BMJ Open

Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2014-006544
Article Type:	Research
Date Submitted by the Author:	04-Sep-2014
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Primary Subject Heading:	Qualitative research
Secondary Subject Heading:	Pharmacology and therapeutics
Keywords:	QUALITATIVE RESEARCH, GERIATRIC MEDICINE, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

Title: 'Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis'.

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Keywords: Attitudes, Decision making, Medication Safety & Qualitative Research, Inappropriate Prescribing

Word count: 4000 words (excluding Title page, References, Figures, Tables, Acknowledgements, Conflict of Interest & Funding)

References: 62

Figures: 2 (Figure 2 maybe be printed in black and white but preference is for colour online)

Tables: 4

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ABSTRACT

Objectives – To synthesise qualitative studies that explore prescribers' perceived barriers and enablers to minimising potentially inappropriate medications (PIM) chronically prescribed in adults.

Design – A qualitative systematic review was undertaken by searching PubMed, Embase, Scopus, PsycINFO, CINAHL and INFORMIT from inception to March 2014, combined with an extensive manual search of reference lists and related citations. A quality checklist was used to assess the transparency of the reporting of included studies and the potential for bias. Thematic synthesis identified common subthemes and descriptive themes across studies from which an analytic construct was developed. Study characteristics were examined to explain differences in findings.

Setting – All healthcare settings.

Participants – Medical and non-medical prescribers of medicines to adults.

Outcomes – Prescribers' perspectives on factors which shape their behaviour towards continuing or discontinuing PIMs in adults.

Results – Twenty-one studies were included, most explored primary care physicians' perspectives on managing older, community-based adults. Barriers and enablers to minimising PIMs emerged within four analytic themes: problem awareness; inertia secondary to lower perceived value proposition for ceasing versus continuing PIMs; self-efficacy in regards to personal ability to alter prescribing; and feasibility of altering prescribing in routine care environments given external constraints. The first three themes are intrinsic to the prescriber (e.g. beliefs, attitudes, knowledge, skills, behaviour) and the fourth is extrinsic (e.g. patient, work-setting, health system and cultural factors). The PIM/s examined and practice setting influenced the themes reported.

Conclusions - A multitude of highly interdependent factors shape prescribers' behaviour towards continuing or discontinuing PIMs. A full understanding of prescriber barriers and enablers to changing prescribing behaviour is critical to the development of targeted interventions aimed at minimising potentially inappropriate prescribing and reducing risk of iatrogenic harm.

ARTICLE SUMMARY

Strengths and limitations of this study

- This is the most comprehensive review of prescribers' barriers and enablers to minimising potentially inappropriate medications which are chronically prescribed in adults
- Although database and manual searching was protracted and extensive, it is possible not all relevant studies were found due to poor indexing and inconsistent terminology for this topic
- Utilising a peer-reviewed, published method for thematic synthesis and checklist to assess potential bias in studies contribute to the review's methodological rigour
- Included studies largely explored General Practitioners' perspectives on managing older, community-based adults in relation to relatively few drug classes and may limit the generalisability of the findings

INTRODUCTION

Studies in the United States and Australia indicate at least one in two older persons (aged 65 years or greater) living in the community use five or more prescription, over-the-counter or complementary medicines every day, and the number used increases with age. [1 2] Polypharmacy (defined here as more than five regular medications) predisposes older people to increased potentially inappropriate prescribing (PIP). [3-5] Recent international data suggests that one in five prescriptions for community dwelling older persons is inappropriate. [6] In Australia, approximately 20%-50% of persons in this age group are prescribed one or more potentially inappropriate medications (PIMs), with higher rates seen in residential aged care facilities (RACFs). [3 7-10] PIP is independently associated with adverse drug events, hospital presentations, poorer health related quality of life and death. [11 12] Up to 15% of all hospitalisations involving older persons in Australia are medication-related, with one in five potentially preventable. [13]

The well documented harms of PIP should evoke a response from clinicians to identify and stop, or reduce the dose of, inappropriate medications as a matter of priority. While there is some evidence that PIM exposure has decreased marginally over recent years, its prevalence remains high. [3 14-16] The process of reducing or discontinuing medications, with the goal of minimising inappropriate use and preventing adverse patient outcomes is increasingly referred to as 'deprescribing'. [17] Although the term may be new, appropriate cessation or reduction of medication is an accepted component of competent prescribing. [18 19]

The act of stopping a medication prescribed over months to years, however, is complicated by many factors related to both patients and prescribers. These need to be understood if effective deprescribing strategies are to be developed. A recent review by Reeve *et al* identified patient barriers to, and enablers of, deprescribing, [20] but to our knowledge, no comprehensive equivalent review of prescribers' perspectives has been reported, which this paper aims to provide.

METHODS

As there is no universally accepted method to conduct a systematic review of qualitative data, we utilised principles of quantitative systematic review, applied to qualitative research, [21] and were guided by the Cochrane endorsed ENTREQ (*Enhancing transparency in reporting the synthesis of qualitative research)* position statement. [22]

Search strategy and sources

An initial search was conducted to ensure no systematic review on the same topic already existed. Two experienced health librarians were independently consulted in developing a comprehensive search strategy, which was informed by extensive prior scoping. [23]

Pubmed, Embase, Scopus (limited to Health Sciences), PsycINFO, CINAHL and Informit (Health Collection) electronic databases were searched from inception to March 2014. Filters to identify qualitative research were used and adapted to improve search sensitivity. [24] These were combined with terms and text words for: medical and non-medical prescribers and either inappropriate prescribing or reducing, stopping or optimising medications. Terms/text words were

searched in all/any fields or restricted to title, abstract or keyword, depending upon the size of the database and sophistication of its indexing. Reference lists and related citations of relevant articles were reviewed for additional studies. The full search strategy is detailed in the Appendix.

Study selection

After duplicate citations were excluded, one reviewer (KA) screened titles, abstracts and where necessary, full text, to create a list of potentially relevant full text articles which met draft, intentionally over inclusive eligibility criteria to minimise inappropriate exclusions by the single reviewer. This list was forwarded to three reviewers (CF, DS, IS) who independently assessed the articles for inclusion. Discrepant views were resolved by group discussion to create the final list of included papers based on refined eligibility criteria.

Inclusion and exclusion criteria

Inclusion criteria comprised: 1) original research articles with a qualitative component (i.e. qualitative, mixed or multi-method studies all accepted); and 2) focus on eliciting prescribers' perspectives of factors that influence their decision to continue or cease chronically prescribed PIMs (as defined by each studies' authors) in adults.

No limits were placed on the care or practice setting of the patient or prescriber respectively, or whether the article related to single or multiple medications.

Exclusion criteria comprised: 1) reviews, papers not published in English, and those for which the abstract or full text were not available; 2) focus on medication management decisions in the final weeks of life; 3) focus entirely on initiation of PIM; s and 4) reported only quantitative data derived from structured questionnaires.

Assessment of the quality of studies

One researcher (KA) assessed the reporting of studies using the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist. This reporting guideline, endorsed by the Cochrane Collaboration, assesses the completeness of the reporting, and potential for bias in studies of interviews or focus-groups. [25] Any instances of interpretive uncertainty arising from the checklist were discussed and resolved within the four investigators.

Studies were not excluded or findings weighted on the basis of the COREQ assessment. Rather, we elected to include all studies, ascribing to the theory that the value of insights contained within individual studies may only become apparent at the point of synthesis rather than during the appraisal process. [26]

Data extraction process

For all included articles, data were extracted about study aims, location, setting, study design, participants, recruitment, PIM/s examined, and prescribers' perspectives of factors influencing the

chronic prescription of PIMs. Data for thematic analysis were only extracted from the results (not discussion) section of papers, with particular notice taken of quotations from prescriber participants.

Synthesis of results

The method used to synthesis results was based on the technique of thematic synthesis described by Thomas and Harden. [27] Following multiple readings of the papers to achieve immersion, KA manually coded and extracted text, developing subthemes according to concepts until no further subthemes could be identified. Two reviewers (DS, IS) independently read all papers and then iteratively assessed coded text and subthemes to ensure comprehensiveness and reliability of the findings [28]. Descriptive and draft analytic themes were subsequently developed by KA and then presented to, and discussed with all investigators in developing and finalising the new analytic construct. Study characteristics and results were analysed for associations between particular themes and specific studies.

RESULTS

Study selection

The search yielded 6003 papers, 21 of which met the selection criteria (see Figure 1). There were no studies exploring non-medical prescribers' perspectives.

Study characteristics

Characteristics of included studies are presented in Table 1. All but one, which collected data by survey, used focus groups and semi-structured interviews as the method for qualitative data collection. [29] Four papers explored prescribers' views in relation to multiple medications (i.e. polypharmacy) [30-33]whilst the remaining papers investigated prescribers' views in relation to single PIMs or classes of medications (ten described one or more centrally acting agents such as psychotropics, hypnotics, benzodiazepines, minor opiates and antidepressants[34-43]; two for proton pump inhibitors [44 45] and five for various PIMs. [29 46-49] Eighteen studies elicited the views of prescribers practicing in primary care, [29-41 44-48] one of prescribers in secondary care,[49] and two of prescribers servicing residential aged care facilities. [42 43]

Table 1 – Studies investigating the perspectives of prescribers in various settings

Year of publication	Lead author	Country	Aim	Medication types	Participants (including non-prescribers) & setting	Data collection method	Analysis
1995	Britten	England	To identify patients whose current medication is the result of past treatment decisions and is regarded by their current GP as no longer appropriate, and to describe the drugs and the circumstances in which they continue to be prescribed	Variety of different single medications	7 GPs, primary care	Descriptive survey; GP selected patients prescribed inappropriate medicines, structured data extraction from notes & GP-facilitated interview of patient	N/A
1997	Dybwad	Norway	To understand factors that could result in variations between GPs in order to form hypotheses and build theories about prescribing (main focus on factors that explain higher rates of prescribing)	Benzodiazepines and minor opiates	38 GPs, 18 high rate prescribers, 20 med to low rate prescribers, primary care	SSIs (combined with prescription registration information)	Not stated
1999	Damestoy	Canada	To explore physicians' perceptions and attitudes and the decision-making process associated with prescribing psychotropic medications for elderly patients	Psychotropics (sedatives, hypnotics, anxiolytics and antidepressants)	9 physicians who conduct home visits, primary care	(Presumed face-to-face) SSIs	Grounded theory analysis
2000	Cantrill	England and Scotland	To explore factors which may contribute to inappropriate long-term prescribing in United Kingdom general practice	Variety of different single medications	22 GPs, primary care	Face-to-face & telephone interviews informed by specific examples of PIP identified by validated indicators	Not stated
2004	Iliffe	England	To explore beliefs and attitudes about continuing or stopping benzodiazepine hypnotics amongst older patients using such medicines, and amongst their general practitioners	Benzodiazepines	72 GPs (5 Practice Managers, 4 Practice Nurses, 2 counsellors and 192 patients), primary care	Non-standardized interview group discussions	Not stated
2005	Spinewine	Belgium	To explore the processes leading to inappropriate use of medicines for elderly patients admitted for acute care	Variety of different medications	3 geriatricians & 2 house officers (4 nurses, 3 pharmacists & 17 inpatients), hospital elderly acute care wards	SSIs with health professionals triangulated with observation on wards and FGs with elderly inpatients	Not stated
2005	Raghunath	England	To understand the prescribing behaviour of GPs by exploring their knowledge, understanding and attitudes towards PPIs	PPIs	49 GPs, primary care	Focus groups	Not stated
2006	Parr	Australia	To gain more detailed understanding of GP and benzodiazepine user perceptions relating to starting, continuing and stopping benzodiazepine use	Benzodiazepines	28 GPs (and 23 individual users), primary care	SSIs	Not stated
2007	Cook	USA	To understand factors influencing chronic use of benzodiazepines in older adults	Benzodiazepines	33 Primary care physicians	Face-to-face and telephone SSIs	Narrative analysis
2007	Rogers	England	To explore the dilemmas the legacy of the benzodiazepines controversy has created for recent practitioners & their view of prescribing benzodiazepines	Benzodiazepines	22 GPs, primary care	SSIs	Not stated
2010	Anthierens	Belgium	To describe GPs' views and beliefs on polypharmacy in order to identify the role of the GP in improving	Polypharmacy	65 GPs, primary care	Face-to-face individual SSIs (literature informed interview	Content analysis

Year of publication	Lead author	Country	Aim	Medication types	Participants (including non-prescribers) & setting	Data collection method	Analysis
			prescribing behaviour			guide)	
2010	Dickinson	United Kingdom	To explore the attitudes of older patients and their GPs to chronic prescribing of antidepressant therapy, and factors influencing such prescribing	Antidepressants	10 GPs (and 36 patients aged ≥75 years), primary care	SSIs	Framework analysis
2010	Frich	Norway	To explore GPs' and tutors' experiences with peer group academic detailing, and to explore GPs' reasons for deviating from recommended prescribing practice	Variety of different single medications	20 GPs (39 GPs also interviewed on topics outside scope of this review)	Focus group interviews following individual receipt of prescription profile report	Thematic content analysis
2010	Moen	Sweden	To explore GPs' perspectives of treating older users of multiple medicines	Polypharmacy	31 GPs (4 private, 27 county-employed), primary care	Focus groups (literature informed question guide)	Conventional content analysis
2010	Subelj	Slovenia	To investigate how high-prescribing family physicians explain their own prescription	Benzodiazepines	10 family physicians, 5 high and 5 low prescribers, primary care	SSIs	Not stated
2011	Fried	USA	To explore clinicians' perspectives of and experiences with therapeutic decision making for older persons with multiple medical conditions	Polypharmacy	36 physicians (2 Nurse Practitioners, 1 pharmacist, 1 physician assistant), primary care, Vet affairs and academia	Focus groups	Content analysis
2011	Iden	Norway	To explore decision-making among doctors and nurses on antidepressant treatment in nursing homes	Antidepressants	16 doctors, 8 each working full & part time in nursing homes, (and 8 registered nurses), residential aged care	Focus groups	Systematic text condensation & analysis
2012	Flick	Germany	To explore, given the specific risks and the limited effect of sleeping medication, why doctors prescribe hypnotics for the elderly in long-term care settings	Hypnotics	20 prescribers servicing nursing homes (32 nurses and nursing aids) in residential aged care	Episodic interviews	Thematic analysis
2012	Schuling	The Netherlands	To explore how experienced GPs feel about deprescribing medication in older patients with multimorbidity and to what extent they involve patients in these decisions	Polypharmacy	29 GPs, primary care	Focus groups	Not stated
2013	Clyne	Ireland	To evaluate GP perspectives on a pilot intervention (to reduce PIP in Irish primary care)	Variety of different medications	8 GPs in focus group & 5 GPs for SSIs , primary care	Focus group & SSIs	Thematic analysis
2013	Wermeling	Germany	To describe factors and motives associated with the inappropriate continuation of prescriptions of PPIs in primary care	PPIs	10 GPs, 5 who frequently continue and 5 who frequently discontinue PPIs, primary care	SSIs	Framework analysis

GPs = General Practitioners; PIP = Potentially inappropriate prescribing; PPIs = Proton Pump Inhibitors; SSIs = Semi-structured interviews.

Quality Assessment

Table 2 – Comprehensiveness or reporting assessment (Consolidated criteria for reporting qualitative studies checklist) [25]

Reporting Criteria	No N=21	References of studies reporting each criterion
DOMAIN 1:		
Characteristics of research team		
1. Interviewer/facilitator identified	14	[30-34 37 38 42 44-49]
2. Credentials	12	[29 30 33-35 38-40 42 46 47 49]
3. Occupation	7	[34 38-40 42 46 49]
4. Gender	17	[30-35 37-39 41-43 45-49]
5. Experience and training	2	[38 39]
Relationship with participants:		
6. Relationship established before study started	5	[34 36 41 44 45]
7. Participant knowledge of the interviewer	3	[34 36 41]
8. Interviewer characteristics	4	[38 39 42 47]
DOMAIN 2:		
Study design		
9. Methodological theory identified	16	[30 32-35 37-40 42-45 47-49]
Participant selection		
10. Sampling method (e.g. purposive, convenience)	21	[29-49]
11. Method of approach	13	[30 32 34 37 38 40-43 45-47 49]
12. Sample size	21	[29-49]
13. Number/reasons for non-participation	7	[32 34 35 37 40 41 44]
Setting		
14. Setting of data collection	11	[29-32 34 36 37 39 41 45 46]
15. Presence of non-participants	0	-
16. Description of sample	17	[29-34 37-45 47 49]
Data collection		
17. Interview guide	16	[29-35 37 38 40-43 46 47 49]
18. Repeat interviews	0	
19. Audio/visual recording	19	[30-35 37-49]
20. Field notes	6	[30 32 37 40 42 47]
21. Duration	12	[30 31 33 35 37 41-45 48 49]
22. Data saturation	7	[30 31 35 37-39 44]
23. Transcripts returned to participants	1	[44]
DOMAIN 3		
Data analysis		
24. Number of data coders	16	[30-34 36 37 39-42 44-47 49]
25. Description of coding tree	15	[30-34 37 39-45 47 49]
26. Derivation of themes	18	[30-34 36-47 49]
27. Software	6	[30 38 40 44 48 49]
28. Participant checking	2	[37 49]
Reporting		
29. Participant quotations presented	18	[30-34 37-49]
30. Data and findings consistent	20	[29-35 37-49]
31. Clarity of major themes	18	[29-34 37-47 49]
32. Clarity of minor themes	14	[29-31 33 34 36 37 39-41 43-45 49]

COREQ assessment

The completeness of reporting varied across studies, with an average of 17 (range 8-22) of 32 items from the COREQ checklist clearly documented (Table 2). The single descriptive survey reported nine of 24 applicable fields. [29]

Lowest rates of reporting were observed in Domain 1 meaning that researcher bias (poor confirmability) cannot be excluded. [26] Greater transparency was apparent with Domains 2 and 3 allowing comparatively better assessment of the credibility, dependability and transferability of study findings. For example, all studies reported the sample size and method and most reported a description of the sample and interview guide. There was consistency between raw data and interpretive findings in all papers except one in which the interpretation was so brief that its accuracy was considered doubtful. [36]

Synthesis of results

Thematic synthesis yielded 42 subthemes, 12 descriptive themes and 4 analytic themes (Figure 2), with multiple interdependencies and relationships. Barrier and enabler descriptive themes and subthemes tended to mirror each other for each analytic theme of Awareness, Inertia, Self-efficacy and Feasibility. The first three themes reflect factors intrinsic to the prescriber and his/her decision making process while the fourth deals with extrinsic factors. Tables 3 and 4 provide illustrative quotations from either primary study participants or study authors relating to barrier and enabler subthemes, respectively.

Table 3 – Illustrative quotations for barrier themes and subthemes

Analytic & Descriptive themes	Subtheme and References	Illustrative quotations "*Italicised text*" = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS		
	Poor insight[46 47 49]	"*When I saw the list of patients [to be discussed with the researcher], I was quite happy about the prescriptions…but obviously when you look at them in more detail there are anomalies there that ought to be either checked on, reviewed or even altered.*" [46]
	Discrepant beliefs and practice [31 34 38 41 44]	'In contrast to stated beliefs about best practice, physicians estimated that 5-10% of their older adult patients were using benzodiazepines on a daily basis for at least the past 3 months.' [38]
INERTIA		
PRESCRIBER BELIEFs/ATTITUDE	Fear of unknown/negative consequences of change (for the prescriber, patient and staff) [29-31 34-36 38 40 42-47 49]	*"He gets very worried and excitable if you attempt to change anything… even just something minor would cause him virtually a breakdown."* [46] *"We can't predict the effect [of deprescribing] for the individual patient."* [31] *"It's scary to stop a medication that's been going for a long time, because you kind of think am I opening a can of worms here, because I don't know what the reasons were for them starting that medication. To explore all that will take, you know, I can't do all that now, I will have to do that another time."* [40] *"I suggest to them that ideally we should try to get them off of that, but if they're saying, been there, done that, that didn't work for me when I came off of this, I don't think it's worth getting into a big knock-down drag-out [fight] with them or having them leave my practice over this issue".* [38]
	Drugs work, few side effects [34 35 38 39 41 43-45 47]	'In their [the physicians'] view psychotropic medication helps the elderly patient remain functional and is the least problematic solution... The physicians stated that they often do not see side effects and that patients often do not report them...' [35]
	Prescribing is kind, meets needs (of patient, staff, carer) [34 37-41 43 44]	*"There is a paradox concerning older patients. You do not want to make them grow dull, but on the other hand you know their chronic problems, and you know that at their age the drugs are not so addictive. You want them to keep their minds clear, but on the other hand I do have a tendency to be permissive to older patients."* [34] *"...It treats our own pain as well as our patients' pain, 'cos we want to help people and make people feel better. So if we give people something and make them feel better, then everybody seems to be happier."* [39]
	Stopping is difficult, futile has/will fail [31 34 36-38 42 43 46 47] ,	*"Let's pretend it's an octogenarian...if it's gonna make the patient feel better, I don't care if the patient's on it for the rest of their life."* [38] 'Most frequent concern identified was the difficulty anticipated in persuading older patients to withdraw after years of using benzodiazepines.' [36] *"In my experience, patients get hooked on PPIs, it is almost addictive like heroine and people appear to experience severe indigestion symptoms on attempting to stop them."* [44]
	Stopping is a lower priority issue[38 40 44 45 49]	"... We are always faced with multiple problems and PPIs are just one issue..." [44]
PRESCRIBER BEHAVIOUR	Devolve responsibility [29 34 35 40 42 43 49]	'They [the physicians] recognized that the inappropriate use of psychotropic medication for elderly patients was a public health problem, but they felt that it was beyond the scope of the individual physician.' [35]

		"(...) I ask them if it should be a sleeping pill or another of the available options and mostly they have a need for sleeping pills." [43] *"I have been running this practice for twelve years. I took it over from an older colleague. I took over all his patients. They were mostly old people. Prescribing policy has been rather liberal, and I have continued this policy."* [34]
SELF-EFFICACY		
SKILLS/KNOWLEDGE	Skills/knowledge gaps[30-35 40 45 49]	*"I don't have enough time for education about the newest information on psychiatric disorders, and better communication with specialists would be very helpful." [41]* 'Side effects are not always recognised as such.' [32] "When house officers come on our ward, they haven't necessarily been trained in geriatrics. So they arrive here, and then they start with 10mg of morphine every four hours. That's too much." (Hospital based geriatrician) [49] *"You look at the medication list and want to reduce it but then you can't find things you can eliminate."* [31]
INFORMATION/INFLUENCERS	Lack of evidence[30 31 33]	*"To me, the guidelines are kind of a hindrance. At the moment they do not cater for older patients"* [31]
	Incomplete clinical picture [30-33 40 41 46 47 49]	*"The problem is that the medication lists of the doctors involved are not exchanged and are consequently inconsistent."* [31] *"One has discovered that they might have completely different expectations than what the doctor had from the beginning. Do they want to survive for five more years or? And so on. What are their expectations?"* [30] '…Medicines, (mainly for chronic conditions) were sometimes not appropriately reviewed because there was no written information on indication and follow-up or because this was not readily available.' [49] "...sometimes the older people decide for themselves to reduce some of their medication or to adjust the doses without telling their GP. Therefore as their GP you can have the wrong impression about their medication intake..." [32]
	Guidelines/specialists[30-33 38 44 46 49]	'When existing guidelines are debated, GPs felt deceived and insecure... The importance of individualising treatment was also expressed and many guidelines were perceived as too rigid leading to a standardized 'kit' of medicines per indication...' [30] *"I have difficulty not following the guidelines if I don't have good reasons to do so."* [31] *"When the hospital consultant recommends a treatment it's difficult… for us not to prescribe unless there is a very good reason. To some extent we feel obliged to carry on when they have initiated it."* [46]
	Other Health Professionals (Aged Care) [42 43]	*"(…) in such a situation it amounts to the sleeping pill, because everybody else's need is the sleeping pill, and I would have to fight tooth and nail if really I wanted to avoid this."* [43] *"They called me on the carpet to tell me that withdrawing antidepressants was not a clever thing to do because the patient became angrier and resisted care. They therefore demanded that I reinstate medication."* [42]
FEASIBILITY		
PATIENT	Resistance/Ambivalence [29-32 35 37 38 40 43 44 46 48	*"When I said initially we wanted her to come off it, she said, oh no, I've been on that for ages, and I don't want to*

