to enable appropriate polypharmacy rather than introducing new behaviours. GPs also receive prompts from reception staff as a reminder to conduct medication review. GPs to discuss medication review schedule at practice meetings with staff. Practice staff receive information sheet outlining involvement in the pilot. Patients are invited to medication review at two timepoints: initial review and then again in 6m time.	Usual care

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Saffar et al. (2018). USA	Protocol registration for a cluster RCT and formative evaluation	Target of 1500 veterans	Proportion of days PPIs are prescribed in the 12 months following the index visit	PPIs	PPI deprescribing program that includes alerts to clinical pharmacy specialist and primary care providers. Alerts inform them of patients who meet criteria for PPI deprescription and who are scheduled for an upcoming appointment.	Usual care
Sheppard et al. (2018). UK	Protocol for a RCT	Target of 540 patients aged ≥80 years receiving antihypertensive medications with compelling indication for medication continuation	Proportion of participants with clinically acceptable blood pressure levels at 12-week follow-up	Antihypertensives	GPs review antihypertensive medication regimen and decide which medication should be removed (decision informed by existing guidelines and patients comorbidities). Reduction of one medication will be in reverse of an algorithm for older patients. GPs or other healthcare professional will closely monitor participant's response to medication reduction. All participants have at least one routine safety follow-up visit, with additional visits as needed. Participants will also be given the option to self-monitor their blood pressure at home.	Usual care
Sonnichsen et al. (2016). Germany, UK, Austria, Italy	Protocol for a cluster RCT	Target of 325 GPs and 3575 patients aged 75 years with multimorbidity	Composite endpoint of first non-elective hospital admission or death during the observation period	Polypharmacy (8+ medications)	GPs will be given access to an electronic medication review tool called the PRIMA-eDS decision support tool. The tool analyses patient information and produces recommendations for drug discontinuation or modification.	Usual care. GPs asked to record medication and other data for patients
Sullivan et al (2020). USA	Nested case-control study	2409 patients aged 18 years and older with long-term opioid use (two consectutive quarters of opioid prescriptions with ≥60 day supply) and a daily dose of≥ 50 mg morphine equivalent (MME)) (Int n = 894, Con n = 3576)	Opioid dose in each calendar quarter was the moving average of the current and immediately preceding quarter's average daily MME	Opioids	Opioid taper plans documented by primary care providers in the electronic health record	Patients without sustained taper (matched controls)

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Towle et al. (2006). UK	Intervention study	369 patients aged 70 years and older with a repeat BZD prescription	No. of pts on a repeat prescription for a benzo between baseline and the end of the study period (3 years)	BZD	A new prescribing policy was agreed upon with GPs and implemented into practice. Included initiation of a voluntary ban on prescribing BZD, maximum 28 day prescribing interval, agreement on a withdrawal protocol, issuing all new diazepam prescriptions in the 2mg formulation. New protocol was promoted via posters displayed in the practice and all staff were educated about systems to minimise inappropriate prescriptions. Patients considered for withdrawal received a letter informing them of the withdrawal policy and encouraged them to make an appointment with their GP. At review, GP conducted a structured interview which included information about the withdrawal policy, general support and non-pharmacological alternatives to coping with stress or insomnia. Patients had their BZD inactivated from repeat prescription. Each BZD was converted to an equivalent diazepam dose and the reduced at a rate considered appropriate. All prescriptions issued on acute prescription. Withdrawal regimens generally kept to a maximum of 8 weeks per prescription. Withdrawal chart and prescription prepared by pharmacist and recorded in patient medical records. Patients received a copy of the withdrawal regimen.	N/A
Vejar et al. (2013). USA	Before and after study (Quality improvement project)	1580 manual chart audits and 903 patient surveys. Patients aged between 51 years to 102 years	Documentation of medication reconciliation, percentage of patients bringing medication to appointment, reduction of potentially dangerous over the counter medications, reduction in the use of the duplicate medications and potential drug–drug interactions was desired	PIM (Diphenhydramine, Tylenol PM, naproxen, ibuprofen, other)	Improving medication reconciliation by: • Reminder to patients to bring medications to clinic visit. • Medication management educational flyers for patients in exam rooms. Education for patients regarding over the counter medications. Patients completed a detailed questionnaire. Medical assistant supported patient education and data collection. • Provider education one-on-ones, email and at meetings in group settings. • Reminders to provider to document medication reconciliation in each exam room and via medical records. • Training for providers for new medical record system.	N/A