	49]	*come off it."* [48] *"The discontent rarely lies with the patient themselves."* [31]
	Poor acceptance of alternatives[37 38 42-44]	*"… these types of people and they tend not to want to help themselves, you know they won't take the hypnotherapy and they won't go to yoga classes and they won't do anything else. They just want a quick fix."* [37]
	Difficult & intractable adverse circumstance [34 35 37 39 40]	*"I think they have horrible lives, a lot of them… I think it's a combination of all things, their health, their social circumstances… I think a lot of people are on antidepressants because of everything put together. And you can't… change most of the factors that cause it."* [40]
	Discrepant goals to prescriber [30 33]	*"I kind of get aggravated that half of the medicines that I think are totally rubbish are the ones that the patient really wants to take."* [33]
RESOURCES	Time and effort[30 33 34 37 38 40-42 46 48 49]	*"We have a big problem with long-term hypnotic use. It would take an awful lot of work and it's purely a time and work problem".* [46]
	Insufficient reimbursement[37 38]	'… a lack time or resources to provide counselling, especially due to the absence of remuneration for doing so.' [37]
	Limited availability of effective alternatives [37 38 41-43]	'...There is hardly any alternative to medicamentous therapy.' [43]
WORK PRACTICES	Prescribe without review [34 35 42 43 45-47]	*"(…) then he gets something and he continues this pill, and then the issue is over for him, then it's quiet, and then he has his pill and then he sleeps through, and from time to time you may enquire, it if occurs to you while looking at his medication."* [43] *"When we work in a large health centre, then we sign prescriptions for each other... when a colleague is absent, we issue prescriptions for him that day. Any prescription I issue is my responsibility, but if you are asked to prescribe a particular drug [for a colleague] then you sign it in the reception. I don't check which other drugs that person uses."* [47]
MEDICAL CULTURE	Respect prescriber's right to autonomy & hierarchy [29 30 34 37 45 46 49]	'The GPs rarely contact colleagues, for example, hospital specialists, as there is a perceived lack of routines for this as well as an informal understanding not to pursue colleagues' motivations for prescriptions. ' [30]
HEALTH BELIEFS & CULTURE	Culture to prescribe more[32 42 47]	*"The number of medications grows slowly. There is a complaint, we give new medication, it continues without really stopping it after a while… and it is our responsibility to try and withdraw it from the patient"* [32]
	Prescribing validates illness[34 40 43]	*"They feel that unless they are on a tablet for it then they are not having any treatment. There are a lot of those kinds of people."* [40]
REGULATORY	Quality measure driven care [33]	*"Another factor that we experience at the VA is these electronic reminders that tell you to do things…What I do really depends on who is in front of me…So the reminder comes up and it makes no sense. This guy's LDL is 101.8… Should I go from 40 to 80 of simvastatin? And what's the risk and benefit there?"* [33]

Table 4 – Illustrative quotations for enabler themes and subthemes

Analytic & Descriptive themes	Subtheme	Illustrative quotations "*Italicised text*" = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS	Review, observation, audit & feedback [46 47 49]	As above.[46]
INERTIA		

PRESCRIBER BELIEFs/ATTITUDE	Positive attitude toward deprescribing [31]	*"You can have a field day with crossing off medication: 'sure, scrap half of it'."* [31]
	Stopping brings benefits [36 37 48]	*"O ya, and she was delighted, I stopped some of her other medications because she was in front of me and I had a bit of time to do it."* [48]
	Fear of negative/unknown consequences of continuation [44]	*"Miracle all right, but too good of anything can be dangerous. Would just like to reiterate that, let me say they [PPIs] even work too well, what worries me is won't there be long-term missed cancers?"* [44]
	Devolve responsibility [29 40 44]	'Some [GPs] preferred to wait until the patient went to hospital where they would be taken off their drugs without the GP being blamed. The GP might even write and ask a hospital doctor to do this.' [29] *"Why not be honest and say, the NHS can't afford to keep giving you these drugs unless there's a very good reason. The patients understand that, and in this day and age they understand perfectly well about cost."* [44]
SELF-EFFICACY		
SKILLS/ATTITUDE	Confidence (to stop therapy/deviate from guidelines)[33 45]	*"It's not as if the life of the patient is suddenly at risk because I take away a pill, yes. [...] in the worst case heartburn may re-occur or there is upper abdominal discomfort, but that will not immediately cause a bleeding ulcer."* [45] *"I look at their functioning as a whole and also whether or not they live alone, their support system, have help. AND I sort of you know tone those goals down. I am not looking for a Hemaglobin A1C of 7 anymore…so I take the pressure off them and I start removing those medications especially the ones that cause hypoglycaemia."* [33]
	Work experience, skills & training [30 45 49]	*"Yes, maybe problem oriented when you are new. Maybe now one thinks more about consequences, in another way."* [30]
INFORMATION/DECISION SUPPORT	Data to quantify benefits/harms [30-32 41 48]	*"…because actually what you could do is to give him (patient) some more 'hard core' facts like: 'If you refrain from treatment your chance of stroke is 20%..."* [30]
	Dialogue with patients[29 30 44 46]	'Discussion during the research interview made some patients more willing to consider a change in medication.' [29] 'Adequate discussion with patients was widely recognised as one of the keys to influencing change, but although practiced by some GPs it was not always successful.' [46]
	Access to specialists [40 41 44 49]	'They (low benzodiazepine prescribing family physicians) desired better co-operation and clear instructions from psychiatrists.' [41]
FEASIBILITY		
PATIENT	Receptivity/motivation to change [33 37 46]	*"He's fairly amenable to tinkering with his pills, so we'll look at that".* [46]
	Poor prognosis[49]	*"Sometimes people have taken 10 medicines while they were in curative care, and gradually they move on to palliative care. Then we must reconsider all the prescriptions, drug by drug, saying: OK, what's the goal? To improve your comfort? Well, this medicine will make you feel more comfortable; we can stop this other one."* [49]
RESOURCES	Adequate reimbursement [38]	*"Reimbursement is very low... I think if it was something that we did get reimbursed on I think you would see physicians' attitudes a lot different. You'd be more willing to spend time." [38]*
	Access to support services[31 37 41 46]	'Most GPs work closely with a local pharmacist [when undertaking medication review to stop medicines]: the task perception of such pharmacists was an important factor when a GP was looking for decision support in medication review' [31]
WORK PRACTICE	Stimulus to review[29 31 40 44 48 49]	'A new patient entering the practice list is welcomed as an opportunity to review their medication.' [31]
REGULATORY	Raise prescribing threshold [44 45]	*"I think we are all sitting here and debating about this mainly because of the pressure on us by our pharmaceutical advisors not to prescribe PPIs because of cost implications to the NHS; I bet that this will not be an important topic in 2 years when Losec goes generic."* [44]
	Monitoring by authorities [34]	'The continuous monitoring of prescriptions by health authorities also put stress on the doctors...' [34]

Fewer enablers were reported than barriers and there was variation in the relative contribution of each study to each theme.

AWARENESS

This theme was apparent in the three papers which utilised audit or informal third-party (e.g. other health professional) observation and feedback. [46 47 49] Poor insight was an observed, rather than reported, barrier, with interventions to raise prescriber awareness an enabler to addressing PIP. Prescriber beliefs at a population level did not necessarily translate to prescribing practices at an individual level. For example, agreement among prescribers that benzodiazepines should not be used regularly or long-term did not necessarily preclude such prescribing in individual patients. [34 38 41]

INERTIA

Inertia was defined as failure to act, despite awareness that prescribing is potentially inappropriate because of prescriber perceptions that discontinuing medication is, for various reasons, less of a value proposition than continuing medications.

Fear of unknown/negative consequences of change featured in 15 of 22 papers, and related to consequences for: the prescriber (threatened therapeutic relationship, diminished credibility, increased initial and ongoing workload, potential for litigation, conflict with other prescribers/health professionals); [29-31 34-36 38 40 43-47 49] the patient (withdrawal syndrome, symptom relapse or increased risk of the condition/event for which preventive medication was originally prescribed);[36 38 40 42-47] and other health professionals (increased workload and safety concerns of staff in RACFs). [42 43] The prescriber beliefs that facilitate cessation were the converse , that is, fear of unknown/negative consequences of continuation,[44] a positive attitude to stopping medicines [31] and a belief this can bring benefits. [36 37 48]

The barrier belief that drugs appear to work with few adverse effects was apparent in nine papers [34 35 38 39 41 43-45 47] of which two studied benzodiazepine prescribers. 'High-rate' prescribers consistently downplayed risks, whereas 'low'/ 'medium-rate' prescribers were more conscious of the risk of continued use. [34 41] The futility and harm of cessation in patients of advanced age was a subtheme predominantly present in papers considering psychoactive agents. [34 35 38 43 46 47]

Another barrier was the devolvement of responsibility for the decision to continue or cease a medication to another party (e.g. another prescriber, health professional, society, or the patient). One example was continuation of PIMs in patients that prescribers had inherited from colleagues where the former failed to question, the rationale used by the latter in prescribing such drugs. [29 34 49] Another example was the provision of PIMs upon the request of RACF nursing staff [42] or patients [34 40 43] without critical prescriber review. Finally inappropriate prescribing of psychotropics was seen as a public health concern but beyond the scope of individual prescribers. [35]

SELF-EFFICACY

This analytic theme refers to factors that influence a prescriber's belief and confidence in his or her ability to address PIM use. It involves subthemes relating to knowledge, skill, information and attitudes, influences and decision support.

Knowledge or skill deficits, [30-35 40 45 49] including difficulty balancing the benefits and harms of therapy, [30-33] recognising adverse drug effects [31 32]and establishing clear cut

diagnoses/indications for medicines [34 35 40] were challenges prescribers faced in identifying and managing PIMs. Balancing the benefits and harms was perceived to be especially difficult when reviewing preventive medications in multimorbid older persons with polypharmacy where shorter life expectancy, uncertain future benefits and higher susceptibility to more immediate adverse drug effects all need to be taken into account. [30-33] On the other hand, better quantification of the benefits and harms of therapy, [30-32 41 48] confidence to deviate from guidelines and stop medications if thought necessary, [33 45] greater experience, [30 44] and targeted training, especially in prescribing for older persons[49] were seen as enabling factors.

Compounding generic knowledge and skill gaps were information deficits specific to individual prescribing decisions, resulting from poor communication with multiple prescribers and specialists involved in patient care, inadequate transfer of information at care interfaces, fragmented and difficult-to-access patient medical records, and failure of patients to know/disclose their full medical history/medication lists to prescribers. [30-33 40 41 46 47 49] This subtheme linked strongly with time and effort demands on prescribers, and in two papers was associated with low motivation arising from a perceived inability to efficiently access all required prescribing information. [40 49]

Eight papers discussed the influence of care recommendations from guidelines and specialists. [30-33 38 44 46 49] Guidelines were often viewed negatively, with prescribers feeling pressured to comply with recommendations divorced from the complexities of clinical practice. [30-32 44 46] Pressure from staff to continue prescribing PIMs, often to maintain facility routines, were presented as a barrier unique to RACFs. [42 43] Offsetting this were enablers centred on greater dialogue with patients to increase understanding and facilitate shared decision making,[29 30 44 46] as well as timely access to, and support from, specialists, particularly geriatricians and psychiatrists. [37 40 41 44 46 49]

FEASIBILITY

Feasibility refers to factors, external to the prescriber, which determine the ease or likelihood of change. They relate to patient characteristics, resource availability, work practices, medical and societal health beliefs and culture, and regulations.

The most frequently expressed barrier concerning patients was their ambivalence or resistance to change [29-32 35 37 38 40 43 44 46 48 49] and their poor acceptance of alternative therapies. [37 38 42-44] In contrast, receptivity and capacity to change was identified as an enabler in three studies, [33 37 46] as was a poor prognosis which helped crystallise care goals and stimulate a review of the appropriateness of existing drug regimens. [49]

Limited time and effort to review and discontinue medications, [30 33 34 37 38 40-42 46 48 49] was the most common resource constraint followed by limited availability of effective non-drug care options. [35 37 38 41-43] Adequate reimbursement [38]and access to support services such as mental health workers and pharmacists for medication review [31 37 41 46]emerged as enablers.

Certain work practices were raised as barriers to deprescribing, such as provision of repeats for a prescriber's own or a colleague's patients, [34 46 47] and the absence of explicit treatment plans or formal or planned medication review. [34 43] The mirroring enabler is opportunities to review medication regimens (e.g. hospital admission,[29 49] change of prescriber,[31] specialist[40] or scheduled review). [44 48]

Remaining descriptive themes related to societal health beliefs, cultural and regulatory factors. The most frequently mentioned were discomfort and reluctance to question a colleagues' prescribing

decisions [29 30 34 37 45 46 49] (and devolve responsibility) associated with respect for professional autonomy or the medical hierarchy when specialists or hospital prescribers were involved.

Prescribing patterns driven by externally imposed guideline-based quality measures were presented as a barrier to minimising PIP. [33] Raising the prescribing threshold for medications (e.g. through increased cost or restricted access) and monitoring by authorities were seen by prescribers as unwelcome, perverse enablers. [44 45]

DISCUSSION

This systematic review comprehensively investigates prescriber barriers and enablers to minimising the prevalence of chronically prescribed PIMs in adults. The thematic construct we developed from published literature centres on Awareness, Inertia, Self-efficacy and Feasibility. It principally reflects the perspectives of primary care physicians managing older, community based adults. Although the themes and subthemes have been presented separately, the reasons doctors continue to prescribe, or do not cease, PIMs are multi-factorial, highly interdependent and impacted by considerable clinical complexity.

Many subthemes were common to papers regardless of inter-study differences in the PIM/s discussed, patient age and clinical setting (e.g. primary, secondary or residential aged care).

Subthemes varied if the paper focussed on polypharmacy or single PIMs or classes of PIMs with levels of prescriber insight and certainty also differing according to this characteristic. In the four studies focussed on polypharmacy, prescribers were aware of polypharmacy-related harm but could not easily identify which medications were inappropriate, as reflected by the subthemes 'difficulty/inability to balance benefits and harms of therapy', [30-33] 'inability to recognise ADRs/side effects, [31 32]'Lack of evidence' [30 31 33] and 'incomplete clinical picture'. [30-33] In other studies focussing on specific classes of over-prescribed medications, prescribers were aware of this inappropriateness, but in response voiced various rationalisations for continued prescribing such as 'drugs work, few adverse effects', [34 35 38 39 41 43-45 47] 'prescribing is kind and meets needs', [34 37-41 43 44] 'stopping is difficult, futile, has or will fail', [34 36-38 42 43 47] 'poor (patient) acceptance of alternatives', [37 38 42-44] and 'difficult and intractable adverse (patient) circumstance'. [34 35 37 39 40]

Yet in other studies focussing on different PIMs, prescribers were generally not aware of their inappropriate prescribing until this was revealed to them (e.g. through audit and feedback). [46 47 49]

No definite thematic pattern was observed from the subthemes of six studies which did not specifically focus on the care of older persons [29 37 39 41 44 45] compared to the remaining 15 which did. Compared to studies in primary care, unique themes emerged from papers set in RACFs and acute care settings. For example, pressure on prescribers to continue prescribing PIMs at the request of RACF nursing staff was unique to this setting. [42 43] The one study set in acute care highlighted inexperience and training deficiencies of junior prescribers, as viewed by three geriatricians. [49]

The finding that poor insight into PIP was only apparent in studies where prescribers were made aware of it isunsurprising, given prescribers do not intentionally engage in inappropriate prescribing. It demonstrates the importance of awareness-raising strategies for prescribers. Inertia, as in failure to deprescribe when appropriate, sits at odds with the more traditional use of the word as symbolising failure to intensify therapy when indicated. [50] Inertia has been linked to 'omission bias' (where individuals deem harm resulting from an act of commission to be worse than that

resulting from an act of omission.[51 52] In the case of deprescribing as an act of commission, it becomes more a matter of reconciling a level of expected utility (accrual of benefits) with a level of acceptable regret (potential to cause some harm). [53] Fear of negative consequences resulting from deprescribing contributes to inertia and this fear is not easily allayed by the current limited evidence base regarding the safety and efficacy of deprescribing. In the same papers in which prescribers rationalised continuation of therapy with the belief that drugs work and have few adverse effects, [34 35 38 39 41 43-45 47] prescribers also identified different thresholds for initiating versus continuing the same therapy. This anomaly suggests either a lack of prescriber insight, clear differences in prescribers' minds between initiation versus continuation, or a social response bias towards a false belief induced by the methodology or approach used by interviewers.

Relevance to previous literature

One meta-synthesis of seven papers has recently been published online exploring prescribers' perspectives of why PIP occurs in older people.[54] This study had a generic focus on PIP, including under-prescribing and used a less robust methodology. Scanning their reference list did not reveal any additional papers which would have met our selection criteria and their results yielded no additional themes to those contained within our results.

Our findings are consistent with literature (largely focused on *initiation* of therapy) suggesting that pharmacological criteria are not the only factor impacting doctors' prescribing decisions. [55] Rather, prescribing decisions result from interacting clinical, social and cultural factors impacting on both patient and prescriber. [55-57]

Reeve *et al* recently published a review of patient barriers and enablers to deprescribing and emphasised the importance of a patient-centred deprescribing process. When comparing their results with ours, prescribers' barriers are concordant with those of patients with respect to resistance to change, poor acceptance of non-drug alternatives, and fear of negative consequences of discontinuation. However, prescribers also underestimate enabling factors including patients' experiences /concerns of adverse effects, dislike of medicines and assurance that a ceased medication can be recommenced if necessary. Patients also reported their primary care physician could be highly influential in encouraging them to discontinue therapy, a perception not echoed amongst prescribers.[20] Prescribers need to discuss, rather than assume, patient attitudes towards their medicines, and to deprescribing, in the context of their current care goals.

Previous reviews of interventions to reduce inappropriate prescribing/polypharmacy in the elderly have not been able to conclude with certainty that multi-faceted interventions are more effective than single strategies.[58 59] Although our findings suggest the former are likely to be more successful, further research is required to identify the barriers and enablers with the greatest potential for impact in designing targeted deprescribing interventions.

Strengths and limitations

We experienced great difficulty in identifying relevant studies due to the inconsistent terminology and poor indexing of search terms relating to deprescribing and inappropriate therapy. We attempted to mitigate this problem with a comprehensive pre-scoping exercise, a highly iterative search strategy tailored to each database, and snowballing from reference lists and related citations, however, it may be possible that not all relevant articles were found.

Although we did not restrict our search according to patient age, clinical setting, or type of PIM, most participants were experienced primary care physicians caring for older, community-based

adults. Caution should be exercised in transferring our results to other settings or patient groups. However, two recent cross-sectional studies looking at barriers to discontinuation of benzodiazepines and antipsychotics in nursing homes reflected those identified in our review. [60 61]

Many of the papers focussed on relatively few drug classes (psychotropics and PPIs) and only four focussed on polypharmacy. Although some subthemes were common to all types of studies (single and various PIMs and polypharmacy papers), others were not. It is possible that, had more medication classes been studied, some of our results may have been different.

The strengths of our review included adherence to a peer-reviewed, documented methodology for thematic synthesis, COREQ assessment of studies allowing assessment of potential for bias, and a multi-disciplinary team of investigators to validate theme identification and synthesis.

Implications for clinicians and policy makers and future research

The results of this review disclose prescriber perceptions of their own cognitive processes as well as patient, work setting and other health system factors which shape their behaviour towards continuing or discontinuing chronically prescribed PIMs. The thematic synthesis provides a clear conceptual framework to understand this behaviour. Rendering these issues visible for both clinicians and policy makers is the first stage in minimising inappropriate prescribing in routine clinical practice. It facilitates a pragmatic approach for both parties towards identifying and taking heed of local barriers and enablers which will determine the effectiveness of any targeted intervention designed to promote appropriate deprescribing.

It is clear that further high quality prospective clinical trial data are urgently needed in demonstrating the safety and benefits of deprescribing and the best way to undertake it, especially in multimorbid older persons.[59 62] The fog of polypharmacy clouds a prescriber's capacity and confidence to identify PIMs which, to be overcome, requires complete and accurate information and decision support.

Professional organisations and colleges have an important role in encouraging the necessary cultural and attitudinal shifts towards 'less can be more' in appropriate patients. The push for guideline adherence and intensification of therapy needs to be counterbalanced by the view that judicious reduction or discontinuation of medication, in consultation with a patient and after declaring agreed care goals, is an affirmation of highest quality, individualised care. This view needs to be embraced in the education and training of all health professionals, not just doctors, who exert influence on the prescribing process.

Prescribers are making decisions in the face of immense clinical and health system complexity. Appropriate deprescribing needs to be regarded as equally important and easy to perform as appropriate initiation of new medications. Understanding how prescribers perceive and react to influences is the first step to designing policy initiatives and health system reforms that will minimise unnecessary over-prescribing.

Acknowledgements

We would like to thank University of Queensland librarians Mr Lars Eriksson and Ms Jill McTaggart for their assistance in developing the search strategy and Ms Debra Rowett for her invaluable insights when scoping the search and developing the manuscript.

Competing Interests

Ms Anderson received a speaker honorarium for an Australian Association of Consultant Pharmacy presentation. Dr Stowasser reports personal fees from National Prescribing Service, outside the submitted work. A.Prof Scott and Dr Freeman report no conflicts of interest directly relevant to this work.

Funding

Ms Anderson and A/Prof Scott are funded through a National Health and Medical Research Council grant under the Centre of Research Excellence Quality & Safety in Integrated Primary/Secondary Care (Grant ID, GNT1001157).

Contributorship

IS conceived the paper, the scope of which was refined by all authors. KA searched the literature, lead data analysis and drafted the manuscript. IS and DS read articles and assessed data analysis for comprehensiveness and reliability. IS, DS and CF provided critical comments and contributed to the interpretation of analysed results and framework development. All authors read, revised and accepted the final draft.

Data Sharing

Preliminary data used to develop the tables and figures presented in this article are available by emailing the corresponding author, Kristen Anderson, k.anderson8@uq.edu.au .

REFERENCES

1. Morgan T, Williamson M, Pirotta M, et al. A national census of medicines use: a 24-hour snapshot of Australians aged 50years and older. Med J Aust 2012;196(1):50 - 53
2. Qato DM, Alexander G, Conti RM, et al. USe of prescription and over-the-counter medications and dietary supplements among older adults in the united states. JAMA 2008;300(24):2867-78 doi: 10.1001/jama.2008.892[published Online First: Epub Date]|.
3. Price SD, Holman CD, Sanfilippo FM, et al. Are older Western Australians exposed to potentially inappropriate medications according to the Beers Criteria? A 13-year prevalence study. Australasian journal on ageing 2014 doi: 10.1111/ajag.12136[published Online First: Epub Date]|.
4. Guaraldo L, Cano FG, Damasceno GS, et al. Inappropriate medication use among the elderly: a systematic review of administrative databases. BMC geriatrics 2011;11:79 doi: 10.1186/1471-2318-11-79[published Online First: Epub Date]|.
5. Aparasu R, Mort J. Inappropriate prescribing for the elderly: beers criteria-based review. Ann Pharmacother 2000;34(3):338 - 46
6. Opondo D, Eslami S, Visscher S, et al. Inappropriateness of medication prescriptions to elderly patients in the primary care setting: a systematic review. PLoS One 2012;7(8):e43617
7. Roughead EE, Anderson B, Gilbert AL. Potentially inappropriate prescribing among Australian veterans and war widows/widowers. Intern Med J 2007;37(6):402-5 doi: 10.1111/j.1445-5994.2007.01316.x[published Online First: Epub Date]|.
8. Byles JE, Heinze R, Nair BK, et al. Medication use among older Australian veterans and war widows. Intern Med J 2003;33(8):388-92
9. Stafford AC, Alswayan MS, Tenni PC. Inappropriate prescribing in older residents of Australian care homes. Journal of clinical pharmacy and therapeutics 2011;36(1):33-44 doi: 10.1111/j.1365-2710.2009.01151.x[published Online First: Epub Date]|.
10. Somers M, Rose E, Simmonds D, et al. Quality use of medicines in residential aged care. Australian family physician 2010;39(6):413-6
11. Cahir C, Bennett K, Teljeur C, et al. Potentially inappropriate prescribing and adverse health outcomes in community dwelling older patients. Br J Clin Pharmacol 2014;77(1):201-10 doi: 10.1111/bcp.12161[published Online First: Epub Date]|.
12. Dedhiya SD, Hancock E, Craig BA, et al. Incident use and outcomes associated with potentially inappropriate medication use in older adults. The American journal of geriatric pharmacotherapy 2010;8(6):562-70 doi: 10.1016/s1543-5946(10)80005-4[published Online First: Epub Date]|.
13. Kalisch LM, Caughey GE, Barratt JD, et al. Prevalence of preventable medication-related hospitalizations in Australia: an opportunity to reduce harm. International Journal for Quality in Health Care 2012;24(3):239-49
14. Carey IM, De Wilde S, Harris T, et al. What factors predict potentially inappropriate primary care prescribing in older people? Analysis of UK primary care patient record database. Drugs Aging 2008;25(8):693-706
15. Lai HY, Hwang SJ, Chen YC, et al. Prevalence of the prescribing of potentially inappropriate medications at ambulatory care visits by elderly patients covered by the Taiwanese National Health Insurance program. Clin Ther 2009;31(8):1859-70 doi: 10.1016/j.clinthera.2009.08.023[published Online First: Epub Date]|.
16. Meurer WJ, Potti TA, Kerber KA, et al. Potentially inappropriate medication utilization in the emergency department visits by older adults: analysis from a nationally representative sample. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 2010;17(3):231-7 doi: 10.1111/j.1553-2712.2010.00667.x[published Online First: Epub Date]|.
17. Alldred DP. Deprescribing: a brave new word? The International journal of pharmacy practice 2014;22(1):2-3 doi: 10.1111/ijpp.12093[published Online First: Epub Date]|.

18. World Health Organisation. Guide to Good Prescribing - A Practical Manual. Chapter 11. STEP 6: Monitor (and stop?) the treatment, 1994.
19. NPS: Better Choices BH. Competencies required to prescribe medicines: putting quality use of medicines into practice. Sydney: National Prescribing Service Limited, 2012.
20. Reeve E, To J, Hendrix I, et al. Patient Barriers to and Enablers of Deprescribing: a Systematic Review. Drugs & Aging 2013:1-15 doi: 10.1007/s40266-013-0106-8[published Online First: Epub Date]|.
21. Dixon-Woods M, Bonas S, Booth A, et al. How can systematic reviews incorporate qualitative research? A critical perspective. Qualitative Research 2006;6(1):27-44 doi: 10.1177/1468794106058867[published Online First: Epub Date]|.
22. Tong A, Flemming K, McInnes E, et al. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Med Res Methodol 2012;12:181 doi: 10.1186/1471-2288-12-181[published Online First: Epub Date]|.
23. Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. Journal of Health Services Research & Policy 2005;10(suppl 1):6-20 doi: 10.1258/1355819054308576[published Online First: Epub Date]|.
24. InterTASC Information Specialists' Sub-Group. Filters to Identify Qualitative Research. Secondary Filters to Identify Qualitative Research. https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/filters-to-identify-qualitative-research.
25. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua 2007;19(6):349-57 doi: 10.1093/intqhc/mzm042[published Online First: Epub Date]|.
26. Hannes K. Chapter 4: Critical appraisal of qualitative research. In: Noyes J, Booth A, Hannes K, et al., eds. Supplementary Guidance for Inclusion of Qualitative Research in Cochrane Systematic Reviews of Interventions: Cochrane Collaboration Qualitative Methods Group, 2011.
27. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med Res Methodol 2008;8:45 doi: 10.1186/1471-2288-8-45[published Online First: Epub Date]|.
28. Tong A, Lesmana B, Johnson DW, et al. The perspectives of adults living with peritoneal dialysis: thematic synthesis of qualitative studies. American journal of kidney diseases : the official journal of the National Kidney Foundation 2013;61(6):873-88 doi: 10.1053/j.ajkd.2012.08.045[published Online First: Epub Date]|.
29. Britten N, Brant S, Cairns A, et al. Continued prescribing of inappropriate drugs in general practice. Journal of clinical pharmacy and therapeutics 1995;20(4):199-205
30. Moen J, Norrgard S, Antonov K, et al. GPs' perceptions of multiple-medicine use in older patients. Journal of Evaluation in Clinical Practice 2010;16(1):69-75
31. Schuling J, Gebben H, Veehof LJG, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. BMC Family Practice 2012;13:56
32. Anthierens S, Tansens A, Petrovic M, et al. Qualitative insights into general practitioners views on polypharmacy. BMC Fam Pract 2010;11:65 doi: 10.1186/1471-2296-11-65[published Online First: Epub Date]|.
33. Fried TR, Tinetti ME, Iannone L. Primary care clinicians' experiences with treatment decision making for older persons with multiple conditions. Arch Intern Med 2011;171(1):75-80 doi: 10.1001/archinternmed.2010.318[published Online First: Epub Date]|.

34. Dybwad TB, Kjolsrod L, Eskerud J, et al. Why are some doctors high-prescribers of benzodiazepines and minor opiates? A qualitative study of GPs in Norway. Fam Pract 1997;14(5):361-8
35. Damestoy N, Collin J, Lalande R. Prescribing psychotropic medication for elderly patients: some physicians' perspectives. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 1999;161(2):143-5
36. Iliffe S, Curran HV, Collins R, et al. Attitudes to long-term use of benzodiazepine hypnotics by older people in general practice: findings from interviews with service users and providers. Aging & mental health 2004;8(3):242-8 doi: 10.1080/13607860410001669778[published Online First: Epub Date]|.
37. Parr JM, Kavanagh DJ, Young RM, et al. Views of general practitioners and benzodiazepine users on benzodiazepines: A qualitative analysis. Social Science and Medicine 2006;62(5):1237-49
38. Cook JM, Marshall R, Masci C, et al. Physicians' perspectives on prescribing benzodiazepines for older adults: a qualitative study. J Gen Intern Med 2007;22(3):303-7 doi: 10.1007/s11606-006-0021-3[published Online First: Epub Date]|.
39. Rogers A, Pilgrim D, Brennan S, et al. Prescribing benzodiazepines in general practice: a new view of an old problem. Health (London, England : 1997) 2007;11(2):181-98 doi: 10.1177/1363459307074693[published Online First: Epub Date]|.
40. Dickinson R, Knapp P, House AO, et al. Long-term prescribing of antidepressants in the older population: a qualitative study. Br J Gen Pract 2010;60(573):e144-55 doi: 10.3399/bjgp10X483913[published Online First: Epub Date]|.
41. Subelj M, Vidmar G, Svab V. Prescription of benzodiazepines in Slovenian family medicine: a qualitative study. Wiener klinische Wochenschrift 2010;122(15-16):474-8 doi: 10.1007/s00508-010-1413-2[published Online First: Epub Date]|.
42. Iden KR, Hjorleifsson S, Ruths S. Treatment decisions on antidepressants in nursing homes: a qualitative study. Scand J Prim Health Care 2011;29(4):252-6 doi: 10.3109/02813432.2011.628240[published Online First: Epub Date]|.
43. Flick U, Garms-Homolová V, Röhnsch G. "And mostly they have a need for sleeping pills": Physicians' views on treatment of sleep disorders with drugs in nursing homes. Journal of Aging Studies 2012;26(4):484-94
44. Raghunath AS, Hungin APS, Cornford CS, et al. Use of proton pump inhibitors: An exploration of the attitudes, knowledge and perceptions of general practitioners. Digestion 2005;72(4):212-18
45. Wermeling M, Himmel W, Behrens G, et al. Why do GPs continue inappropriate hospital prescriptions of proton pump inhibitors? A qualitative study. Eur J Gen Pract 2013 doi: 10.3109/13814788.2013.844787[published Online First: Epub Date]|.
46. Cantrill JA, Dowell J, Roland M. Qualitative insights into general practitioners' views on the appropriateness of their long-term prescribing. International Journal of Pharmacy Practice 2000;8(1):20-26
47. Frich JC, Hoye S, Lindbaek M, et al. General practitioners and tutors' experiences with peer group academic detailing: a qualitative study. BMC Fam Pract 2010;11:12 doi: 10.1186/1471-2296-11-12[published Online First: Epub Date]|.
48. Clyne B, Bradley MC, Hughes CM, et al. Addressing potentially inappropriate prescribing in older patients: development and pilot study of an intervention in primary care (the OPTI-SCRIPT study). BMC Health Serv Res 2013;13:307 doi: 10.1186/1472-6963-13-307[published Online First: Epub Date]|.
49. Spinewine A, Swine C, Dhillon S, et al. Appropriateness of use of medicines in elderly inpatients: qualitative study. BMJ 2005;331(7522):935 doi: 10.1136/bmj.38551.410012.06[published Online First: Epub Date]|.

50. Ostini R, Hegney D, Jackson C, et al. Knowing how to stop: ceasing prescribing when the medicine is no longer required. J Manag Care Pharm 2012;18(1):68-72
51. Ritov I, Baron J. Status-quo and omission bias Journal of Risk and Uncertainty 1992(5):49-61
52. Spranca M, Minsk E, Baron J. Omission and commission in judgment and choice. Journal of Experimental Social Psychology 1991(27):76-105
53. Tsalatsanis A, Hozo I, Vickers A, et al. A regret theory approach to decision curve analysis: a novel method for eliciting decision makers' preferences and decision-making. BMC medical informatics and decision making 2010;10:51 doi: 10.1186/1472-6947-10-51[published Online First: Epub Date]|.
54. Cullinan S, O'Mahony D, Fleming A, et al. A Meta-Synthesis of Potentially Inappropriate Prescribing in Older Patients. Drugs Aging 2014 doi: 10.1007/s40266-014-0190-4[published Online First: Epub Date]|.
55. Bradley CP. Factors which influence the decision whether or not to prescribe: the dilemma facing general practitioners. Br J Gen Pract 1992;42(364):454-8
56. Butler CC, Rollnick S, Pill R, et al. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. BMJ 1998;317(7159):637-42
57. Cohen D, McCubbin M, Collin J, et al. Medications as Social Phenomena. Health: 2001;5(4):441-69 doi: 10.1177/136345930100500403[published Online First: Epub Date]|.
58. Kaur S, Mitchell G, Vitetta L, et al. Interventions that can Reduce Inappropriate Prescribing in the Elderly. Drugs & Aging 2009;26(12):1013-28 doi: 10.2165/11318890-000000000-00000[published Online First: Epub Date]|.
59. Patterson S, Hughes C, Kerse N, et al. Interventions to improve the appropriate use of polypharmacy for older people. Cochrane Database Syst Rev 2012;5:CD008165
60. Azermai M, Vander Stichele RRH, Van Bortel LM, et al. Barriers to antipsychotic discontinuation in nursing homes: An exploratory study. Aging and Mental Health 2014;18(3):346-53 doi: 10.1002/14651858.CD007726. [published Online First: Epub Date]|.
61. Bourgeois J, Elseviers MM, Azermai M, et al. Barriers to discontinuation of chronic benzodiazepine use in nursing home residents: Perceptions of general practitioners and nurses. European Geriatric Medicine 2013
62. Iyer S, Naganathan V, McLachlan A, et al. Medication Withdrawal Trials in People Aged 65 Years and Older. Drugs & Aging 2008;25(12):1021-31 doi: 10.2165/0002512-200825120-00004[published Online First: Epub Date]|.

Figure 1 – Flowchart of study selection

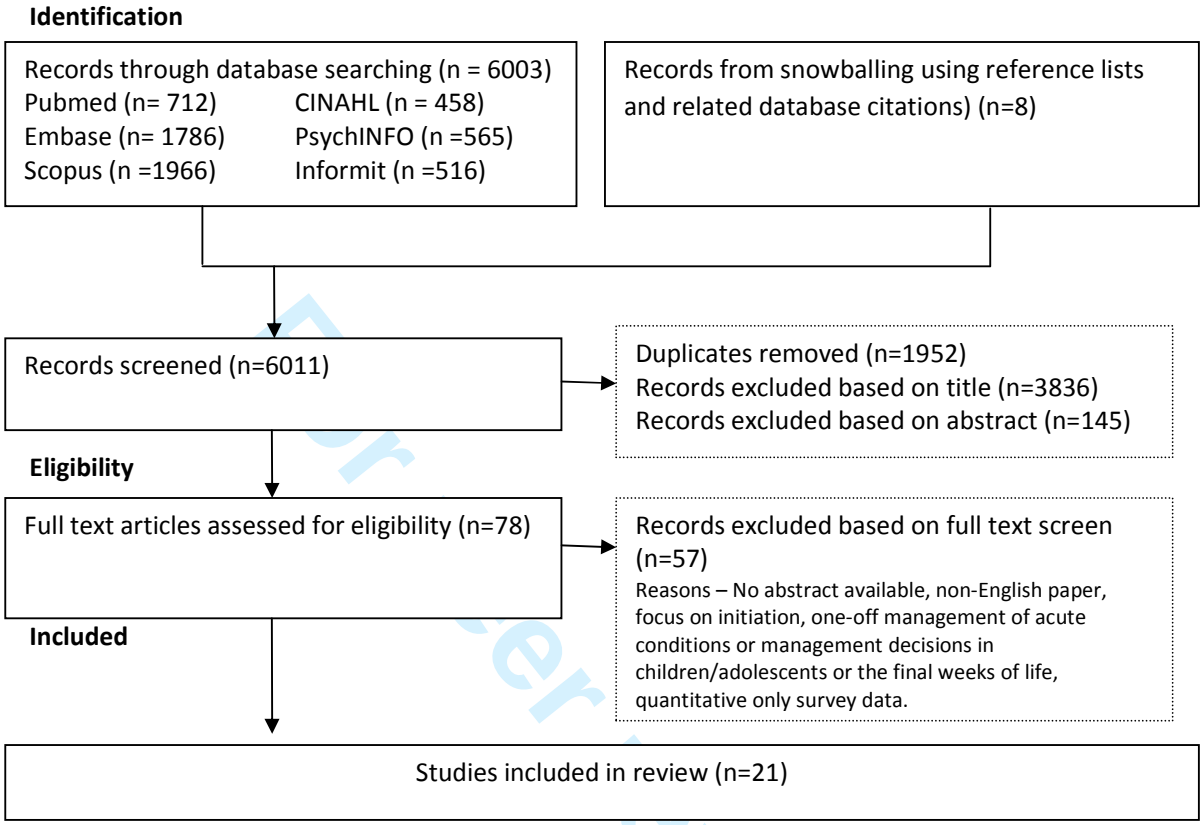
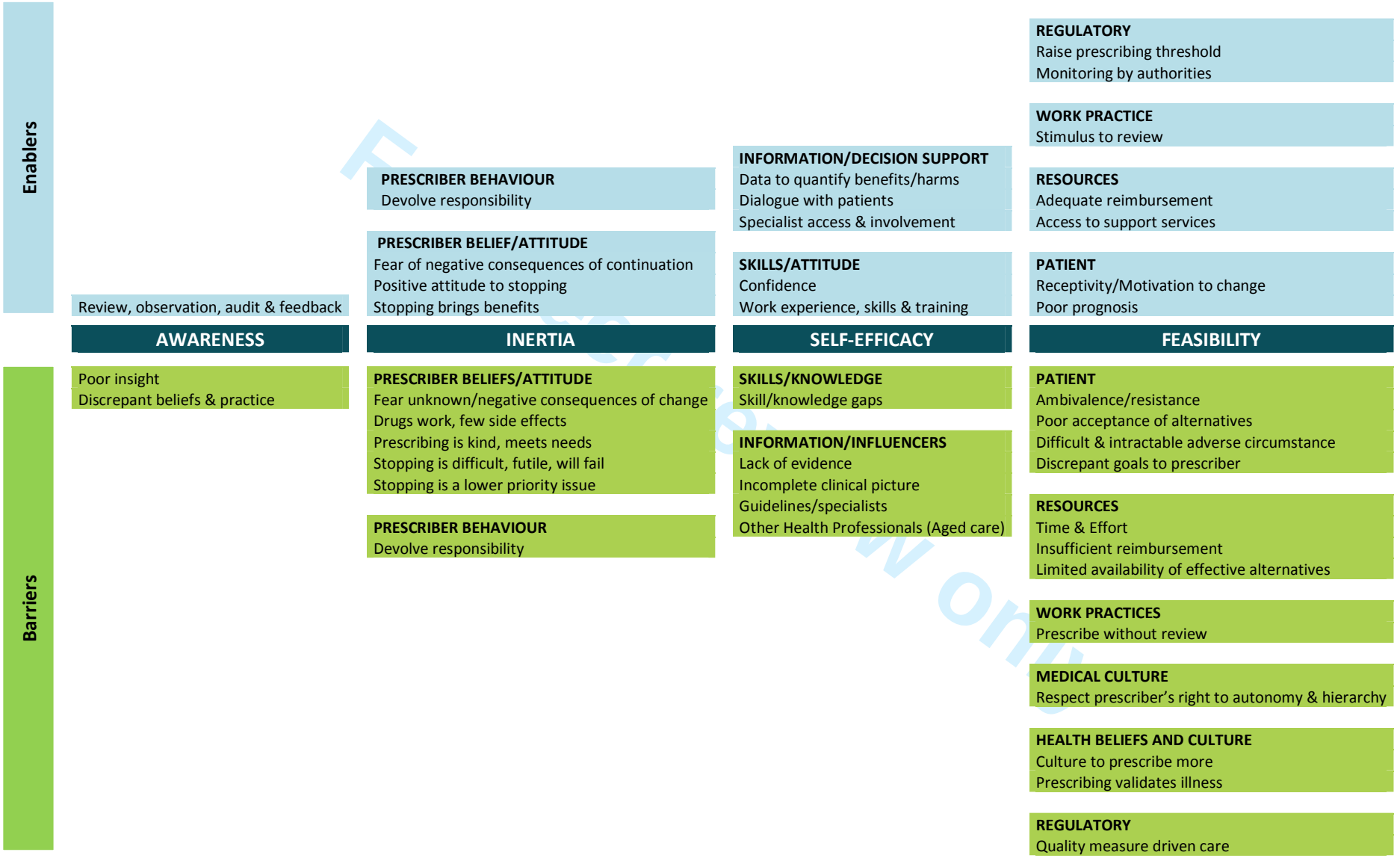


Figure 2 – Schematic Representation of Barriers and Enablers Associated with Each Analytic and Descriptive Theme



Appendix 1 – Search strategy for each electronic database

Pubmed 22 Feb 2014 712 Results

((((((((((withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing OR optim*)) AND (“Prescription drug” OR medicines OR medication OR polypharmacy OR prescribing))) OR inappropriate prescribing)) AND ((Physician OR “family physician” OR “general practitioner” OR GP OR doctor OR clinician OR prescriber OR specialist OR health personnel OR "health professional" OR "health care professional" OR "health practitioner"))) AND ((((((“semi-structured”[TIAB] OR semistructured[TIAB] OR unstructured[TIAB] OR informal[TIAB] OR “in-depth”[TIAB] OR indepth[TIAB] OR “face-to-face”[TIAB] OR structured[TIAB] OR guide[TIAB] OR guides[TIAB]) AND (interview*[TIAB] OR discussion*[TIAB] OR questionnaire*[TIAB])) OR (“focus group”[TIAB] OR “focus groups”[TIAB] OR qualitative[TIAB] OR fieldwork[TIAB] OR “field work”[TIAB] OR “key informant”[TIAB])) OR “interviews as topic”[Mesh] OR “focus groups”[Mesh] OR narration[Mesh] OR qualitative research[Mesh]))))))))))

Embase Search 24 Feb 2014 1786 Results

interview:ab,ti OR discussion:ab,ti OR questionnaire:ab,ti OR survey:ab,ti OR 'focus group':ab,ti OR 'focus groups':ab,ti OR qualitative:ab,ti OR 'qualitative research'/de AND [english]/lim AND [embase]/lim
AND
['inappropriate prescribing'/de OR (inappropriate:ab,ti AND prescribing:ab,ti) AND [english]/lim AND [embase]/lim
OR
(withdraw:ab,ti OR withdrawing:ab,ti OR withdrawal:ab,ti OR cease:ab,ti OR ceasing:ab,ti OR cessation:ab,ti OR stop:ab,ti OR stopping:ab,ti OR discontinue:ab,ti OR discontinuing:ab,ti OR discontinuation:ab,ti OR reduce:ab,ti OR reducing:ab,ti OR reduction:ab,ti ORdeprescribe:ab,ti OR deprescribing:ab,ti OR optim*:ab,ti AND [english]/lim AND [embase]/lim
AND
'prescription drug'/de OR medicines:ab,ti OR medication:ab,ti OR polypharmacy:ab,ti OR prescribing:ab,ti AND [english]/lim AND [embase]/lim)]
AND
physician:ab,ti OR 'family physician':ab,ti OR 'general practitioner':ab,ti OR gp:ab,ti OR doctor:ab,ti OR clinician:ab,ti OR prescriber:ab,ti OR 'medical specialist':ab,ti OR specialist:ab,ti OR 'health care personnel':ab,ti OR 'health professional':ab,ti OR 'health care professional':ab,ti OR 'health practitioner':ab,ti AND [english]/lim AND [embase]/lim

Scopus 12 Mar 2014 – 1966 search results

(TITLE(physician OR "family physician" OR "general practitioner" OR GP OR doctor OR clinician OR prescriber OR specialist OR "health professional" OR "health care professional" OR "health personnel" OR "health practitioner" OR nurse OR pharmacist) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)) AND (TITLE-ABS-KEY(interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative OR "qualitative research") AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)) AND (((TITLE-ABS-KEY(Withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing OR optim*) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR

DENT OR HEAL)) AND (TITLE-ABS-KEY("Prescription drug" OR prescribing OR medicines OR medication OR polypharmacy) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL))) OR (TITLE-ABS-KEY(inappropriate AND prescribing) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)))

Cinahl 20 Mar 2014 - 458 Search results

Physician or "family physician" or "general practitioner" or GP or doctor or clinician or prescriber or specialist or "health professional" or "health care professional" OR "health personnel" or "health practitioner"
AND
("inappropriate prescribing" OR (inappropriate and prescribing)
OR
("prescription drug" OR prescribing OR medicines OR medication OR polypharmacy) AND (
Withdraw or withdrawing or withdrawal or cease or ceasing or cessation or stop or stopping or discontinue or discontinuing or discontinuation or reduce or reducing or reduction or deprescribe or deprescribing or optim*))
AND
interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative

PsycINFO 20 Mar 2014 – 565 Search results

(((AnyField:("prescription drug" OR prescribing OR medicines OR medication OR polypharmacy)) AND (AnyField:(Withdraw or withdrawing or withdrawal or cease or ceasing or cessation or stop or stopping or discontinue or discontinuing or discontinuation or reduce or reducing or reduction or deprescribe or deprescribing or optim*))) OR (AnyField:("inappropriate prescribing" OR (inappropriate AND prescribing)))) AND (AnyField:(Physician or "family physician" or "general practitioner" or GP or doctor or clinician or prescriber or specialist or "health professional" or "health care professional" OR "health personnel" or "health practitioner")) AND (AnyField:(interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative OR "qualitative research"))

INFORMIT 20 Mar 2014 – Health collection – 516 Records

((((((Withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing or optim*) AND (“Prescription drug” OR prescribing OR medicines OR medication OR polypharmacy))) OR (inappropriate and prescribing))) AND (Physician OR “family physician” OR “general practitioner” OR GP OR doctor OR clinician OR prescriber OR specialist OR “health professional” OR “health care professional” OR "health personnel" OR “health practitioner” OR nurse or pharmacist) AND (interview OR discussion OR questionnaire OR “survey” OR “focus group” OR “focus groups” OR qualitative))

BMJ Open

Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2014-006544.R1
Article Type:	Research
Date Submitted by the Author:	16-Oct-2014
Complete List of Authors:	Anderson, Kristen; University of Queensland, School of Medicine; Charming Institute, Stowasser, Danielle; University of Queensland, School of Pharmacy Freeman, Christopher ; Charming Institute, ; University of Queensland, School of Pharmacy Scott, Ian; University of Queensland, School of Medicine; Princess Alexandra Hospital, Department of Internal Medicine and Clinical Epidemiology
Primary Subject Heading:	Qualitative research
Secondary Subject Heading:	Pharmacology and therapeutics
Keywords:	QUALITATIVE RESEARCH, GERIATRIC MEDICINE, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

Title: 'Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis'.