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Vicens et al. (2006). Spain	RCT	139 patients aged between 14 years to 75 years taking a BZD at least 5 times a week for over a year (Int n = 73, Con n = 66)	BZD use at 12 month (success, no use or no more than once every 15 days; reduced, at least a 50% reduction in initial dose; failure, no change or a decrease smaller than 50%)	BZD	A 15-20 minute interview with a standardised message (about BZD use and withdrawal). Patients underwent a stepwise dose reduction with control visits every 15 days. Dose reduced b/n 10% and 25% of the initial dose fortnightly. Follow-up appointments lasted 10 minutes. GPs given 2-hour training workshop regarding administration of questionnaires, structured interview, tapering guidelines.	Usual care and informed of the convenience of reducing the use of BZD
Vicens et al. (2016). Spain	Cluster RCT	75 GPs and 532 patients aged between 18 years and 80 years taking BZD daily for at least 6 months (Int 1 n = 191, Int 2 n = 168, Con n = 173)	BZD cessation (defined as no prescription in the last 6m)	BZD	GPs attended a 2-hour workshop on BZD discontinuation. Patients in each group received initial structured educational interview with individualised stepped dose reduction (either intervention 1 or 2). • Intervention 1: structured intervention with stepped dose reduction and follow-up visits (SIF). Patients scheduled for follow-up appointments with their GPs every 2-3 weeks until end of dose reduction period. • Intervention 2 = structured intervention with written stepped dose reduction (SIW). Patients received written instructions with reinforcing information and tailored gradual dose-reduction until cessation. Gradual taper consisted of 10-25% reduction in the daily dose every 2-3 weeks.	Usual care
Vicens et al. (2019). Spain	Protocol for a Cluster RCT	Target of 638 GPs (319 in each arm)	GPs' DHD defined daily dosage per 1000 inhabitants per day) of BZDs at 12 months after the training workshop.	BZD	Multifactorial intervention consisting of 3 parts: 1. 2-hour educational workshop training for GPs which includes rationale for prescribing BZDs and strategies for deprescribing long-term BZD use. 2. Monthly audit and feedback for participating GPs. 3. GPs to be given general BZD information (rationales and effective strategies for discontinuation etc) via a training and support web page.	Usual care
Walsh et al. (2010). Ireland	Prospective cohort study (randomised selection of study participants)	50 patients aged 65 years and older receiving repeat prescriptions for 2 or more medications	Total number of medications actually taken, total number of medications appearing on patient computerised record	Polypharmacy (2+ medications)	Patients were contacted by telephone to invite them to attend a review. The 10-minute medication review comprising of updating actual medications being taken by patients, errors in dosage, inappropriate medications being taken, etc. Patients were informed that all over the counter preparations could interact with prescribed medication. Patients attended a follow-up appointment with their GP following any change to medication. Four weeks following review, telephone contact was made with patients.	Not specified

Study details	Study design	Participants	Primary outcome/s	Medication to be deprescribed	Intervention elements	Comparison
Walsh et al (2016). Canada	Quality improvement project	46 patients aged 18 years and older taking PPOs for 8 weeks	PPI reassessment at 10 weeks after visit (determined by patient chart review) and primary care provider perceptions of tool and processes	PPIs	An electronic medical record alert advised primary care provider of an upcoming appointment with an eligible patient. Appointments were usual, periodic health examinations. A PPI deprescribing tool document containing guidelines and information regarding PPIs was uploaded into the patient's medical record as a second reminder and to assist with reassessment and deprescribing process. Patients received a handout to help them understand the harms associated with long-term PPIs use and provided guidance on the tapering process, which was also uploaded into their medical record.	N/A
Wentink et al. (2019). Netherlands	Protocol for a cluster RCT	Target of 138 patients 18 years and older	Full discontinuation of antidepressant medication (= 0 mg) within 6 months after starting the intervention	Antidepressants	SPD + MBCT: • Supported protocolised discontinuation (SPD) intervention = Patients will make a personal tapering schedule with their GP. Also offered supportive meetings with a mental health assistant. Patients advised to discontinue medication within 6 months. • Mindfulness based cognitive therapy (MBCT) intervention = sessions 1-4 take place on a weekly basis, and session 5-8 on a fortnightly basis. Each session lasts for 2.5 hours with a 6-hour silent day between session 6 and 7. Participants also instructed to practice mindfulness for approximately 30 minutes a day. Participants receive a link to download guided meditations and yoga exercises for home practice and psycho-education about depression and the pros and cons of stopping antidepressants. The mental health assistant will receive basic information about discontinuation guidance.	SPD only
Zitman et al. (2001). Netherlandsd	Placebo controlled study	230 patients aged 18 years and older with major depressive disorder and chronic BZD use (daily for use for at least 3 months)	Long-term effect of the discontinuation program	BZD	3 Phase discontinuation: 1. change to equivalent dose of diazepam; 2. subsequent randomisation to either 20mg of paroxetine or placebo (patients with a low depression score went onto phase 3); 3. gradual reduction of diazepam. Daily dose was reduced by 25% in week 1 and 2, the remaining 50% was tapered off in 4 steps of 12.5% in weeks 3 and 4. Patients continued treatment with study medication for 2 weeks, followed by 3 weeks of no psychotropic medication.	Transfer to diazepam, then placebo

BZD = Benzodiazepine.

ED = Emergency Department.
GHQ = General Health Questionnaire. Measure of current mental health. Goldberg.
RCT = Randomised Controlled Trial.
MCI = Mild Cognitive Impairment.
PIM = Potentially Inappropriate Medication.
rPATDcog = Patients' Attitudes Towards Deprescribing for cognitive impairment.
PPMD = Prescribers' Perceptions of Medication Discontinuation.
PPI = Proton Pump Inhibitors
CVD = cardiovascular disease

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	2-3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4-5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Appendix A
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	N/A
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A – included as a limitation on page 17
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7-8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Appendix B and 8-15
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8-15
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-15
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	16
Limitations	20	Discuss the limitations of the scoping review process.	17
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	18
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	19

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

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