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Keywords: Attitudes, Decision Making, Medication Safety & Qualitative Research, Inappropriate Prescribing

Word count: 4130 words (excluding Title page, References, Figures, Tables, Acknowledgements, Conflict of Interest & Funding)

References: 65

Figures: 2 (Figure 2 maybe be printed in black and white but preference is for colour online. Please note it has been updated since the original submission.)

Tables: 4

Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis

ABSTRACT

Objectives – To synthesise qualitative studies that explore prescribers' perceived barriers and enablers to minimising potentially inappropriate medications (PIMs) chronically prescribed in adults.

Design – A qualitative systematic review was undertaken by searching PubMed, Embase, Scopus, PsycINFO, CINAHL and INFORMIT from inception to March 2014, combined with an extensive manual search of reference lists and related citations. A quality checklist was used to assess the transparency of the reporting of included studies and the potential for bias. Thematic synthesis identified common subthemes and descriptive themes across studies from which an analytic construct was developed. Study characteristics were examined to explain differences in findings.

Setting – All healthcare settings.

Participants – Medical and non-medical prescribers of medicines to adults.

Outcomes – Prescribers' perspectives on factors which shape their behaviour towards continuing or discontinuing PIMs in adults.

Results – Twenty-one studies were included, most explored primary care physicians' perspectives on managing older, community-based adults. Barriers and enablers to minimising PIMs emerged within four analytic themes: problem awareness; inertia secondary to lower perceived value proposition for ceasing versus continuing PIMs; self-efficacy in regards to personal ability to alter prescribing; and feasibility of altering prescribing in routine care environments given external constraints. The first three themes are intrinsic to the prescriber (e.g. beliefs, attitudes, knowledge, skills, behaviour) and the fourth is extrinsic (e.g. patient, work-setting, health system and cultural factors). The PIMs examined and practice setting influenced the themes reported.

Conclusions - A multitude of highly interdependent factors shape prescribers' behaviour towards continuing or discontinuing PIMs. A full understanding of prescriber barriers and enablers to changing prescribing behaviour is critical to the development of targeted interventions aimed at deprescribing PIMs and reducing risk of iatrogenic harm.

ARTICLE SUMMARY

Strengths and limitations of this study

- This is the most comprehensive review to date of prescribers' barriers and enablers to minimising potentially inappropriate medications which are chronically prescribed in adults
- Although database and manual searching was protracted and extensive, it is possible not all relevant studies were found due to poor indexing and inconsistent terminology for this topic
- Utilisation of a peer-reviewed, published method for thematic synthesis and checklist to assess potential bias in studies contributed to the review's methodological rigour
- Included studies largely explored primary care physicians' perspectives on managing older, community-based adults in relation to relatively few drug classes and may limit the generalisability of the findings

INTRODUCTION

Studies in the United States and Australia indicate at least one in two older people (aged 65 years or greater) living in the community use five or more prescription, over-the-counter or complementary medicines every day, and the number used increases with age. [1 2] Polypharmacy (the use of multiple medications concurrently) predisposes older people to being prescribed potentially inappropriate medications (PIMs), i.e. where the actual or potential harms of therapy outweigh the benefits. [3-5] Recent international data suggests that one in five prescriptions for community-dwelling older adults is inappropriate. [6] In Australia, approximately 20%-50% of individuals in this age group are prescribed one or more PIMs, with higher rates seen in residential aged care facilities (RACFs). [3 7-10] For adults younger than 65 years of age, rates of prescribing of PIMs have not been quantified beyond single medication classes (e.g. benzodiazepines, proton pump inhibitors). The rates and harms of polypharmacy in this population remain uncertain, although likely to be considerably less than that seen in older adults. In contrast, the harms of polypharmacy and prescribing of PIMs in older people are well established. Prescribing of PIMs is independently associated with adverse drug events, hospital presentations, poorer health related quality of life and death. [11 12] Up to 15% of all hospitalisations involving older people in Australia are medication-related, with one in five potentially preventable. [13]

These well documented harms of prescribing PIMs should evoke a response from clinicians to identify and stop, or reduce the dose of, inappropriate medications as a matter of priority. While there is some evidence that PIM exposure has decreased marginally over recent years, its prevalence remains high. [3 14-16] The process of reducing or discontinuing medications, with the goal of minimising inappropriate use and preventing adverse patient outcomes is increasingly referred to as 'deprescribing'. [17] Although the term may be new, appropriate cessation or reduction of medication is a long accepted component of competent prescribing. [18 19]

The act of stopping a medication prescribed over months to years, however, is complicated by many factors related to both patients and prescribers. These need to be understood if effective deprescribing strategies are to be developed. A recent review by Reeve *et al* identified patient barriers to, and enablers of, deprescribing, [20] but to our knowledge, no comprehensive review of prescribers' perspectives has been reported, which this paper aims to provide.

METHODS

In the absence of a universally accepted method to conduct a systematic review of qualitative data, we utilised principles of quantitative systematic review, applied to qualitative research, [21] and were guided by the Cochrane endorsed ENTREQ (*Enhancing transparency in reporting the synthesis of qualitative research)* position statement. [22]

Search strategy and sources

An initial search was conducted to ensure no systematic review on the same topic already existed. Two experienced health librarians were independently consulted in developing a comprehensive search strategy, which was informed by extensive prior scoping. [23]

PubMed, Embase, Scopus (limited to Health Sciences), PsycINFO, CINAHL and INFORMIT (Health Collection) electronic databases were searched from inception to March 2014. Filters to identify qualitative research were used and adapted to improve search sensitivity. [24] These were combined with terms and text words for: medical and non-medical prescribers and either inappropriate prescribing or reducing, stopping or optimising medications. Terms/text words were searched in all/any fields or restricted to title, abstract or keyword, depending upon the size of the database and sophistication of its indexing. Reference lists and related citations of relevant articles were reviewed for additional studies. The full search strategy is detailed in the Appendix.

Study selection

After duplicate citations were excluded, one reviewer (KA) screened titles, abstracts and where necessary, full text, to create a list of potentially relevant full text articles. Articles were required to meet provisional, intentionally overly inclusive, eligibility criteria to minimise the risk of inappropriate exclusions by the single reviewer. This list was forwarded to three reviewers (CF, DS, IS) who independently assessed the articles for inclusion. Discrepant views were resolved by group discussion to create the final list of included papers based on refined eligibility criteria.

Inclusion and exclusion criteria

Inclusion criteria comprised: 1) original research articles with a qualitative component (i.e. qualitative, mixed or multi-method studies all accepted); and 2) focus on eliciting prescribers' perspectives of factors that influence their decision to continue or cease chronically prescribed PIMs (as defined by the authors of each study) in adults.

No limits were placed on the care or practice setting of the patient or prescriber respectively, or whether the article related to single or multiple medications.

Exclusion criteria comprised: 1) reviews, papers not published in English, and those for which the abstract or full text were not available; 2) focus on medication management decisions in the final weeks of life; 3) focus entirely on initiation of PIMs and; 4) reported only quantitative data derived from structured questionnaires.

Assessment of the quality of studies

One researcher (KA) assessed the reporting of studies using the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist. This reporting guideline, endorsed by the Cochrane Collaboration, assesses the completeness of reporting and potential for bias in studies of interviews or focus groups. [25] Any instances of interpretive uncertainty arising from the checklist were discussed and resolved within the four investigators.

Studies were not excluded or findings weighted on the basis of the COREQ assessment. Rather, we elected to include all studies, ascribing to the theory that the value of insights contained within individual studies may only become apparent at the point of synthesis rather than during the appraisal process. [26]

Data extraction process

For all included articles, data were extracted about study aims, location, setting, study design, participants, recruitment, PIMs examined, and prescribers' perspectives of factors influencing the chronic prescription of PIMs. Data for thematic analysis were only extracted from the results (not discussion) section of papers, with particular notice taken of quotations from prescriber participants.

Synthesis of results

The method used to synthesise results was based on the technique of thematic synthesis described by Thomas and Harden. [27] Following multiple readings of the papers to achieve immersion, KA manually coded and extracted text, and developed subthemes until no further subthemes could be identified. Two reviewers (DS, IS) independently read all papers and then reviewed extracted, coded text and subthemes to confirm comprehensiveness and reliability of the findings [28]. Descriptive and draft analytic themes were subsequently developed by KA and then presented to, and discussed with, all investigators in developing and finalising the new analytic construct. Study characteristics and results were analysed for associations between specific themes and studies.

RESULTS

Study selection

The search yielded 6011 papers, 21 of which met the selection criteria (see Figure 1). There were no studies exploring the perspectives of non-medical prescribers.

Study characteristics

Characteristics of included studies are presented in Table 1. All but one, which collected data by survey, used focus groups and semi-structured interviews to collect qualitative data. [29] Four papers explored prescribers' views in relation to multiple medications (i.e. polypharmacy) [30-33]whilst the remaining papers investigated prescribers' views in relation to single PIMs or classes of medications (ten described one or more centrally acting agents such as psychotropics, hypnotics, benzodiazepines, minor opiates and antidepressants[34-43]; two for proton pump inhibitors [44 45] and five for miscellaneous PIMs defined according to pre-specified criteria, a preset medication list or clinical judgement. [29 46-49] Eighteen studies elicited the views of prescribers practicing in primary care, [29-41 44-48] one of prescribers in secondary care,[49] and two of prescribers servicing RACFs. [42 43]

Table 1 – Studies investigating the perspectives of prescribers in various settings

Year of publication	Lead author	Country	Aim	Medication types	Participants & setting	Age focus*	Data collection method	Analysis
1995	Britten	England	To identify patients whose current medication is the result of past treatment decisions and is regarded by their current GP as no longer appropriate, and to describe the drugs and the circumstances in which they continue to be prescribed	Miscellaneous PIMs	7 GPs, primary care	All ages	Descriptive survey; GP selected patients prescribed inappropriate medicines, structured data extraction from notes & GP-facilitated interview of patient	N/A
1997	Dybwad	Norway	To understand factors that could result in variations between GPs in order to form hypotheses and build theories about prescribing (main focus on factors that explain higher rates of prescribing)	Benzodiazepines and minor opiates	38 GPs (18 high rate prescribers, 20 medium to low rate prescribers), primary care	All ages	SSIs (combined with prescription registration information)	Not stated
1999	Damestoy	Canada	To explore physicians' perceptions and attitudes and the decision-making process associated with prescribing psychotropic medications for elderly patients	Psychotropics (sedatives, hypnotics, anxiolytics and antidepressants)	9 physicians who conduct home visits, primary care	Older patients	(Presumed face-to-face) SSIs	Grounded theory analysis
2000	Cantrill	England & Scotland	To explore factors which may contribute to inappropriate long-term prescribing in United Kingdom general practice	Miscellaneous PIMs	22 GPs, primary care	All ages	Face-to-face & telephone interviews informed by specific examples of PIMs identified by validated indicators	Not stated
2004	Iliffe	England	To explore beliefs and attitudes about continuing or stopping benzodiazepine hypnotics amongst older patients using such medicines, and amongst their general practitioners	Benzodiazepines	72 GPs, primary care	Older patients	Non-standardized interview group discussions	Not stated
2005	Spinewine	Belgium	To explore the processes leading to inappropriate use of medicines for elderly patients admitted for acute care	Miscellaneous PIMs	3 geriatricians & 2 house officers, hospital elderly acute care wards	Older patients	SSIs with health professionals triangulated with observation on wards and FGs with elderly inpatients	Not stated
2005	Raghunath	England	To understand the prescribing behaviour of GPs by exploring their knowledge, understanding and attitudes towards PPIs	PPIs	49 GPs, primary care	All ages	Focus groups	Not stated
2006	Parr	Australia	To gain more detailed understanding of GP and benzodiazepine user perceptions relating to starting, continuing and stopping benzodiazepine use	Benzodiazepines	28 GPs, primary care	All ages	SSIs	Not stated
2007	Cook	USA	To understand factors influencing chronic use of benzodiazepines in older adults	Benzodiazepines	33 Primary care physicians	Older patients	Face-to-face and telephone SSIs	Narrative analysis
2007	Rogers	England	To explore the dilemma the controversial benzodiazepine legacy has created for recent practitioners & their view of prescribing benzodiazepines	Benzodiazepines	22 GPs, primary care	All ages	SSIs	Not stated
2010	Anthierens	Belgium	To describe GPs' views and beliefs on polypharmacy in order to identify the role of the GP in improving prescribing behaviour	Polypharmacy	65 GPs, primary care	Older patients	Face-to-face individual SSIs (literature informed interview guide)	Content analysis
2010	Dickinson	United Kingdom	To explore the attitudes of older patients and their GPs to chronic prescribing of antidepressant therapy, and factors influencing such prescribing	Antidepressants	10 GPs, primary care	Older patients	SSIs	Framework analysis

Year of publication	Lead author	Country	Aim	Medication types	Participants & setting	Age focus*	Data collection method	Analysis
2010	Frich	Norway	To explore GPs' and tutors' experiences with peer group academic detailing, and to explore GPs' reasons for deviating from recommended prescribing practice	Miscellaneous PIMs	20 GPs (39 GPs also interviewed on topics outside scope of this review)	Older patients	Focus group interviews following individual receipt of prescription profile report	Thematic content analysis
2010	Moen	Sweden	To explore GPs' perspectives of treating older users of multiple medicines	Polypharmacy	31 GPs (4 private, 27 county-employed), primary care	Older patients	Focus groups (literature informed question guide)	Conventional content analysis
2010	Subelj	Slovenia	To investigate how high-prescribing family physicians explain their own prescription	Benzodiazepines	10 family physicians (5 high and 5 low prescribers), primary care	All ages	SSIs	Not stated
2011	Fried	USA	To explore clinicians' perspectives of and experiences with therapeutic decision making for older persons with multiple medical conditions	Polypharmacy	36 physicians, primary care, Vet affairs and academia	Older patients	Focus groups	Content analysis
2011	Iden	Norway	To explore decision-making among doctors and nurses on antidepressant treatment in nursing homes	Antidepressants	16 doctors, 8 each working full & part time in residential aged care facilities	Older patients	Focus groups	Systematic text condensation & analysis
2012	Flick	Germany	To explore, given the specific risks and the limited effect of sleeping medication, why doctors prescribe hypnotics for the elderly in long-term care settings	Hypnotics	20 prescribers servicing residential aged care facilities	Older patients	Episodic interviews	Thematic analysis
2012	Schuling	The Netherlands	To explore how experienced GPs feel about deprescribing medication in older patients with multimorbidity and to what extent they involve patients in these decisions	Polypharmacy	29 GPs, primary care	Older patients	Focus groups	Not stated
2013	Clyne	Ireland	To evaluate GP perspectives on a pilot intervention (to reduce PIP in Irish primary care)	Miscellaneous PIMs	8 GPs in focus group & 5 GPs for SSIs , primary care	Older patients	Focus group & SSIs	Thematic analysis
2013	Wermeling	Germany	To describe factors and motives associated with the inappropriate continuation of prescriptions of PPIs in primary care	PPIs	10 GPs (5 who frequently continue and 5 who frequently discontinue PPIs), primary care	All ages	SSIs	Framework analysis

GPs = General Practitioners; PIMs = Potentially inappropriate medications; PIP = Potentially inappropriate prescribing; PPIs = Proton Pump Inhibitors; SSIs = Semi-structured interviews.

* Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Table 2 – Comprehensiveness of reporting assessment (Consolidated criteria for reporting qualitative studies checklist) [25]

Reporting Criteria	Number N=x of 21	References of studies reporting each criterion
DOMAIN 1:		
Characteristics of research team		
1. Interviewer/facilitator identified	14	[30-34 37 38 42 44-49]
2. Credentials	12	[29 30 33-35 38-40 42 46 47 49]
3. Occupation	7	[34 38-40 42 46 49]
4. Gender	16	[30-35 37-39 42 43 45-49]
5. Experience and training	2	[38 39]
Relationship with participants:		
6. Relationship established before study started	5	[34 36 41 44 45]
7. Participant knowledge of the interviewer	3	[34 36 41]
8. Interviewer characteristics	4	[38 39 42 47]
DOMAIN 2:		
Study design		
9. Methodological theory identified	15	[30 32-35 37 38 40 42-45 47-49]
Participant selection		
10. Sampling method (e.g. purposive, convenience)	21	[29-49]
11. Method of approach	13	[30 32 34 37 38 40-43 45-47 49]
12. Sample size	21	[29-49]
13. Number/reasons for non-participation	7	[32 34 35 37 40 41 44]
Setting		
14. Setting of data collection	11	[29-32 34 36 37 39 41 45 46]
15. Presence of non-participants	0	-
16. Description of sample	17	[29-34 37-45 47 49]
Data collection		
17. Interview guide	16	[29-35 37 38 40-43 46 47 49]
18. Repeat interviews	0	-
19. Audio/visual recording	19	[30-35 37-49]
20. Field notes	6	[30 32 37 40 42 47]
21. Duration	12	[30 31 33 35 37 41-45 48 49]
22. Data saturation	7	[30 31 35 37-39 44]
23. Transcripts returned to participants	1	[44]
DOMAIN 3		
Data analysis		
24. Number of data coders	16	[30-34 36 37 39-42 44-47 49]
25. Description of coding tree	15	[30-34 37 39-45 47 49]
26. Derivation of themes	18	[30-34 36-47 49]
27. Software	6	[30 38 40 44 48 49]
28. Participant checking	2	[37 49]
Reporting		
29. Participant quotations presented	18	[30-34 37-49]
30. Data and findings consistent	20	[29-35 37-49]
31. Clarity of major themes	18	[29-34 37-47 49]
32. Clarity of minor themes	14	[29-31 33 34 36 37 39-41 43-45 49]

COREQ assessment

The completeness of reporting varied across studies, with an average of 17 (range 8-22) of 32 items from the COREQ checklist clearly documented (Table 2). The single descriptive survey reported nine of 24 applicable fields. [29] See Supplementary Table for the completed COREQ assessment for each study.

Lowest rates of reporting were observed in Domain 1 meaning that researcher bias (poor confirmability) cannot be excluded. [26] Greater transparency was apparent with Domains 2 and 3 allowing comparatively better assessment of the credibility, dependability and transferability of study findings. For example, all studies reported the sample size and method and most reported a description of the sample and interview guide. There was consistency between raw data and interpretive findings in all papers except one in which the interpretation was so brief that its accuracy was considered doubtful. [36] For five papers it was unclear whether ethics approval was obtained. [29 34 43 44 46]

Synthesis of results

Thematic synthesis yielded 42 subthemes, 12 unique descriptive themes and 4 analytic themes (Figure 2), with multiple interdependencies and relationships. Barrier and enabler descriptive themes and subthemes tended to mirror each other for each analytic theme of Awareness, Inertia, Self-efficacy and Feasibility. The first three themes reflect factors intrinsic to the prescriber and his/her decision making process while the fourth deals with extrinsic factors. Tables 3 and 4 provide illustrative quotations from either primary study participants or study authors relating to barrier and enabler subthemes, respectively.

Table 3 – Illustrative quotations for barrier themes and subthemes

Analytic & Descriptive themes	Subtheme and References	Characteristics of studies from which subthemes were derived: Type of PIMs; Age range*; Setting (number of references).	Illustrative quotations "*Italicised text*" = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS			
	Poor insight[46 47 49]	Misc PIMs (3); Older (2) & all ages (1); Primary (2) & secondary care (1).	"*When I saw the list of patients [to be discussed with the researcher], I was quite happy about the prescriptions…but obviously when you look at them in more detail there are anomalies there that ought to be either checked on, reviewed or even altered."* [46]
	Discrepant beliefs and practice [31 34 38 41 44]	Benzos (2) & minor opiates (1), Polypharm (1), PPIs (1); Older (1) & all ages (4); Primary care (5).	'In contrast to stated beliefs about best practice, physicians estimated that 5-10% of their older adult patients were using benzodiazepines on a daily basis for at least the past 3 months.' [38]
INERTIA			
PRESCRIBER BELIEFs/ ATTITUDE	Fear of unknown/negative consequences of change (for the prescriber, patient and staff) [29-31 34-36 38 40 42-47 49]	Antidepressants (2), Benzos (2) & minor opiates (1), Hypnotics (1), Misc PIMs (4), Polypharm (2), PPIs (2), Psychotropics (1); Older (9) & all ages (6); Primary (12), residential aged (2) & secondary (1) care.	*"He gets very worried and excitable if you attempt to change anything… even just something minor would cause him virtually a breakdown."* [46] *"We can't predict the effect [of deprescribing] for the individual patient."* [31] *"It's scary to stop a medication that's been going for a long time, because you kind of think am I opening a can of worms here, because I don't know what the reasons were for them starting that medication. To explore all that will take, you know, I can't do all that now, I will have to do that another time."* [40] *"I suggest to them that ideally we should try to get them off of that, but if they're saying, been there, done that, that didn't work for me when I came off of this, I don't think it's worth getting into a big knock-down drag-out [fight] with them or having them leave my practice over this issue".* [38]
	Drugs work, few side effects [34 35 38 39 41 43-45 47]	Benzos (3) & minor opiates (1), Hypnotics (1), Misc PIMs (1), PPIs (2), Psychotropics (1); Older (4) & all ages (5); Primary (8) & residential aged (1) care.	'In their [the physicians'] view psychotropic medication helps the elderly patient remain functional and is the least problematic solution... The physicians stated that they often do not see side effects and that patients often do not report them...' [35]
	Prescribing is kind, meets needs (of patient, staff, carer) [34 37-41 43 44]	Antidepressants (1), Benzos (4) & minor opiates (1), Hypnotics (1), PPIs (1); Older (3) & all ages (5); Primary (7) & residential aged (1) care.	*"There is a paradox concerning older patients. You do not want to make them grow dull, but on the other hand you know their chronic problems, and you know that at their age the drugs are not so addictive. You want them to keep their minds clear, but on the other hand I do have a tendency to be permissive to older patients."* [34] *"...It treats our own pain as well as our patients' pain, 'cos we want to help people and make people feel better. So if we give people something and make them feel better, then everybody seems to be happier."* [39]
	Stopping is difficult, futile has/will fail [31 34 36-38 42 43 46 47] ,	Antidepressants (1), Benzos (3) & minor opiates (1), Hypnotics (1), Polypharm (1), Misc PIMs (2); Older (6) & all ages (3); Primary (7) & residential aged (2) care.	*"Let's pretend it's an octogenarian…if it's gonna make the patient feel better, I don't care if the patient's on it for the rest of their life."* [38] 'Most frequent concern identified was the difficulty anticipated in persuading older patients to withdraw after years of using benzodiazepines.' [36]

			"In my experience, patients get hooked on PPIs, it is almost addictive like heroin and people appear to experience severe indigestion symptoms on attempting to stop them." [44]
	Stopping is a lower priority issue[38 40 44 45 49]	Antidepressants (1), Benzos (1), Misc PIMs (1), PPIs (2); Older (3) & all ages (2); Primary (4) & secondary (1) care.	"... We are always faced with multiple problems and PPIs are just one issue..." [44]
PRESCRIBER BEHAVIOUR	Devolve responsibility [29 34 35 40-43 49]	Antidepressants (2), Benzos (1) & minor opiates (1), Hypnotics (1), Misc PIMs (2), Psychotropics (1); Older (5) & all ages (3); Primary (5), secondary (1) & residential aged (2) care.	'They [the physicians] recognized that the inappropriate use of psychotropic medication for elderly patients was a public health problem, but they felt that it was beyond the scope of the individual physician.' [35] *"(...) I ask them if it should be a sleeping pill or another of the available options and mostly they have a need for sleeping pills."* [43] *"I have been running this practice for twelve years. I took it over from an older colleague. I took over all his patients. They were mostly old people. Prescribing policy has been rather liberal, and I have continued this policy."* [34]
SELF-EFFICACY			
SKILLS/ KNOWLEDGE	Skills/knowledge gaps[30-35 40 45 49]	Antidepressants (1), Benzos & minor opiates (1), Misc PIMs (1), Polypharm (4), PPIs (1), Psychotropics (1); Older (7) & all ages (2); Primary (8) & secondary (1) care.	*"I don't have enough time for education about the newest information on psychiatric disorders, and better communication with specialists would be very helpful." [41]* 'Side effects are not always recognised as such.' [32] "*When house officers come on our ward, they haven't necessarily been trained in geriatrics. So they arrive here, and then they start with 10mg of morphine every four hours. That's too much*." (Hospital based geriatrician) [49] *"You look at the medication list and want to reduce it but then you can't find things you can eliminate."* [31]
INFORMATION/ INFLUENCERS	Lack of evidence[30 31 33]	Polypharm (3); Older age (3); Primary care (3).	*"To me, the guidelines are kind of a hindrance. At the moment they do not cater for older patients"* [31]
	Incomplete clinical picture [30-33 40 41 46 47 49]	Antidepressants (1), Benzos (1), Misc PIMs (3), Polypharm (4); Older (7) & all ages (2); Primary (8) & secondary (1) care.	*"The problem is that the medication lists of the doctors involved are not exchanged and are consequently inconsistent."* [31] *"One has discovered that they might have completely different expectations than what the doctor had from the beginning. Do they want to survive for five more years or? And so on. What are their expectations?"* [30] '…Medicines, (mainly for chronic conditions) were sometimes not appropriately reviewed because there was no written information on indication and follow-up or because this was not readily available.' [49] "...sometimes the older people decide for themselves to reduce some of their medication or to adjust the doses without telling their GP. Therefore as their GP you can have the wrong impression about their medication intake..." [32]
	Guidelines/specialists[30-33 38	Benzos (1), Misc PIMs (2), Polypharm (4),	'When existing guidelines are debated, GPs felt deceived and insecure... The importance of individualising

	44 46 49]	PPIs (1); Older (6) & all ages (2); Primary (7) & secondary (1) care.	treatment was also expressed and many guidelines were perceived as too rigid leading to a standardized 'kit' of medicines per indication...' [30] *"I have difficulty not following the guidelines if I don't have good reasons to do so."* [31] *"When the hospital consultant recommends a treatment it's difficult… for us not to prescribe unless there is a very good reason. To some extent we feel obliged to carry on when they have initiated it."* [46]
	Other Health Professionals (Aged Care) [42 43]	Antidepressants (1) & Hypnotics (1); Older patients (2); Aged care (2).	*"(…) in such a situation it amounts to the sleeping pill, because everybody else's need is the sleeping pill, and I would have to fight tooth and nail if really I wanted to avoid this."* [43] *"They (RACF nurses) called me on the carpet to tell me that withdrawing antidepressants was not a clever thing to do because the patient became angrier and resisted care. They therefore demanded that I reinstate medication."* [42]
FEASIBILITY			
PATIENT	Ambivalence/resistance to change [29-32 35 37 38 40 43 44 46 48 49]	Antidepressants (2), Benzos (2), Hypnotics (1), Misc PIMs (4), Polypharm (3), PPIs (1), Psychotropics (1); Older (9) & all ages (4); Primary (11), secondary (1) & residential aged (1) care.	*"When I said initially we wanted her to come off it, she said, oh no, I've been on that for ages, and I don't want to come off it."* [48] *"The discontent rarely lies with the patient themselves."* [31]
	Poor acceptance of alternatives[37 38 42-44]	Antidepressants (1), Benzos (2), Hypnotics (1), PPIs (1); Older (3) & all ages (2); Primary (3) & residential aged (2) care.	*"… these types of people and they tend not to want to help themselves, you know they won't take the hypnotherapy and they won't go to yoga classes and they won't do anything else. They just want a quick fix."* [37]
	Difficult & intractable adverse circumstance [34 35 37 39 40]	Antidepressants (1), Benzos (2) & minor opiates (1), Psychotropics (1); Older (2) & all ages (3); Primary care (5).	*"I think they have horrible lives, a lot of them… I think it's a combination of all things, their health, their social circumstances… I think a lot of people are on antidepressants because of everything put together. And you can't… change most of the factors that cause it."* [40]
	Discrepant goals to prescriber [30 33]	Polypharmacy (2); Older age (2); Primary care (2).	*"I kind of get aggravated that half of the medicines that I think are totally rubbish are the ones that the patient really wants to take."* [33]
RESOURCES	Time and effort[30 33 34 37 38 40-42 46 48 49]	Antidepressants (2), Benzos (3) & minor opiates (1), Misc PIMs (3), Polypharm (2); Older (7) & all ages (4); Primary (9), secondary (1) & residential aged (1) care.	*"We have a big problem with long-term hypnotic use. It would take an awful lot of work and it's purely a time and work problem".* [46]
	Insufficient reimbursement[37 38]	Benzos (2); Older (1) & all ages (1); Primary (2) care.	'… a lack time or resources to provide counselling, especially due to the absence of remuneration for doing so.' [37]
	Limited availability of effective alternatives [37 38 41-43]	Antidepressants (1), Benzos (3), Hypnotics (1); Older (3) & all ages (2); Primary (3) & residential aged (2) care.	'…There is hardly any alternative to medicamentous therapy.' [43]
WORK PRACTICES	Prescribe without review [34 35 42 43 45-47]	Antidepressants (1), Benzos & minor opiates (1), Hypnotics (1), Misc PIMs (2),	*"(…) then he gets something and he continues this pill, and then the issue is over for him, then it's quiet, and then he has his pill and then he sleeps through, and from time to time you may enquire, it if occurs to*

		PPIs (1), Psychotropics (1); Older (4) & all ages (3); Primary (5) & residential aged (2) care.	*you while looking at his medication."* [43]*"When we work in a large health centre, then we sign prescriptions for each other... when a colleague is absent, we issue prescriptions for him that day. Any prescription I issue is my responsibility, but if you are asked to prescribe a particular drug [for a colleague] then you sign it in the reception. I don't check which other drugs that person uses."* [47]
MEDICAL CULTURE	Respect prescriber's right to autonomy & hierarchy [29 30 34 37 45 46 49]	Benzos (1) & minor opiates (1), Misc PIMs (3), Polypharm (1), PPIs (1); Older (2) & all ages (5); Primary (6) & secondary (1) care.	'The GPs rarely contact colleagues, for example, hospital specialists, as there is a perceived lack of routines for this as well as an informal understanding not to pursue colleagues' motivations for prescriptions. ' [30]
HEALTH BELIEFS & CULTURE	Culture to prescribe more[32 42 47]	Antidepressants (1), Misc PIMs (1), Polypharm (1); Older patients (3), Primary (2) & residential aged (1) care.	*"The number of medications grows slowly. There is a complaint, we give new medication, it continues without really stopping it after a while… and it is our responsibility to try and withdraw it from the patient"* [32]
	Prescribing validates illness[34 40 43]	Antidepressants (1), Benzos & minor opiates (1), Hypnotics (1); Older (2) & all ages (1); Primary (2) & residential aged (1) care.	*"They feel that unless they are on a tablet for it then they are not having any treatment. There are a lot of those kinds of people."* [40]
REGULATORY	Quality measure driven care [33]	Polypharm (1); Older (1); Primary care (1).	*"Another factor that we experience at the VA is these electronic reminders that tell you to do things…What I do really depends on who is in front of me…So the reminder comes up and it makes no sense. This guy's LDL is 101.8… Should I go from 40 to 80 of simvastatin? And what's the risk and benefit there?"* [33]

Benzos = Benzodiazepines; Misc = Miscellaneous, PIMs = Potentially inappropriate medications; Polypharm = Polypharmacy, PPIs = Proton Pump Inhibitors.* Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Table 4 – Illustrative quotations for enabler themes and subthemes

Analytic & Descriptive themes	Subtheme	Characteristics of studies from which subthemes were derived including: Type of PIMs; Age range*; Setting (number of references).	Illustrative quotations "*Italicised text*" = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS			
	Review, observation, audit & feedback [46 47 49]	Misc PIMs (3); Older (2) & all ages (1); Primary (2) & secondary (1) care.	As above.[46]
INERTIA			
PRESCRIBER BELIEFs/ATTITUDE	Fear of negative/unknown consequences of continuation [44]	PPIs (1); All ages (1); Primary care (1).	*"Miracle all right, but too good of anything can be dangerous. Would just like to reiterate that, let me say they [PPIs] even work too well, what worries me is won't there be long-term missed cancers?"* [44]
	Positive attitude toward deprescribing [31]	Polypharm (1); Older age (1); Primary care (1).	*"You can have a field day with crossing off medication: 'sure, scrap half of it'."* [31]
	Stopping brings benefits [36 37 48]	Benzos (2) & Misc PIMs (1); Older (2) & all ages (1); Primary care (3).	*"O ya, and she was delighted, I stopped some of her other medications because she was in front of me and I had a bit of time to do it."* [48]
PRESCRIBER BEHAVIOUR	Devolve responsibility [29 40 44]	Antidepressants (1), Misc PIMs (1), PPIs (1);	'Some [GPs] preferred to wait until the patient went to hospital where they would be taken off their drugs without the GP being blamed. The GP might even write and ask a hospital doctor to do this.' [29]

		Older (1) & all ages (2); Primary care (1).	*"Why not be honest and say, the NHS can't afford to keep giving you these drugs unless there's a very good reason. The patients understand that, and in this day and age they understand perfectly well about cost."* [44]
SELF-EFFICACY			
SKILLS/ ATTITUDE	Confidence (to stop therapy/deviate from guidelines)[33 45]	Polypharm (1), PPIs (1); Older patients (1) & all ages (1); Primary care (2).	*"It's not as if the life of the patient is suddenly at risk because I take away a pill, yes. [...] in the worst case heartburn may re-occur or there is upper abdominal discomfort, but that will not immediately cause a bleeding ulcer."* [45] *"I sort of you know tone those goals down. I am not looking for a Hemaglobin A1C of 7 anymore…so I take the pressure off them and I start removing those medications especially the ones that cause hypoglycaemia."* [33]
	Work experience, skills & training [30 45 49]	Misc PIMs (1), Polypharm (1), PPIs (1); Older (2) & all ages (1); Primary (2) & secondary (1) care.	*"Yes, maybe problem oriented when you are new. Maybe now one thinks more about consequences, in another way."* [30]
INFORMATION/ DECISION SUPPORT	Data to quantify benefits/harms [30-32 48]	Misc PIMs (1), Polypharm (3); Older (4); Primary care (4).	*"…because actually what you could do is to give him (patient) some more 'hard core' facts like: 'If you refrain from treatment your chance of stroke is 20%..."* [30]
	Dialogue with patients[29 30 44 46]	Misc PIMs (2), Polypharm (1), PPIs (1); Older (1) & all ages (3); Primary care (4).	'Discussion during the research interview made some patients more willing to consider a change in medication.' [29] 'Adequate discussion with patients was widely recognised as one of the keys to influencing change, but although practiced by some GPs it was not always successful.' [46]
	Access to specialists [40 41 44 49]	Antidepressants (1), Benzos (1), Misc PIMs (1), PPIs (1); Older (2) & all ages (2); Primary (3) & secondary (1) care.	'They (low benzodiazepine prescribing family physicians) desired better co-operation and clear instructions from psychiatrists.' [41]
FEASIBILITY			
PATIENT	Receptivity/motivation to change [33 37 46]	Benzos (1), Misc PIMs (1), Polypharm (1); Older (1) & all ages (2); Primary care (3).	*"He's fairly amenable to tinkering with his pills, so we'll look at that".* [46]
	Poor prognosis[49]	Misc PIMs (1); Older age (1); Secondary care (1).	*"Sometimes people have taken 10 medicines while they were in curative care, and gradually they move on to palliative care. Then we must reconsider all the prescriptions, drug by drug, saying: OK, what's the goal? To improve your comfort? Well, this medicine will make you feel more comfortable; we can stop this other one."* [49]
RESOURCES	Adequate reimbursement [38]	Benzos (1); Older age (1); Primary care (1).	*"Reimbursement is very low... I think if it was something that we did get reimbursed on I think you would see physicians' attitudes a lot different. You'd be more willing to spend time." [38]*
	Access to support services[31 37 41 46]	Benzos (2), Polypharm (1), Misc PIMs (1); Older (1) & all ages (3); Primary care (4).	'Most GPs work closely with a local pharmacist [when undertaking medication review to stop medicines]: the task perception of such pharmacists was an important factor when a GP was looking for decision support in medication review' [31]
WORK PRACTICE	Stimulus to review[29 31 40 44 48 49]	Antidepressants (1), Misc PIMs (3); Polypharm (1), PPIs (1); Older (4) & all ages (2); Primary (5) & secondary (1) care.	'A new patient entering the practice list is welcomed as an opportunity to review their medication.' [31]
REGULATORY	Raise prescribing threshold [44 45]	PPIs (2);	*"I think we are all sitting here and debating about this mainly because of the pressure on us by our*

		All ages (2); Primary care (2)	*pharmaceutical advisors not to prescribe PPIs because of cost implications to the NHS; I bet that this will not be an important topic in 2 years when Losec goes generic."* [44]
	Monitoring by authorities [34]	Benzos & minor opiates (1); All ages (1); Primary care (1).	'The continuous monitoring of prescriptions by health authorities also put stress on the doctors...' [34]

Benzos = Benzodiazepines; Misc = Miscellaneous, PIMs = Potentially inappropriate medications; Polypharm = Polypharmacy, PPIs = Proton Pump Inhibitors. *Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Fewer enablers were reported than barriers and there was variation in the relative contribution of each study to each theme.

AWARENESS

This theme was apparent in the three papers which utilised audit or informal third-party (e.g. other health professional) observation and feedback. [46 47 49] Poor insight was an observed rather than reported barrier, with interventions to raise prescriber awareness an enabler to minimising the prescription of PIMs. Prescriber beliefs at a population level did not necessarily translate to prescribing practices at an individual level. For example, agreement among prescribers that benzodiazepines should not be used regularly or long-term did not necessarily preclude such prescribing in individual patients. [34 38 41]

INERTIA

Inertia was defined as failure to act, despite awareness that prescribing is potentially inappropriate, because ceasing PIMs was perceived to be a lower value proposition than continuing PIMs.

Fear of unknown/negative consequences of change featured in 15 of 22 papers, and related to consequences for: the prescriber (threatened therapeutic relationship, diminished credibility, increased initial and ongoing workload, potential for litigation, conflict with other prescribers/health professionals); [29-31 34-36 38 40 43-47 49] the patient (withdrawal syndrome, symptom relapse or increased risk of the condition/event for which preventive medication was originally prescribed); [36 38 40 42-47] and other health professionals (increased workload and safety concerns of staff in RACFs). [42 43] The prescriber beliefs that facilitate cessation were the converse , that is, fear of unknown/negative consequences of continuation,[44] a positive attitude to stopping medicines [31] and a belief this practice can bring benefits. [36 37 48]

The barrier belief that drugs appear to work with few adverse effects was apparent in nine papers [34 35 38 39 41 43-45 47] of which two studied 'high-rate' and 'low-rate' benzodiazepine prescribers. 'High-rate' prescribers consistently downplayed risks of harm, whereas 'low/ medium-rate' prescribers were more conscious of such risks. [34 41] The futility and potential harm of cessation in patients of advanced age was a subtheme predominantly present in papers considering psychoactive agents. [34 35 38 43 46 47]

Another barrier was the devolvement to another party of responsibility for the decision to continue or cease a medication (e.g. another prescriber, health professional, society, or the patient). One example was continuation of PIMs in patients that prescribers had inherited from colleagues where the former failed to question the rationale used by the latter in prescribing such drugs. [29 34 41 49] Another example was the provision of PIMs upon the request of RACF nursing staff [42] or patients [34 40 43] without critical prescriber review. Finally inappropriate prescribing of psychotropics, while viewed as a public health concern, was considered beyond the scope of individual prescribers. [35]

SELF-EFFICACY

This analytic theme refers to factors that influence a prescriber's belief and confidence in his or her ability to address PIM use. It involves subthemes relating to knowledge, skill, attitudes, influences, information and decision support.

Knowledge or skill deficits, [30-35 40 45 49] including difficulty balancing the benefits and harms of therapy, [30-33] recognising adverse drug effects [31 32]and establishing clear cut diagnoses/indications for medicines [34 35 40] were challenges prescribers faced in identifying and managing PIMs. Balancing the benefits and harms was perceived to be especially difficult when reviewing preventive medications in multimorbid older people with polypharmacy where shorter life expectancy, uncertain future benefits and higher susceptibility to more immediate adverse drug effects must all be considered. [30-33] On the other hand, better quantification of the benefits and harms of therapy, [30-32 48] confidence to deviate from guidelines and stop medications if thought necessary, [33 45] greater experience, [30 45] and targeted training, especially in prescribing for older people, [49] were seen as enabling factors.

Compounding generic knowledge and skill gaps were information deficits specific to individual prescribing decisions, resulting from poor communication with multiple prescribers and specialists involved in patient care, inadequate transfer of information at care interfaces, fragmented and difficult-to-access patient medical records, and failure of patients to know/disclose their full medical history/medication lists to prescribers. [30-33 40 41 46 47 49] This subtheme linked strongly with time and effort demands on prescribers, and in two papers was associated with low motivation arising from a perceived inability to efficiently access all information required for optimal prescribing. [40 49]

Eight papers discussed the influence of care recommendations from guidelines and specialists. [30-33 38 44 46 49] Guidelines were often viewed negatively, with prescribers feeling pressured to comply with recommendations at odds with the complexities of clinical practice. [30-32 44 46] Pressure from staff to continue prescribing PIMs, often to maintain facility routines, was presented as a barrier unique to RACFs. [42 43] Offsetting this were enablers centred on greater dialogue with patients to increase understanding and facilitate shared decision making,[29 30 44 46] as well as timely access to, and decision support from, specialists, particularly geriatricians and psychiatrists. [37 40 41 44 46 49]

FEASIBILITY

Feasibility refers to factors, external to the prescriber, which determine the ease or likelihood of change. They relate to patient characteristics, resource availability, work practices, medical and societal health beliefs and culture, and regulations.

The most frequently expressed barrier concerning patients was their ambivalence or resistance to change [29-32 35 37 38 40 43 44 46 48 49] and their poor acceptance of alternative therapies. [37 38 42-44] In contrast, receptivity and capacity to change was identified as an enabler in three studies, [33 37 46] as was a poor prognosis which helped crystallise care goals and prompt review of the appropriateness of existing drug regimens. [49]

Limited time and effort to review and discontinue medications [30 33 34 37 38 40-42 46 48 49] was the most common resource constraint followed by limited availability of effective non-drug

treatment options. [35 37 38 41-43] Adequate reimbursement [38]and access to support services such as mental health workers and pharmacists for medication review [31 37 41 46]emerged as enablers.

Certain work practices were raised as barriers to deprescribing, such as provision of repeats for a prescriber's own or colleague's patients, [34 46 47] and the absence of explicit treatment plans or formal or scheduled medication review. [34 43] The mirroring enablers were opportunities to review medication regimens (e.g. hospital admission,[29 49] change of prescriber,[31] specialist[40] or scheduled review). [44 48]

Remaining descriptive themes related to medical and societal health beliefs, cultural and regulatory factors. The most frequently mentioned were discomfort and reluctance to question a colleagues' prescribing decisions [29 30 34 37 45 46 49] associated with respect for professional autonomy or the medical hierarchy when specialist prescribers were involved.

Externally imposed guideline-based quality measures were presented as a barrier to minimising the prescription of PIMs. [33] Raising the prescribing threshold for medications (e.g. through increased cost or restricted access) and monitoring by authorities were seen by prescribers as unwelcome, perverse enablers. [44 45]

DISCUSSION

This systematic review comprehensively investigates prescriber barriers and enablers to minimising the prevalence of chronically prescribed PIMs in adults. The thematic construct we developed from published literature centres on Awareness, Inertia, Self-efficacy and Feasibility. It principally reflects the perspectives of primary care physicians managing older, community based adults. Although the themes and subthemes have been presented separately, the reasons doctors continue to prescribe, or do not cease, PIMs are multi-factorial, highly interdependent and impacted by considerable clinical complexity.

Many subthemes were common to papers regardless of inter-study differences in the PIMs discussed, patient age and clinical setting (e.g. primary, secondary or residential aged care).

Subthemes varied according to whether studies focussed on polypharmacy or single PIMs or classes of PIMs, which was also associated with differing levels of prescriber insight and certainty. In the four studies focussed on polypharmacy, prescribers were aware of polypharmacy-related harm but could not easily identify which medications were inappropriate, as reflected by the subthemes 'difficulty/inability to balance benefits and harms of therapy', [30-33] 'inability to recognise adverse drug effects, [31 32]'lack of evidence' [30 31 33] and 'incomplete clinical picture'. [30-33] In other studies focussing on specific classes of over-prescribed medications, prescribers were aware of this inappropriateness, but in response voiced various rationalisations for continued prescribing such as 'drugs work, few adverse effects', [34 35 38 39 41 43-45 47] 'prescribing is kind and meets needs', [34 37-41 43 44] 'stopping is difficult, futile, has or will fail', [34 36-38 42 43 47] 'poor (patient) acceptance of alternatives', [37 38 42-44] and 'difficult and intractable adverse (patient) circumstance'. [34 35 37 39 40]

However, in other studies focussing on miscellaneous PIMs, prescribers were generally not aware of their inappropriate prescribing until this was revealed to them (e.g. through audit and feedback). [46 47 49]

No definite thematic pattern was observed from the subthemes of six studies which did not specifically focus on the care of older people [29 37 39 41 44 45] compared to the remaining 15 which did. Compared to studies in primary care, unique themes emerged from papers set in RACFs and acute care settings. For example, pressure on prescribers to continue prescribing PIMs at the request of RACF nursing staff was unique to this setting. [42 43] The one study set in acute care highlighted inexperience and training deficiencies of junior prescribers, as viewed by three geriatricians. [49]

The finding that poor insight into potentially inappropriate prescribing practices was only apparent in studies where prescribers were made aware of this is unsurprising, given prescribers do not intentionally prescribe medications inappropriately. It demonstrates the importance of awareness-raising strategies for prescribers. Inertia, as in failure to deprescribe when appropriate, sits at odds with the more traditional use of the word as symbolising failure to intensify therapy when indicated. [50] Inertia has been linked to 'omission bias' where individuals deem harm resulting from an act of commission to be worse than that resulting from an act of omission.[51 52] In the case of deprescribing as an act of commission, it becomes more a matter of reconciling a level of expected utility (accrual of benefits) with a level of acceptable regret (potential to cause some harm). [53] Fear of negative consequences resulting from deprescribing contributes to inertia and is not easily allayed by the current limited evidence base regarding the safety and efficacy of deprescribing. [54] In the same papers in which prescribers rationalised continuation of therapy with the belief that drugs work and have few adverse effects, [34 35 38 39 41 43-45 47] prescribers also identified different thresholds for initiating versus continuing the same therapy. This anomaly suggests either a lack of prescriber insight, clear differences in prescribers' attitudes toward initiation versus continuation, or a social response bias towards a false belief induced by the methodology used by interviewers.

Relevance to previous literature

One meta-synthesis of seven papers has recently been published online exploring prescribers' perspectives of why potentially inappropriate prescribing (PIP) occurs in older people.[55] Compared to our review, this study had a generic focus on PIP, including under-prescribing and its search strategy retrieved fewer articles (n= 7). Scanning their reference list did not reveal any additional papers which would have met our selection criteria and their results yielded no additional themes.

Our findings are consistent with literature (largely focused on *initiation* of therapy) suggesting that pharmacological considerations are not the only factors impacting doctors' prescribing decisions. [56] Rather, prescribing decisions result from interacting clinical, social and cultural factors impacting on both the patient and prescriber. [56-58]

Reeve *et al* recently published a review of patient barriers and enablers to deprescribing [20] and have emphasised the importance of a patient-centred deprescribing process. [59] When

comparing their results with ours, prescribers' barriers are concordant with those of patients with respect to resistance to change, poor acceptance of non-drug alternatives, and fear of negative consequences of discontinuation. However, prescribers also underestimate enabling factors including patients' experiences /concerns of adverse effects, dislike of multiple medicines, and being assured that a ceased medication can be recommenced if necessary. Patients also reported their primary care physician could be highly influential in encouraging them to discontinue therapy, a perception not echoed amongst prescribers.[20] Prescribers need to discuss, rather than assume, patient attitudes towards their medicines and to deprescribing, in the context of their current care goals.

Previous reviews of interventions to reduce inappropriate prescribing/polypharmacy in older patients have not been able to conclude with certainty that multi-faceted interventions are more effective than single strategies.[60 61] Although our findings suggest the former are likely to be more successful, further research is required to identify the barriers and enablers with the greatest potential for impact in designing targeted deprescribing interventions.

Strengths and limitations

Inconsistent terminology and poor indexing of search terms relating to deprescribing and inappropriate therapy greatly hampered our ability to identify relevant studies. Our mitigation efforts comprised a comprehensive pre-scoping exercise, a highly iterative search strategy tailored to each database, and snowballing from reference lists and related citations.

Despite no search restrictions on patient age, clinical setting, or type of PIM, most study participants were experienced primary care physicians caring for older, community-based adults. Caution is therefore needed when transferring our results to other settings or patient groups. However, two recent cross-sectional studies looking at barriers to discontinuation of benzodiazepines and antipsychotics in nursing homes reflected subthemes identified in our review - fear of negative consequences of discontinuation such as poorer quality of life, symptom recurrence, greater workload and a lack of available, effective, non-drug alternatives. [62 63]

Many of the papers focussed on relatively few drug classes (psychotropics and PPIs) and only four focussed on polypharmacy. Although some subthemes were common to all types of studies (single and miscellaneous PIMs and polypharmacy papers), others were not. It is possible that, had more medication classes been studied, some of our results may have been different.

The strengths of our review included adherence to a peer-reviewed, documented methodology for thematic synthesis, COREQ assessment of studies allowing assessment of potential for bias, compliance with ENTREQ reporting requirements and a multi-disciplinary team of investigators to validate theme identification and synthesis.

Implications for clinicians and policy makers and future research

The results of this review disclose prescriber perceptions of their own cognitive processes as well as patient, work setting and other health system factors which shape their behaviour towards continuing or discontinuing chronically prescribed PIMs. The thematic synthesis

provides a clear conceptual framework to understand this behaviour. Rendering these issues visible for both clinicians and policy makers is the first stage in minimising inappropriate prescribing in routine clinical practice. It facilitates what has been lacking in deprescribing intervention studies to date - a pragmatic approach towards identifying and accounting for local barriers and enablers which will determine overall effectiveness of targeted interventions.

Further high quality prospective clinical trials are urgently needed in demonstrating the safety, benefits and optimal modes of deprescribing, especially in relation to multimorbid older people.[61 64] The fog of polypharmacy clouds a prescriber's capacity and confidence to identify PIMs which, to be overcome, requires complete and accurate clinical information and decision support.

Professional organisations and colleges have an important role in encouraging the necessary cultural and attitudinal shifts towards 'less can be more' in appropriate patients. The push for guideline adherence and intensification of therapy needs to be counterbalanced by the view that judicious reduction, discontinuation or non-initiation of medication, in the context of shared decision making and agreed care goals, is an affirmation of highest quality, individualised care.[65] This view needs to be embraced in the education and training of all health professionals, not just doctors, who influence the prescribing process.

Prescribers are making decisions in the face of immense clinical and health system complexity. Appropriate deprescribing needs to be regarded as equally important and achievable as appropriate initiation of new medications. Understanding how prescribers perceive and react to prescribing and deprescribing contexts is the first step to designing policy initiatives and health system reforms that will minimise inappropriate over-prescribing.

Acknowledgements

We thank University of Queensland librarians Mr Lars Eriksson and Ms Jill McTaggart for their assistance in developing the search strategy and Ms Debra Rowett for her invaluable insights when scoping the search and developing the manuscript.

Competing Interests

Ms Anderson received a speaker honorarium for an Australian Association of Consultant Pharmacy presentation. Dr Stowasser reports personal fees from National Prescribing Service, outside the submitted work. A.Prof Scott and Dr Freeman report no conflicts of interest directly relevant to this work.

Funding

Ms Anderson and A/Prof Scott are funded through a National Health and Medical Research Council grant under the Centre of Research Excellence Quality & Safety in Integrated Primary/Secondary Care (Grant ID, GNT1001157).

Contributorship

IS conceived the paper, the scope of which was refined by all authors. KA searched the literature, lead data analysis and drafted the manuscript. IS and DS read articles and assessed data analysis for comprehensiveness and reliability. IS, DS and CF provided critical comments and contributed to the interpretation of analysed results and framework development. All authors read, revised and accepted the final draft.

Data Sharing

Data used to develop the tables and figures presented in this article are available by emailing the corresponding author, Kristen Anderson, k.anderson8@uq.edu.au .

REFERENCES

1. Morgan T, Williamson M, Pirotta M, et al. A national census of medicines use: a 24-hour snapshot of Australians aged 50years and older. Med J Aust 2012;196(1):50 - 53
2. Qato DM, Alexander G, Conti RM, et al. Use of prescription and over-the-counter medications and dietary supplements among older adults in the united states. JAMA 2008;300(24):2867-78 doi: 10.1001/jama.2008.892[published Online First: Epub Date]|.
3. Price SD, Holman CD, Sanfilippo FM, et al. Are older Western Australians exposed to potentially inappropriate medications according to the Beers Criteria? A 13-year prevalence study. Australasian journal on ageing 2014 doi: 10.1111/ajag.12136[published Online First: Epub Date]|.
4. Guaraldo L, Cano FG, Damasceno GS, et al. Inappropriate medication use among the elderly: a systematic review of administrative databases. BMC geriatrics 2011;11:79 doi: 10.1186/1471-2318-11-79[published Online First: Epub Date]|.
5. Aparasu R, Mort J. Inappropriate prescribing for the elderly: beers criteria-based review. Ann Pharmacother 2000;34(3):338 - 46
6. Opondo D, Eslami S, Visscher S, et al. Inappropriateness of medication prescriptions to elderly patients in the primary care setting: a systematic review. PLoS One 2012;7(8):e43617
7. Roughead EE, Anderson B, Gilbert AL. Potentially inappropriate prescribing among Australian veterans and war widows/widowers. Intern Med J 2007;37(6):402-5 doi: 10.1111/j.1445-5994.2007.01316.x[published Online First: Epub Date]|.
8. Byles JE, Heinze R, Nair BK, et al. Medication use among older Australian veterans and war widows. Intern Med J 2003;33(8):388-92
9. Stafford AC, Alswayan MS, Tenni PC. Inappropriate prescribing in older residents of Australian care homes. Journal of clinical pharmacy and therapeutics 2011;36(1):33-44 doi: 10.1111/j.1365-2710.2009.01151.x[published Online First: Epub Date]|.
10. Somers M, Rose E, Simmonds D, et al. Quality use of medicines in residential aged care. Australian family physician 2010;39(6):413-6
11. Cahir C, Bennett K, Teljeur C, et al. Potentially inappropriate prescribing and adverse health outcomes in community dwelling older patients. Br J Clin Pharmacol 2014;77(1):201-10 doi: 10.1111/bcp.12161[published Online First: Epub Date]|.
12. Dedhiya SD, Hancock E, Craig BA, et al. Incident use and outcomes associated with potentially inappropriate medication use in older adults. The American journal of geriatric pharmacotherapy 2010;8(6):562-70 doi: 10.1016/s1543-5946(10)80005-4[published Online First: Epub Date]|.
13. Kalisch LM, Caughey GE, Barratt JD, et al. Prevalence of preventable medication-related hospitalizations in Australia: an opportunity to reduce harm. International Journal for Quality in Health Care 2012;24(3):239-49
14. Carey IM, De Wilde S, Harris T, et al. What factors predict potentially inappropriate primary care prescribing in older people? Analysis of UK primary care patient record database. Drugs Aging 2008;25(8):693-706
15. Lai HY, Hwang SJ, Chen YC, et al. Prevalence of the prescribing of potentially inappropriate medications at ambulatory care visits by elderly patients covered by the Taiwanese National Health Insurance program. Clin Ther 2009;31(8):1859-70 doi: 10.1016/j.clinthera.2009.08.023[published Online First: Epub Date]|.
16. Meurer WJ, Potti TA, Kerber KA, et al. Potentially inappropriate medication utilization in the emergency department visits by older adults: analysis from a nationally

representative sample. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 2010;17(3):231-7 doi: 10.1111/j.1553-2712.2010.00667.x[published Online First: Epub Date]|.
17. Alldred DP. Deprescribing: a brave new word? The International journal of pharmacy practice 2014;22(1):2-3 doi: 10.1111/ijpp.12093[published Online First: Epub Date]|.
18. World Health Organisation. Guide to Good Prescribing - A Practical Manual. Chapter 11. STEP 6: Monitor (and stop?) the treatment, 1994.
19. NPS: Better Choices BH. Competencies required to prescribe medicines: putting quality use of medicines into practice. Sydney: National Prescribing Service Limited, 2012.
20. Reeve E, To J, Hendrix I, et al. Patient Barriers to and Enablers of Deprescribing: a Systematic Review. Drugs & Aging 2013:1-15 doi: 10.1007/s40266-013-0106-8[published Online First: Epub Date]|.
21. Dixon-Woods M, Bonas S, Booth A, et al. How can systematic reviews incorporate qualitative research? A critical perspective. Qualitative Research 2006;6(1):27-44 doi: 10.1177/1468794106058867[published Online First: Epub Date]|.
22. Tong A, Flemming K, McInnes E, et al. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Med Res Methodol 2012;12:181 doi: 10.1186/1471-2288-12-181[published Online First: Epub Date]|.
23. Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. Journal of Health Services Research & Policy 2005;10(suppl 1):6-20 doi: 10.1258/1355819054308576[published Online First: Epub Date]|.
24. InterTASC Information Specialists' Sub-Group. Filters to Identify Qualitative Research. Secondary Filters to Identify Qualitative Research. https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/filters-to-identify-qualitative-research.
25. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua 2007;19(6):349-57 doi: 10.1093/intqhc/mzm042[published Online First: Epub Date]|.
26. Hannes K. Chapter 4: Critical appraisal of qualitative research. In: Noyes J, Booth A, Hannes K, et al., eds. Supplementary Guidance for Inclusion of Qualitative Research in Cochrane Systematic Reviews of Interventions: Cochrane Collaboration Qualitative Methods Group, 2011.
27. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med Res Methodol 2008;8:45 doi: 10.1186/1471-2288-8-45[published Online First: Epub Date]|.
28. Tong A, Lesmana B, Johnson DW, et al. The perspectives of adults living with peritoneal dialysis: thematic synthesis of qualitative studies. American journal of kidney diseases : the official journal of the National Kidney Foundation 2013;61(6):873-88 doi: 10.1053/j.ajkd.2012.08.045[published Online First: Epub Date]|.
29. Britten N, Brant S, Cairns A, et al. Continued prescribing of inappropriate drugs in general practice. Journal of clinical pharmacy and therapeutics 1995;20(4):199-205
30. Moen J, Norrgard S, Antonov K, et al. GPs' perceptions of multiple-medicine use in older patients. Journal of Evaluation in Clinical Practice 2010;16(1):69-75

31. Schuling J, Gebben H, Veehof LJG, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. BMC Family Practice 2012;13:56
32. Anthierens S, Tansens A, Petrovic M, et al. Qualitative insights into general practitioners views on polypharmacy. BMC Fam Pract 2010;11:65 doi: 10.1186/1471-2296-11-65[published Online First: Epub Date]|.
33. Fried TR, Tinetti ME, Iannone L. Primary care clinicians' experiences with treatment decision making for older persons with multiple conditions. Arch Intern Med 2011;171(1):75-80 doi: 10.1001/archinternmed.2010.318[published Online First: Epub Date]|.
34. Dybwad TB, Kjolsrod L, Eskerud J, et al. Why are some doctors high-prescribers of benzodiazepines and minor opiates? A qualitative study of GPs in Norway. Fam Pract 1997;14(5):361-8
35. Damestoy N, Collin J, Lalande R. Prescribing psychotropic medication for elderly patients: some physicians' perspectives. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 1999;161(2):143-5
36. Iliffe S, Curran HV, Collins R, et al. Attitudes to long-term use of benzodiazepine hypnotics by older people in general practice: findings from interviews with service users and providers. Aging & mental health 2004;8(3):242-8 doi: 10.1080/13607860410001669778[published Online First: Epub Date]|.
37. Parr JM, Kavanagh DJ, Young RM, et al. Views of general practitioners and benzodiazepine users on benzodiazepines: A qualitative analysis. Social Science and Medicine 2006;62(5):1237-49
38. Cook JM, Marshall R, Masci C, et al. Physicians' perspectives on prescribing benzodiazepines for older adults: a qualitative study. J Gen Intern Med 2007;22(3):303-7 doi: 10.1007/s11606-006-0021-3[published Online First: Epub Date]|.
39. Rogers A, Pilgrim D, Brennan S, et al. Prescribing benzodiazepines in general practice: a new view of an old problem. Health (London, England : 1997) 2007;11(2):181-98 doi: 10.1177/1363459307074693[published Online First: Epub Date]|.
40. Dickinson R, Knapp P, House AO, et al. Long-term prescribing of antidepressants in the older population: a qualitative study. Br J Gen Pract 2010;60(573):e144-55 doi: 10.3399/bjgp10X483913[published Online First: Epub Date]|.
41. Subelj M, Vidmar G, Svab V. Prescription of benzodiazepines in Slovenian family medicine: a qualitative study. Wiener klinische Wochenschrift 2010;122(15-16):474-8 doi: 10.1007/s00508-010-1413-2[published Online First: Epub Date]|.
42. Iden KR, Hjorleifsson S, Ruths S. Treatment decisions on antidepressants in nursing homes: a qualitative study. Scand J Prim Health Care 2011;29(4):252-6 doi: 10.3109/02813432.2011.628240[published Online First: Epub Date]|.
43. Flick U, Garms-Homolová V, Röhnsch G. "And mostly they have a need for sleeping pills": Physicians' views on treatment of sleep disorders with drugs in nursing homes. Journal of Aging Studies 2012;26(4):484-94
44. Raghunath AS, Hungin APS, Cornford CS, et al. Use of proton pump inhibitors: An exploration of the attitudes, knowledge and perceptions of general practitioners. Digestion 2005;72(4):212-18
45. Wermeling M, Himmel W, Behrens G, et al. Why do GPs continue inappropriate hospital prescriptions of proton pump inhibitors? A qualitative study. Eur J Gen Pract 2013 doi: 10.3109/13814788.2013.844787[published Online First: Epub Date]|.

46. Cantrill JA, Dowell J, Roland M. Qualitative insights into general practitioners' views on the appropriateness of their long-term prescribing. International Journal of Pharmacy Practice 2000;8(1):20-26
47. Frich JC, Hoye S, Lindbaek M, et al. General practitioners and tutors' experiences with peer group academic detailing: a qualitative study. BMC Fam Pract 2010;11:12 doi: 10.1186/1471-2296-11-12[published Online First: Epub Date]|.
48. Clyne B, Bradley MC, Hughes CM, et al. Addressing potentially inappropriate prescribing in older patients: development and pilot study of an intervention in primary care (the OPTI-SCRIPT study). BMC Health Serv Res 2013;13:307 doi: 10.1186/1472-6963-13-307[published Online First: Epub Date]|.
49. Spinewine A, Swine C, Dhillon S, et al. Appropriateness of use of medicines in elderly inpatients: qualitative study. BMJ 2005;331(7522):935 doi: 10.1136/bmj.38551.410012.06[published Online First: Epub Date]|.
50. Ostini R, Hegney D, Jackson C, et al. Knowing how to stop: ceasing prescribing when the medicine is no longer required. J Manag Care Pharm 2012;18(1):68-72
51. Ritov I, Baron J. Status-quo and omission bias. . Journal of Risk and Uncertainty 1992(5):49-61
52. Spranca M, Minsk E, Baron J. Omission and commission in judgment and choice. Journal of Experimental Social Psychology 1991(27):76-105
53. Tsalatsanis A, Hozo I, Vickers A, et al. A regret theory approach to decision curve analysis: a novel method for eliciting decision makers' preferences and decision-making. BMC medical informatics and decision making 2010;10:51 doi: 10.1186/1472-6947-10-51[published Online First: Epub Date]|.
54. Reeve E, Shakib S, Hendrix I, et al. The benefits and harms of deprescribing. Medical Journal of Australia 2014;201(7):386-89
55. Cullinan S, O'Mahony D, Fleming A, et al. A Meta-Synthesis of Potentially Inappropriate Prescribing in Older Patients. Drugs Aging 2014 doi: 10.1007/s40266-014-0190-4[published Online First: Epub Date]|.
56. Bradley CP. Factors which influence the decision whether or not to prescribe: the dilemma facing general practitioners. Br J Gen Pract 1992;42(364):454-8
57. Butler CC, Rollnick S, Pill R, et al. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. BMJ 1998;317(7159):637-42
58. Cohen D, McCubbin M, Collin J, et al. Medications as Social Phenomena. Health: 2001;5(4):441-69 doi: 10.1177/136345930100500403[published Online First: Epub Date]|.
59. Reeve E, Shakib S, Hendrix I, et al. Review of deprescribing processes and development of an evidence based, patient-centred deprescribing process. Br J Clin Pharmacol 2014 doi: 10.1111/bcp.12386[published Online First: Epub Date]|.
60. Kaur S, Mitchell G, Vitetta L, et al. Interventions that can Reduce Inappropriate Prescribing in the Elderly. Drugs & Aging 2009;26(12):1013-28 doi: 10.2165/11318890-000000000-00000[published Online First: Epub Date]|.
61. Patterson S, Hughes C, Kerse N, et al. Interventions to improve the appropriate use of polypharmacy for older people. Cochrane Database Syst Rev 2012;5:CD008165
62. Azermai M, Vander Stichele RRH, Van Bortel LM, et al. Barriers to antipsychotic discontinuation in nursing homes: An exploratory study. Aging and Mental Health 2014;18(3):346-53 doi: 10.1002/14651858.CD007726. [published Online First: Epub Date]|.

63. Bourgeois J, Elseviers MM, Azermai M, et al. Barriers to discontinuation of chronic benzodiazepine use in nursing home residents: Perceptions of general practitioners and nurses. European Geriatric Medicine 2013
64. Iyer S, Naganathan V, McLachlan A, et al. Medication Withdrawal Trials in People Aged 65 Years and Older. Drugs & Aging 2008;25(12):1021-31 doi: 10.2165/0002512-200825120-00004[published Online First: Epub Date]|.
65. Scott I, Anderson K, Freeman C, et al. First do no harm: a real need to deprescribe in older patients. Medical Journal of Australia 2014;201(7):309-92

Figure 1 – Flowchart of study selection

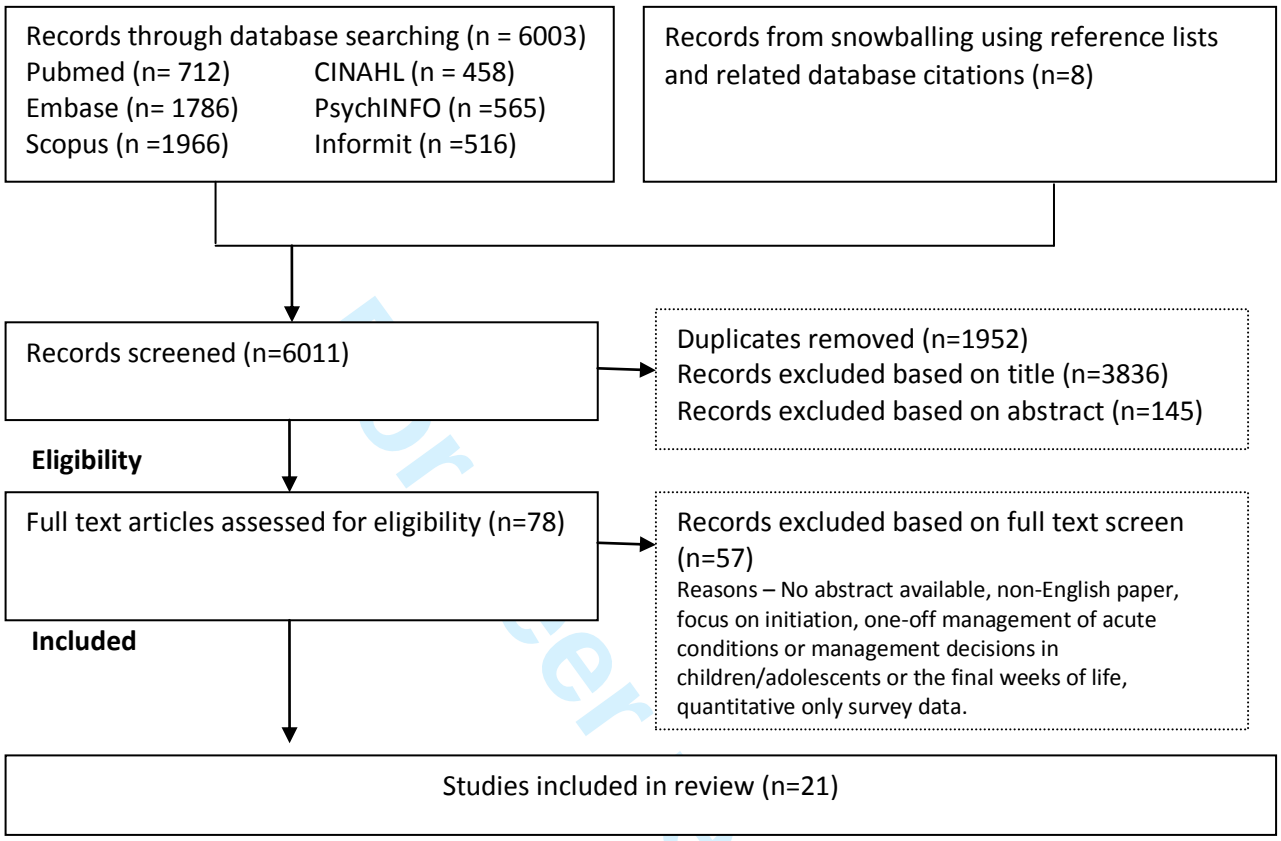
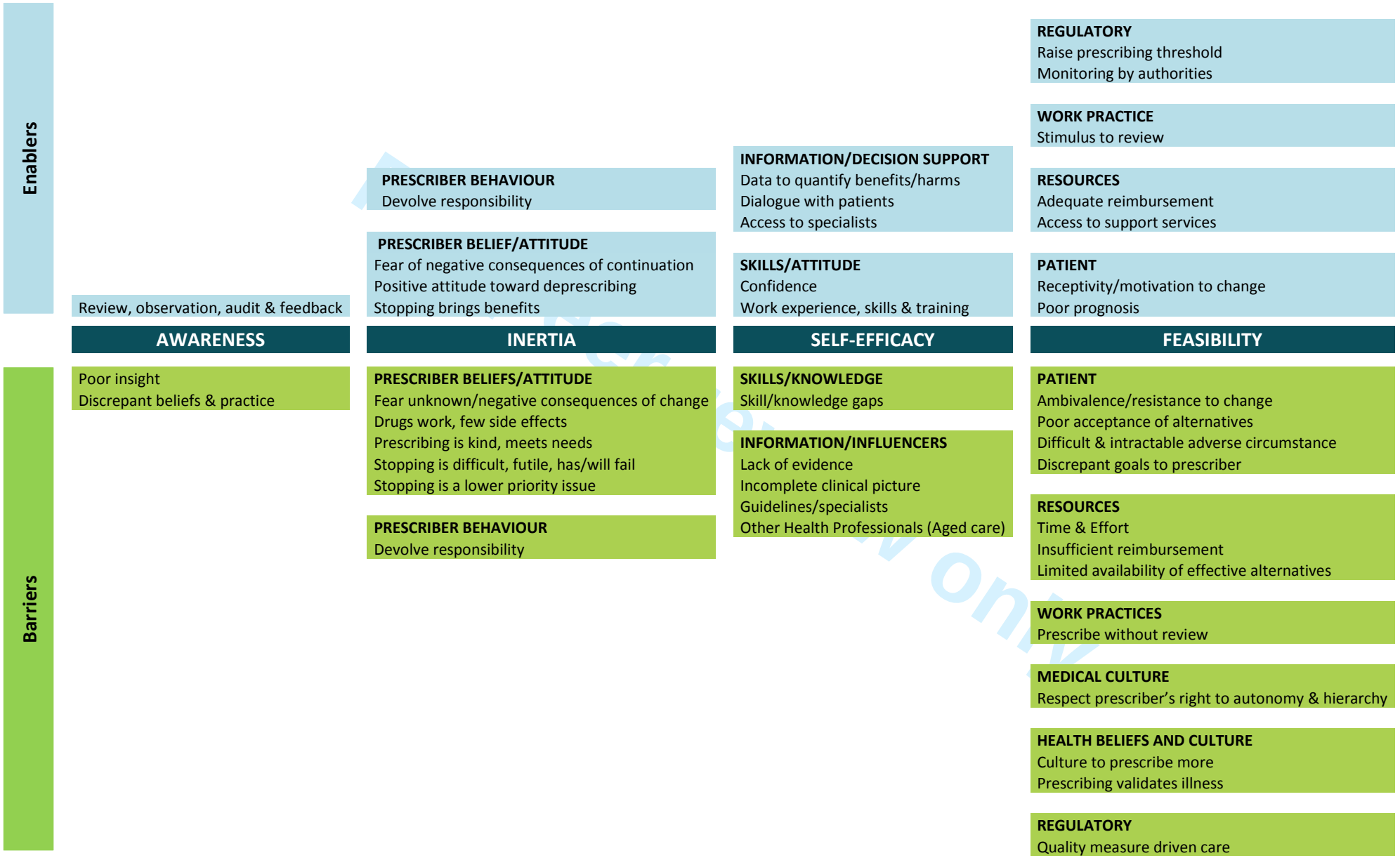


Figure 2 – Schematic Representation of Barriers and Enablers Associated with Each Analytic and Descriptive Theme



Appendix 1 – Search strategy for each electronic database

PubMed 22 Feb 2014 712 Results

((((((((((withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing OR optim*)) AND (“Prescription drug” OR medicines OR medication OR polypharmacy OR prescribing))) OR inappropriate prescribing)) AND ((Physician OR “family physician” OR “general practitioner” OR GP OR doctor OR clinician OR prescriber OR specialist OR health personnel OR "health professional" OR "health care professional" OR "health practitioner"))) AND ((((((“semi-structured”[TIAB] OR semistructured[TIAB] OR unstructured[TIAB] OR informal[TIAB] OR “in-depth”[TIAB] OR indepth[TIAB] OR “face-to-face”[TIAB] OR structured[TIAB] OR guide[TIAB] OR guides[TIAB]) AND (interview*[TIAB] OR discussion*[TIAB] OR questionnaire*[TIAB])) OR (“focus group”[TIAB] OR “focus groups”[TIAB] OR qualitative[TIAB] OR fieldwork[TIAB] OR “field work”[TIAB] OR “key informant”[TIAB])) OR “interviews as topic”[Mesh] OR “focus groups”[Mesh] OR narration[Mesh] OR qualitative research[Mesh]))))))))))

Embase Search 24 Feb 2014 1786 Results

interview:ab,ti OR discussion:ab,ti OR questionnaire:ab,ti OR survey:ab,ti OR 'focus group':ab,ti OR 'focus groups':ab,ti OR qualitative:ab,ti OR 'qualitative research'/de AND [english]/lim AND [embase]/lim
AND
['inappropriate prescribing'/de OR (inappropriate:ab,ti AND prescribing:ab,ti) AND [english]/lim AND [embase]/lim
OR
(withdraw:ab,ti OR withdrawing:ab,ti OR withdrawal:ab,ti OR cease:ab,ti OR ceasing:ab,ti OR cessation:ab,ti OR stop:ab,ti OR stopping:ab,ti OR discontinue:ab,ti OR discontinuing:ab,ti OR discontinuation:ab,ti OR reduce:ab,ti OR reducing:ab,ti OR reduction:ab,ti ORdeprescribe:ab,ti OR deprescribing:ab,ti OR optim*:ab,ti AND [english]/lim AND [embase]/lim
AND
'prescription drug'/de OR medicines:ab,ti OR medication:ab,ti OR polypharmacy:ab,ti OR prescribing:ab,ti AND [english]/lim AND [embase]/lim)]
AND
physician:ab,ti OR 'family physician':ab,ti OR 'general practitioner':ab,ti OR gp:ab,ti OR doctor:ab,ti OR clinician:ab,ti OR prescriber:ab,ti OR 'medical specialist':ab,ti OR specialist:ab,ti OR 'health care personnel':ab,ti OR 'health professional':ab,ti OR 'health care professional':ab,ti OR 'health practitioner':ab,ti AND [english]/lim AND [embase]/lim

Scopus 12 Mar 2014 – 1966 search results

(TITLE(physician OR "family physician" OR "general practitioner" OR GP OR doctor OR clinician OR prescriber OR specialist OR "health professional" OR "health care professional" OR "health personnel" OR "health practitioner" OR nurse OR pharmacist) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)) AND (TITLE-ABS-KEY(interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative OR "qualitative research") AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)) AND (((TITLE-ABS-KEY(Withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing OR optim*) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR

DENT OR HEAL)) AND (TITLE-ABS-KEY("Prescription drug" OR prescribing OR medicines OR medication OR polypharmacy) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL))) OR (TITLE-ABS-KEY(inappropriate AND prescribing) AND SUBJAREA(MULT OR MEDI OR NURS OR VETE OR DENT OR HEAL)))

CINAHL 20 Mar 2014 - 458 Search results

Physician or "family physician" or "general practitioner" or GP or doctor or clinician or prescriber or specialist or "health professional" or "health care professional" OR "health personnel" or "health practitioner"
AND
("inappropriate prescribing" OR (inappropriate and prescribing)
OR
("prescription drug" OR prescribing OR medicines OR medication OR polypharmacy) AND (Withdraw or withdrawing or withdrawal or cease or ceasing or cessation or stop or stopping or discontinue or discontinuing or discontinuation or reduce or reducing or reduction or deprescribe or deprescribing or optim*))
AND
interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative

PsycINFO 20 Mar 2014 – 565 Search results

(((AnyField:("prescription drug" OR prescribing OR medicines OR medication OR polypharmacy)) AND (AnyField:(Withdraw or withdrawing or withdrawal or cease or ceasing or cessation or stop or stopping or discontinue or discontinuing or discontinuation or reduce or reducing or reduction or deprescribe or deprescribing or optim*))) OR (AnyField:("inappropriate prescribing" OR (inappropriate AND prescribing)))) AND (AnyField:(Physician or "family physician" or "general practitioner" or GP or doctor or clinician or prescriber or specialist or "health professional" or "health care professional" OR "health personnel" or "health practitioner")) AND (AnyField:(interview OR discussion OR questionnaire OR survey OR "focus group" OR "focus groups" OR qualitative OR "qualitative research"))

INFORMIT 20 Mar 2014 – Health collection – 516 Records

((((((Withdraw OR withdrawing OR withdrawal OR cease OR ceasing OR cessation OR stop OR stopping OR discontinue OR discontinuing OR discontinuation OR reduce OR reducing OR reduction OR deprescribe OR deprescribing or optim*) AND (“Prescription drug” OR prescribing OR medicines OR medication OR polypharmacy))) OR (inappropriate and prescribing))) AND (Physician OR “family physician” OR “general practitioner” OR GP OR doctor OR clinician OR prescriber OR specialist OR “health professional” OR “health care professional” OR "health personnel" OR “health practitioner” OR nurse or pharmacist) AND (interview OR discussion OR questionnaire OR “survey” OR “focus group” OR “focus groups” OR qualitative))

Comprehensiveness of reporting assessment using COREQ (consolidated criteria for reporting qualitative research) checklist.

Key – Benzo = Benzodiazepines. CME = Continuing Medical Education. F = Female. FG = Focus group. Dept = Department. GP = General Practitioner. M = Male. MD = Medical doctor. NH = Nursing home. NP = Nurse Practitioner. NS = Not stated. PhD = Doctor of Philosophy. RCT = Randomised Control Trial. SSI = Semi-structure interview. VA = Veterans Affairs. Other abbreviations refer to study author initials.

		Lead author	Anthierens	Britten -	Cantrill	Clyne	Cook	Damesto y	Dickinson	Dybwad	Flick	Frich	Fried	Iden	Illiffe	Moen	Parr	Raghunath	Rogers	Schuling	Spinewine	Subejl	Wermeling
Domain 1: Research team and reflexivity																							
Personal Characteristics																							
1	Interviewer/facilitator	Which author/s conducted the interview or focus group?	Yes - AT collected data. T Strobe took and processed interviews	N/A Descriptive survey	JD	FG - MB &BC, SSI - BC	JMC	NS	NS	TBD	NS	JCF & SH	TRF	KI	NS - 2 researchers	Ring	JP	ASR did 1, 'Non-clinicians' did remaining 4	NS	HJG & JS (observer)	AS	NS	GB
2	Credentials	What were the researcher's credentials? *E.g. PhD, MD*	NS	Masters, MD	Masters	NS	PhD	MD, PhD & Masters	Masters, PhD, MD, Psychiatrists	MD	NS	MD qualification as a minimum	MD	MD qualification as a minimum	NS	PhD	NS	NS	Professor of sociology, Clinical Psychologist & researcher, 3 med students, 1 GP & Senio	NS - ? MD	PhD min	NS	NS

																			r lecturer				
3	Occupation	What was their occupation at the time of the study?	NS	NS	Research pharmacist	NS	Research psychologist	NS	Researchers, academics, clinicians	GP – 'Important as they were peers'	NS	NS	NS	All are specialists in family medicine, experienced GPs	NS	NS	NS	NS - 1 clinician, remaining authors were not	See above	NS	Clinical pharmacist & research fellow	NS	NS
4	Gender	Was the researcher male or female?	Y - could be derived	NS	F	F	F	F	NS	F	M	F	F	F	NS	F	F	NS	Mix	M	F	NS	F
5	Experience and training	What experience or training did the researcher have?	NS	NS	NS	NS	Experienced research psychologist, specialist in geriatrics & disse	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Inferred	NS	NS	NS	NS

							mination															
Relationship with participants																						
6	Relationship established	Was a relationship established prior to study commencement?	NS	NS	NS	NS	NS	NS	NS	Peers - hence random selection of low-med prescribers (minimise selection bias) to match high prescriber sample	NS	NS - Run by Academic Dept GP + Norwegian Medical Association	NS	NS	Contact with practice staff when recruiting patients for SSIs	NS	NS	Mix - known and not known	NS	NS but likely - GP trainers and study conducted through Dept of General Practice at a local University	NS	Yes as this was a follow-up to a study in 2006	Follow-up to cross-sectional observation study so some familiarity
7	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. *personal goals, reasons for doing the research*	NS	NS	NS	NS	NS	NS	NS	Peers + Qualitative study accompanied survey of all prescriptions for Benzos and opiates in Oslo revealing	NS	NS - Some participants had prior knowledge of the project.	NS	NS	Practices had been recruited into an RCT of Benzo withdrawal in long term users	NS	NS	NS	NS	NS	NS - Although Spinewine is well published in this space	Have insight from previous study	NS

										prescribing profile of every Dr in area- participants would have had an idea about researchers' interests and motivations													
8	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. *Bias, assumptions, reasons and interests in the research topic*	NS	NS	NS	NS	Specialist in geriatrics & dissemination	NS	NS	NS	NS	Interest in continuing medical education & quality care	NS	First author has long experience as NH Dr, concerned about improving health care in NHs.	NS	NS	NS	NS	All had interest in mental health.	NS	NS	NS	NS
Domain 2: study design																						

Theoretical framework																					
9	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis*	Qual descriptive methodology, content analysis	NS	NS	Thematic analysis	Narrative analysis	Grounded theory analysis	Framework analysis	Phenomenological theory	Thematic coding – presume analysis?	Thematic content analysis	Content analysis	Systematic text condensation & analysis	NS	Conventional context analysis	Consensual Qualitative Research Approach	Grounded theory & constant comparative approach	NS (Inferground ed theory - exploratory qualitative study)	NS	Grounded theory	NS	Framework analysis
Participant selection																							
10	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball*	Purposive	Convenience	Purposive sampling of practices (across 4 health authorities) & patients with	Convenience sample of GPs working in a variety of different general practices involved	Purposive? "deliberate efforts to diversify experience level and practice setting"	Convenience	Drs of patients purposively selected for study	Purposive (high Prescribers selected based on script volume, low-medium prescribers matched by geography	Convenience - physicians attached to NHs who delivered the routine data arm of stud	Purposive - varied sample of GPs	Purposive - sample practices from academic, community & VA settings	Purposive - 24 informants from 23 NHs	Convenience sample of practice staff involved in care of 192 patients who agreed to participate	Purposively selected existing Further education and Quality groups - already functioning forum	Convenience	Mix - Purposive & convenience	Purposive - respondents drawn from sampling frame of 70 GPs who participate/ host undergrad traini	Purposive - see above	Purposive - teaching & non teaching, rural & urban hosp	Purposive - high and low Prescribers based on results of previous study	Purposive, informed by previous study

					in large practices	in a local CME discussion group				etc and then selected randomly	y				in the study	s for discussion			ng				
11	Method of approach	How were participants approached? e.g. *face-to-face, telephone, mail, email*	Initial letter, follow-up telephone	NS	Letter via senior partner. Practice to ID two partners	NS	Word-of-mouth, postal mailings, phone solicitations	NS	GPs approached by letter	Letter	Via NHs with phone follow-up - necessary to discuss the project due to physician hesitancy	Approached GPs through group co-ordinator and contacted by phone or email.	NS	Face-to-face at professional meetings, email and nurses through calls to NHs.	NS - Recruited from PC research and teaching network of the Dept. of primary care and population studies of the Royal Free and UCL Med School	Through contacts at primary care centres in 3 large cities in Sweden	Division of General Practice newsletters, Flyers at workshops, individual faxes	NS	NS	NS	Telephone & email	Asked (?face-to-face) and then telephone follow-up required to encourage high Prescribers to participate	Letter and follow-up phone call

12	Sample size	How many participants were in the study?	65	7	22 GPs, 101 patients, 227 instances of PIP	8FG, 5 SSI	33	9	10	38	20	39 GPs (20 tutors)	36 physicians (2 NPs, 1 pharmacist, 1 physician assistant), primary care, Vet Affairs and academia	16 physicians (8 Nurses)	72 Drs/83 practice staff (from 25 practices), 192 patients	31	28 GPs	49GPs	22	29	5 Drs (4 nurses, 3 pharm, 17pts)	10 family physicians, primary care (5 high, 5 low)	10 GPs (5 high continuers, 5 low continuers)
13	Non-participation	How many people refused to participate or dropped out? Reasons?	37, Not stated	NS	NS	NS	NS	3 - None provided	5 - One retired, 2 PT, 2 no reason	High prescribers - 5 - time constraints; Med-low 10% - not stated.	NS	NS - 39/454 GPs, 20/80 Tutors	NS	NS	NS	NS	Advertised participation. Guessing must have responded and 8 declined. Reas	18 - NS	NS	NS	NS - ?None	13 of the high Prescribers refused - 6 sick leave, 7 mainly due to time	NS

																	ons not stated					
Setting																						
14	Setting of data collection	Where was the data collected? e.g. *home, work*	Work place	Workplace	Workplace	NS	NS	NS	NS	Workplace	NS	NS	NS	NS	Work place	Where groups usually met	Workplace	NS	Work place	Dept GP Uni Med Centre Groningen	NS	Workplace	Workplace
15	Presence of non-participants	Was anyone else present besides the participants and researchers?	NS	N/A Descriptive survey	NS	NS	NS	NS	NS	No	NS	NS	NS	No?	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date*	Gender, average age, 'variety' experience and location	Role, qualification and years since qualification	NS	NS - sample of GPs working in a variety of different general practices, involved in a local CME	22 men, 11 women, Mean age 47, 29 Caucasian, 3 East Indian, 1 Asian, practice characteristics	NS although gathered	GPs of patients recruited from one Primary Care Trust. Age range 34-60. 6M, 4F. No furth	Info gathered 1994-1995. FT Prescribers. Higher Prescribers all male, on average older (5yrs), 5 more years in practice (18.4	NH Physicians 36-68 years, 16 NH in German city. Contracted or employed. Data collected	GPs in Norway who enrolled in CME program. 21/39 men. Med age 47.	36 physicians (2 NPs, 1 pharmacist, 1 physician assistant), primary care, Vet	Data collected 2009-2010. Diverse with respires to age, gender, profession, clinical expe	NS - Urban London Drs interested in particpating in an RCT	31 GPs (4 private, 27 county-employed), aged 33-63, 15 men/ 16women, mean work experience 22 yrs, Sweden	20 males, 8 females. 22 from group practices, 2 solo, 4 other settings. Ave yrs practice =	33 M, 16 F. Age range 26-62. Mix registrars, trainers-non-trainers, academic/non-academic, inner city/urban/rural)	15 M, 7 F, mix newly registered & experienced (although biased towards younger GPs), sole and large group	Dec10 - Jan11. GPs trainers, min 5 yrs experience & third year trainee in practice at the time of study. Only 2 femal	3 Drs geriatricians, 2 house officers. Summary table provided in article.	All high prescribers - male, 10yrs older than low, prescribers, 18 yrs mean employment,	6 M, 4 F.2009.

						discussion group			er information provided.	vs 13.1). Specialist education - 50% of high Prescribers, 85% med-low Prescribers. Some higher Prescribers had good reputations, some elected reps	2009.		Affairs and academia.	rience (1-40yrs) and position. FT and PT prescribers			14. Mix rurality		GPs, mostly urban	es. Mean age 54 (39-65). Mix urban/rural.		50% specialists. Low prescribers - 3 males, 2 females, 12 yrs mean employment, 80% specialists). Info gathered in 2008	
Data collection																						
17	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Yes, Not tested but iterative approach subsequent to debriefing sessions	Yes, but not tested	Appropriate prescribing indicators were provided	N	Y	Y - NS	Yes & Unsure	Yes & NS. Q's served as checklist. Asked GPs to provide narratives of the last 3 consultations	Yes & No	Yes & new themes were fed back into later FGs	Yes	Yes & No but added 2 questions to the final FG as a result of FB from	No - pragmatic approach (allowed participants to show understanding, raise issue	Yes & Yes	Yes	No - overview of how FG conducted but no content	No	Hypothetical case study, outlined position of GP and used question probes where	Yes - published separately	Yes - Not pilot tested	No

										(gap between ideal thinking and practice)				FG's 1 &2	s, min risk of them changing behaviour					necessary. NS			
18	Repeat interviews	Were repeat interviews carried out? If yes, how many?	NS	N/A Descriptive survey	NS	No	No	No	No	No	No	NS	No	NS	No	No	No	No	NS	No	No	No	No
19	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Audio taping	N/A Descriptive survey	Audio taping	Audio taping	Audio taping	Audio taping	Audio taping	Audio taping	Recorded (assume audio)	Digitally recorded	Audio taped	Audio taped	No	Audio taping	Audio taping	Audio taping	Audio taping	Audio taping	Audio taping	Audio taping	Video-taped
20	Field notes	Were field notes made during and/or after the interview or focus group?	Yes & debriefing	N/A Descriptive survey	NS	NS	NS	NS	Yes	NS	NS	Yes	NS	Yes	NS	Yes	Yes	NS	NS	NS	NS	NS	NS

21	Duration	What was the duration of the interviews or focus group?	NS	N/A Descriptive survey	NS	FG - NS, SSI - 5-10 min	NS	60-90min	NS	NS	45 min	NS	60 min	90 min	NS	60-90min	15-30 min	45-55 min	NS	2 hrs	60min	30-60 min	32 min (17-54min range)
22	Data saturation	Was data saturation discussed?	NS	N/A Descriptive survey	NS	NS	Yes	Yes	NS	NS	NS	NS	NS	NS	NS	Yes	Yes	Yes	Yes	Yes	NS	NS	NS
23	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	NS	N/A Descriptive survey	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Yes	NS	NS	NS	NS	NS
Domain 3: analysis and findings																							
Data analysis																							
24	Number of data coders	How many data coders coded the data?	2	NS	1	NS	NS	NS	3 authors	1	NS	2	2 initially, then one after the coding structure had bee	3	2 members participated in discussions	2 with audit by a third	3 initially to develop domains and then 1 person thereafter	2	4 authors	2, 3rd adjudicated	2	2	1 author - blinded to which participants were in which category

													n established										
25	Description of the coding tree	Did authors provide a description of the coding tree?	Yes	NS	NS	NS	No	No	Yes	Yes	Yes	Yes	Yes	Yes	NS	Yes	Yes	Yes	Yes	Yes	Yes - published separately.	Yes	Yes
26	Derivation of themes	Were themes identified in advance or derived from the data?	Derived	NS	Derived	NS	Derived	No clear themes	Derived	Both - Few preformed themes were used	Derived	Derived	Derived	Derived	Derived	Derived	Derived	Derived	Derived	Derived	Both - Inductive and defined descriptive codes.	Derived	In advance and derived (from responses to questions from extensive literature review)
27	Software	What software, if applicable, was used to manage the data?	N/A	NS	N/A	NVivo	QS NVivo 2.0	N/A	NVivo 7	N/A	N/A	NS	NS	NS	N/A	Nvivo 1.2	NS	QSR NUD.IST 40	NS	NS	Nvivo 1.2	NS	NS
28	Participant checkin	Did participants	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Yes - 3 GPs	NS	NS	NS	Yes	NS	NS

	g	provide feedback on the findings?															did					
Reporting																						
29	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.*g. participant number*	Yes	No	Yes	Yes	Yes & No	No	Yes	Yes	Yes (& they were identified)	Yes	Yes & Yes	Yes - limited though and no participant number	No	Yes	Yes & No	Yes & No	Yes	Yes	Yes	Yes & Yes
30	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Too ltd to comment	Yes - v clear	Yes - also triangulated findings with pts	Yes	Yes	Yes	Yes	Yes

31	Clarity of major themes	Were major themes clearly presented in the findings?	Yes	Yes	Yes	No - too small	Yes	No	Yes	Yes	Yes - prescriber approaches to treatment of sleep disorders with drugs in RACF	Yes	Yes	3 clear themes although results section was limited	No	Yes - v clear	Yes	Yes	Yes	Yes	Yes	Yes
32	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	No	Yes but limited	No - Presented one instance of diverse views re: patient receptivity to change.	No - too small	No	No	Yes - although limited	Yes - Premise of paper to explore views of low and high Prescribers.	Yes - apparent in three subthemes of paper	No but comprehensive given diverse aims	Discussion of conflicting views and minor themes (e.g. guidelines)	Ltd information in paper	Conflicting views were presented	Yes - presented conflicting views	Yes & in methodology described these as 'typical' or variant'	Yes - captured minor themes in text but not under subheadings	Yes - presented 'outlier views'	Consistently presented counterbalancing point of view	Theory and data triangulation - stronger methodology	Captured in methodology - high and low prescribers	Captured in methodology - high and low prescribers

Title: 'Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis'.

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Keywords: Attitudes, Decision making, Medication Safety & Qualitative Research, Inappropriate Prescribing

Word count: 4130 words (excluding Title page, References, Figures, Tables, Acknowledgements, Conflict of Interest & Funding)

References: 65

Figures: 2 (Figure 2 maybe be printed in black and white but preference is for colour online. Please note it has been updated since the original submission.)

Tables: 4

Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis

ABSTRACT

Objectives – To synthesise qualitative studies that explore prescribers' perceived barriers and enablers to minimising potentially inappropriate medications (PIMs) chronically prescribed in adults.

Design – A qualitative systematic review was undertaken by searching PubMed, Embase, Scopus, PsycINFO, CINAHL and INFORMIT from inception to March 2014, combined with an extensive manual search of reference lists and related citations. A quality checklist was used to assess the transparency of the reporting of included studies and the potential for bias. Thematic synthesis identified common subthemes and descriptive themes across studies from which an analytic construct was developed. Study characteristics were examined to explain differences in findings.

Setting – All healthcare settings.

Participants – Medical and non-medical prescribers of medicines to adults.

Outcomes – Prescribers' perspectives on factors which shape their behaviour towards continuing or discontinuing PIMs in adults.

Results – Twenty-one studies were included, most explored primary care physicians' perspectives on managing older, community-based adults. Barriers and enablers to minimising PIMs emerged within four analytic themes: problem awareness; inertia secondary to lower perceived value proposition for ceasing versus continuing PIMs; self-efficacy in regards to personal ability to alter prescribing; and feasibility of altering prescribing in routine care environments given external constraints. The first three themes are intrinsic to the prescriber (e.g. beliefs, attitudes, knowledge, skills, behaviour) and the fourth is extrinsic (e.g. patient, work-setting, health system and cultural factors). The PIMs examined and practice setting influenced the themes reported.

Conclusions - A multitude of highly interdependent factors shape prescribers' behaviour towards continuing or discontinuing PIMs. A full understanding of prescriber barriers and enablers to changing prescribing behaviour is critical to the development of targeted interventions aimed at deprescribing PIMs and reducing risk of iatrogenic harm.

ARTICLE SUMMARY

Strengths and limitations of this study

- This is the most comprehensive review to date of prescribers' barriers and enablers to minimising potentially inappropriate medications which are chronically prescribed in adults
- Although database and manual searching was protracted and extensive, it is possible not all relevant studies were found due to poor indexing and inconsistent terminology for this topic
- Utilisation of a peer-reviewed, published method for thematic synthesis and checklist to assess potential bias in studies contributed to the review's methodological rigour
- Included studies largely explored general practitioners' perspectives on managing older, community-based adults in relation to relatively few drug classes and may limit the generalisability of the findings

INTRODUCTION

Studies in the United States and Australia indicate at least one in two older people (aged 65 years or greater) living in the community use five or more prescription, over-the-counter or complementary medicines every day, and the number used increases with age. [1 2] Polypharmacy (the use of multiple medicines concurrently) predisposes older people to being prescribed potentially inappropriate medications (PIMs), i.e. where the actual or potential harms of therapy outweigh the benefits. [3-5] Recent international data suggests that one in five prescriptions for community dwelling older adults is inappropriate. [6] In Australia, approximately 20%-50% of individuals in this age group are prescribed one or more PIMs, with higher rates seen in residential aged care facilities (RACFs). [3 7-10] For adults younger than 65 years of age, rates of prescribing of PIMs have not been quantified beyond single medication classes (e.g. benzodiazepines, proton pump inhibitors). The rates and harms of polypharmacy in this population remain uncertain, although likely to be considerably less than that seen in older adults. In contrast, the harms of polypharmacy and prescribing PIMs in older people are well established. Prescribing of PIMs is independently associated with adverse drug events, hospital presentations, poorer health related quality of life and death. [11 12] Up to 15% of all hospitalisations involving older people in Australia are medication-related, with one in five potentially preventable. [13]

These well documented harms of prescribing PIMs should evoke a response from clinicians to identify and stop, or reduce the dose of, inappropriate medications as a matter of priority. While there is some evidence that PIM exposure has decreased marginally over recent years, its prevalence remains high. [3 14-16] The process of reducing or discontinuing medications, with the goal of minimising inappropriate use and preventing adverse patient outcomes is increasingly referred to as 'deprescribing'. [17] Although the term may be new, appropriate cessation or reduction of medication is a long accepted component of competent prescribing. [18 19]

The act of stopping a medication prescribed over months to years, however, is complicated by many factors related to both patients and prescribers. These need to be understood if effective deprescribing strategies are to be developed. A recent review by Reeve *et al* identified patient barriers to, and enablers of, deprescribing, [20] but to our knowledge, no comprehensive review of prescribers' perspectives has been reported, which this paper aims to provide.

METHODS

In the absence of a universally accepted method to conduct a systematic review of qualitative data, we utilised principles of quantitative systematic review, applied to qualitative research, [21] and were guided by the Cochrane endorsed ENTREQ (*Enhancing transparency in reporting the synthesis of qualitative research)* position statement. [22]

Search strategy and sources

An initial search was conducted to ensure no systematic review on the same topic already existed. Two experienced health librarians were independently consulted in developing a comprehensive search strategy, which was informed by extensive prior scoping. [23]

PubMed, Embase, Scopus (limited to Health Sciences), PsycINFO, CINAHL and INFORMIT (Health Collection) electronic databases were searched from inception to March 2014. Filters to identify qualitative research were used and adapted to improve search sensitivity. [24] These were combined with terms and text words for: medical and non-medical prescribers and either inappropriate prescribing or reducing, stopping or optimising medications. Terms/text words were searched in all/any fields or restricted to title, abstract or keyword, depending upon the size of the database and sophistication of its indexing. Reference lists and related citations of relevant articles were reviewed for additional studies. The full search strategy is detailed in the Appendix.

Study selection

After duplicate citations were excluded, one reviewer (KA) screened titles, abstracts and where necessary, full text, to create a list of potentially relevant full text articles. Articles were required to meet provisional, intentionally overly inclusive, eligibility criteria to minimise the risk of inappropriate exclusions by the single reviewer. This list was forwarded to three reviewers (CF, DS, IS) who independently assessed the articles for inclusion. Discrepant views were resolved by group discussion to create the final list of included papers based on refined eligibility criteria.

Inclusion and exclusion criteria

Inclusion criteria comprised: 1) original research articles with a qualitative component (i.e. qualitative, mixed or multi-method studies all accepted); and 2) focus on eliciting prescribers' perspectives of factors that influence their decision to continue or cease chronically prescribed PIMs (as defined by the authors of each study) in adults.

No limits were placed on the care or practice setting of the patient or prescriber respectively, or whether the article related to single or multiple medications.

Exclusion criteria comprised: 1) reviews, papers not published in English, and those for which the abstract or full text were not available; 2) focus on medication management decisions in the final weeks of life; 3) focus entirely on initiation of PIMs and; 4) reported only quantitative data derived from structured questionnaires.

Assessment of the quality of studies

One researcher (KA) assessed the reporting of studies using the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist. This reporting guideline, endorsed by the Cochrane Collaboration, assesses the completeness of reporting and potential for bias in studies of interviews or focus groups. [25] Any instances of interpretive uncertainty arising from the checklist were discussed and resolved within the four investigators.

Studies were not excluded or findings weighted on the basis of the COREQ assessment. Rather, we elected to include all studies, ascribing to the theory that the value of insights contained within individual studies may only become apparent at the point of synthesis rather than during the appraisal process. [26]

Data extraction process

For all included articles, data were extracted about study aims, location, setting, study design, participants, recruitment, PIMs examined, and prescribers' perspectives of factors influencing the chronic prescription of PIMs. Data for thematic analysis were only extracted from the results (not discussion) section of papers, with particular notice taken of quotations from prescriber participants.

Synthesis of results

The method used to synthesise results was based on the technique of thematic synthesis described by Thomas and Harden. [27] Following multiple readings of the papers to achieve immersion, KA manually coded and extracted text, and developed subthemes until no further subthemes could be identified. Two reviewers (DS, IS) independently read all papers and then reviewed extracted, coded text and subthemes to confirm comprehensiveness and reliability of the findings [28]. Descriptive and draft analytic themes were subsequently developed by KA and then presented to, and discussed with, all investigators in developing and finalising the new analytic construct. Study characteristics and results were analysed for associations between specific themes and studies.

RESULTS

Study selection

The search yielded 6011 papers, 21 of which met the selection criteria (see Figure 1). There were no studies exploring the perspectives of non-medical prescribers.

Study characteristics

Characteristics of included studies are presented in Table 1. All but one, which collected data by survey, used focus groups and semi-structured interviews to collect qualitative data. [29] Four papers explored prescribers' views in relation to multiple medications (i.e. polypharmacy) [30-33]whilst the remaining papers investigated prescribers' views in relation to single PIMs or classes of medications (ten described one or more centrally acting agents such as psychotropics, hypnotics, benzodiazepines, minor opiates and antidepressants[34-43]; two for proton pump inhibitors [44 45] and five for miscellaneous PIMs defined according to pre-specified criteria, a preset medication list or clinical judgement. [29 46-49] Eighteen studies elicited the views of prescribers practicing in primary care, [29-41 44-48] one of prescribers in secondary care,[49] and two of prescribers servicing RACFs. [42 43]

Table 1 – Studies investigating the perspectives of prescribers in various settings

Year of publication	Lead author	Country	Aim	Medication types	Participants & setting	Age focus*	Data collection method	Analysis
1995	Britten	England	To identify patients whose current medication is the result of past treatment decisions and is regarded by their current GP as no longer appropriate, and to describe the drugs and the circumstances in which they continue to be prescribed	Miscellaneous PIMs	7 GPs, primary care	All ages	Descriptive survey; GP selected patients prescribed inappropriate medicines, structured data extraction from notes & GP-facilitated interview of patient	N/A
1997	Dybwad	Norway	To understand factors that could result in variations between GPs in order to form hypotheses and build theories about prescribing (main focus on factors that explain higher rates of prescribing)	Benzodiazepines and minor opiates	38 GPs (18 high rate prescribers, 20 medium to low rate prescribers), primary care	All ages	SSIs (combined with prescription registration information)	Not stated
1999	Damestoy	Canada	To explore physicians' perceptions and attitudes and the decision-making process associated with prescribing psychotropic medications for elderly patients	Psychotropics (sedatives, hypnotics, anxiolytics and antidepressants)	9 physicians who conduct home visits, primary care	Older patients	(Presumed face-to-face) SSIs	Grounded theory analysis
2000	Cantrill	England & Scotland	To explore factors which may contribute to inappropriate long-term prescribing in United Kingdom general practice	Miscellaneous PIMs	22 GPs, primary care	All ages	Face-to-face & telephone interviews informed by specific examples of PIMs identified by validated indicators	Not stated
2004	Iliffe	England	To explore beliefs and attitudes about continuing or stopping benzodiazepine hypnotics amongst older patients using such medicines, and amongst their general practitioners	Benzodiazepines	72 GPs, primary care	Older patients	Non-standardized interview group discussions	Not stated
2005	Spinewine	Belgium	To explore the processes leading to inappropriate use of medicines for elderly patients admitted for acute care	Miscellaneous PIMs	3 geriatricians & 2 house officers, hospital elderly acute care wards	Older patients	SSIs with health professionals triangulated with observation on wards and FGs with elderly inpatients	Not stated
2005	Raghunath	England	To understand the prescribing behaviour of GPs by exploring their knowledge, understanding and attitudes towards PPIs	PPIs	49 GPs, primary care	All ages	Focus groups	Not stated
2006	Parr	Australia	To gain more detailed understanding of GP and benzodiazepine user perceptions relating to starting, continuing and stopping benzodiazepine use	Benzodiazepines	28 GPs, primary care	All ages	SSIs	Not stated
2007	Cook	USA	To understand factors influencing chronic use of benzodiazepines in older adults	Benzodiazepines	33 Primary care physicians	Older patients	Face-to-face and telephone SSIs	Narrative analysis
2007	Rogers	England	To explore the dilemma the controversial benzodiazepine legacy has created for recent practitioners & their view of prescribing benzodiazepines	Benzodiazepines	22 GPs, primary care	All ages	SSIs	Not stated
2010	Anthierens	Belgium	To describe GPs' views and beliefs on polypharmacy in order to identify the role of the GP in improving prescribing behaviour	Polypharmacy	65 GPs, primary care	Older patients	Face-to-face individual SSIs (literature informed interview guide)	Content analysis
2010	Dickinson	United Kingdom	To explore the attitudes of older patients and their GPs to chronic prescribing of antidepressant therapy, and factors influencing such prescribing	Antidepressants	10 GPs, primary care	Older patients	SSIs	Framework analysis

Year of publication	Lead author	Country	Aim	Medication types	Participants & setting	Age focus*	Data collection method	Analysis
2010	Frich	Norway	To explore GPs' and tutors' experiences with peer group academic detailing, and to explore GPs' reasons for deviating from recommended prescribing practice	Miscellaneous PIMs	20 GPs (39 GPs also interviewed on topics outside scope of this review)	Older patients	Focus group interviews following individual receipt of prescription profile report	Thematic content analysis
2010	Moen	Sweden	To explore GPs' perspectives of treating older users of multiple medicines	Polypharmacy	31 GPs (4 private, 27 county-employed), primary care	Older patients	Focus groups (literature informed question guide)	Conventional content analysis
2010	Subelj	Slovenia	To investigate how high-prescribing family physicians explain their own prescription	Benzodiazepines	10 family physicians (5 high and 5 low prescribers), primary care	All ages	SSIs	Not stated
2011	Fried	USA	To explore clinicians' perspectives of and experiences with therapeutic decision making for older persons with multiple medical conditions	Polypharmacy	36 physicians, primary care, Vet affairs and academia	Older patients	Focus groups	Content analysis
2011	Iden	Norway	To explore decision-making among doctors and nurses on antidepressant treatment in nursing homes	Antidepressants	16 doctors, 8 each working full & part time in residential aged care facilities	Older patients	Focus groups	Systematic text condensation & analysis
2012	Flick	Germany	To explore, given the specific risks and the limited effect of sleeping medication, why doctors prescribe hypnotics for the elderly in long-term care settings	Hypnotics	20 prescribers servicing residential aged care facilities	Older patients	Episodic interviews	Thematic analysis
2012	Schuling	The Netherlands	To explore how experienced GPs feel about deprescribing medication in older patients with multimorbidity and to what extent they involve patients in these decisions	Polypharmacy	29 GPs, primary care	Older patients	Focus groups	Not stated
2013	Clyne	Ireland	To evaluate GP perspectives on a pilot intervention (to reduce PIP in Irish primary care)	Miscellaneous PIMs	8 GPs in focus group & 5 GPs for SSIs , primary care	Older patients	Focus group & SSIs	Thematic analysis
2013	Wermeling	Germany	To describe factors and motives associated with the inappropriate continuation of prescriptions of PPIs in primary care	PPIs	10 GPs (5 who frequently continue and 5 who frequently discontinue PPIs), primary care	All ages	SSIs	Framework analysis

GPs = General Practitioners; PIMs = Potentially inappropriate medications; PIP = Potentially inappropriate prescribing; PPIs = Proton Pump Inhibitors; SSIs = Semi-structured interviews.

* Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Table 2 – Comprehensiveness of reporting assessment (Consolidated criteria for reporting qualitative studies checklist) [25]

Reporting Criteria	Number N=x of 21	References of studies reporting each criterion
DOMAIN 1:		
Characteristics of research team		
1. Interviewer/facilitator identified	14	[30-34 37 38 42 44-49]
2. Credentials	12	[29 30 33-35 38-40 42 46 47 49]
3. Occupation	7	[34 38-40 42 46 49]
4. Gender	17	[30-35 37-39 41-43 45-49]
5. Experience and training	2	[38 39]
Relationship with participants:		
6. Relationship established before study started	5	[34 36 41 44 45]
7. Participant knowledge of the interviewer	3	[34 36 41]
8. Interviewer characteristics	4	[38 39 42 47]
DOMAIN 2:		
Study design		
9. Methodological theory identified	16	[30 32-35 37-40 42-45 47-49]
Participant selection		
10. Sampling method (e.g. purposive, convenience)	21	[29-49]
11. Method of approach	13	[30 32 34 37 38 40-43 45-47 49]
12. Sample size	21	[29-49]
13. Number/reasons for non-participation	7	[32 34 35 37 40 41 44]
Setting		
14. Setting of data collection	11	[29-32 34 36 37 39 41 45 46]
15. Presence of non-participants	0	-
16. Description of sample	17	[29-34 37-45 47 49]
Data collection		
17. Interview guide	16	[29-35 37 38 40-43 46 47 49]
18. Repeat interviews	0	-
19. Audio/visual recording	19	[30-35 37-49]
20. Field notes	6	[30 32 37 40 42 47]
21. Duration	12	[30 31 33 35 37 41-45 48 49]
22. Data saturation	7	[30 31 35 37-39 44]
23. Transcripts returned to participants	1	[44]
DOMAIN 3		
Data analysis		
24. Number of data coders	16	[30-34 36 37 39-42 44-47 49]
25. Description of coding tree	15	[30-34 37 39-45 47 49]
26. Derivation of themes	18	[30-34 36-47 49]
27. Software	6	[30 38 40 44 48 49]
28. Participant checking	2	[37 49]
Reporting		
29. Participant quotations presented	18	[30-34 37-49]
30. Data and findings consistent	20	[29-35 37-49]
31. Clarity of major themes	18	[29-34 37-47 49]
32. Clarity of minor themes	14	[29-31 33 34 36 37 39-41 43-45 49]

COREQ assessment

The completeness of reporting varied across studies, with an average of 17 (range 8-22) of 32 items from the COREQ checklist clearly documented (Table 2). The single descriptive survey reported nine of 24 applicable fields. [29] See Supplementary Table for the completed COREQ assessment for each study.

Lowest rates of reporting were observed in Domain 1 meaning that researcher bias (poor confirmability) cannot be excluded. [26] Greater transparency was apparent with Domains 2 and 3 allowing comparatively better assessment of the credibility, dependability and transferability of study findings. For example, all studies reported the sample size and method and most reported a description of the sample and interview guide. There was consistency between raw data and interpretive findings in all papers except one in which the interpretation was so brief that its accuracy was considered doubtful. [36] For five papers it was unclear whether ethics approval was obtained. [29 34 43 44 46]

Synthesis of results

Thematic synthesis yielded 42 subthemes, 12 unique descriptive themes and 4 analytic themes (Figure 2), with multiple interdependencies and relationships. Barrier and enabler descriptive themes and subthemes tended to mirror each other for each analytic theme of Awareness, Inertia, Self-efficacy and Feasibility. The first three themes reflect factors intrinsic to the prescriber and his/her decision making process while the fourth deals with extrinsic factors. Tables 3 and 4 provide illustrative quotations from either primary study participants or study authors relating to barrier and enabler subthemes, respectively.

Table 3 – Illustrative quotations for barrier themes and subthemes

Analytic & Descriptive themes	Subtheme and References	Characteristics of studies from which subthemes were derived: Type of PIMs; Age range*; Setting (number of references).	Illustrative quotations *"Italicised text"* = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS			
	Poor insight[46 47 49]	Misc PIMs (3); Older (2) & all ages (1); Primary (2) & secondary care (1).	*"When I saw the list of patients [to be discussed with the researcher], I was quite happy about the prescriptions…but obviously when you look at them in more detail there are anomalies there that ought to be either checked on, reviewed or even altered."* [46]
	Discrepant beliefs and practice [31 34 38 41 44]	Benzos (2) & minor opiates (1), Polypharm (1), PPIs (1); Older (1) & all ages (4); Primary care (5).	'In contrast to stated beliefs about best practice, physicians estimated that 5-10% of their older adult patients were using benzodiazepines on a daily basis for at least the past 3 months.' [38]
INERTIA			
PRESCRIBER BELIEFs/ ATTITUDE	Fear of unknown/negative consequences of change (for the prescriber, patient and staff) [29-31 34-36 38 40 42-47 49]	Antidepressants (2), Benzos (2) & minor opiates (1), Hypnotics (1), Misc PIMs (4), Polypharm (2), PPIs (2), Psychotropics (1); Older (9) & all ages (6); Primary (12), residential aged (2) & secondary (1) care.	*"He gets very worried and excitable if you attempt to change anything… even just something minor would cause him virtually a breakdown."* [46] *"We can't predict the effect [of deprescribing] for the individual patient."* [31] *"It's scary to stop a medication that's been going for a long time, because you kind of think am I opening a can of worms here, because I don't know what the reasons were for them starting that medication. To explore all that will take, you know, I can't do all that now, I will have to do that another time."* [40] *"I suggest to them that ideally we should try to get them off of that, but if they're saying, been there, done that, that didn't work for me when I came off of this, I don't think it's worth getting into a big knock-down drag-out [fight] with them or having them leave my practice over this issue".* [38]
	Drugs work, few side effects [34 35 38 39 41 43-45 47]	Benzos (3) & minor opiates (1), Hypnotics (1), Misc PIMs (1), PPIs (2), Psychotropics (1); Older (4) & all ages (5); Primary (8) & residential aged (1) care.	'In their [the physicians'] view psychotropic medication helps the elderly patient remain functional and is the least problematic solution... The physicians stated that they often do not see side effects and that patients often do not report them...' [35]
	Prescribing is kind, meets needs (of patient, staff, carer) [34 37-41 43 44]	Antidepressants (1), Benzos (4) & minor opiates (1), Hypnotics (1), PPIs (1); Older (3) & all ages (5); Primary (7) & residential aged (1) care.	*"There is a paradox concerning older patients. You do not want to make them grow dull, but on the other hand you know their chronic problems, and you know that at their age the drugs are not so addictive. You want them to keep their minds clear, but on the other hand I do have a tendency to be permissive to older patients."* [34] *"...It treats our own pain as well as our patients' pain, 'cos we want to help people and make people feel better. So if we give people something and make them feel better, then everybody seems to be happier."* [39]
	Stopping is difficult, futile has/will fail [31 34 36-38 42 43 46 47] ,	Antidepressants (1), Benzos (3) & minor opiates (1), Hypnotics (1), Polypharm (1), Misc PIMs (2); Older (6) & all ages (3); Primary (7) & residential aged (2) care.	*"Let's pretend it's an octogenarian…if it's gonna make the patient feel better, I don't care if the patient's on it for the rest of their life."* [38] 'Most frequent concern identified was the difficulty anticipated in persuading older patients to withdraw after years of using benzodiazepines.' [36]

			"In my experience, patients get hooked on PPIs, it is almost addictive like heroin and people appear to experience severe indigestion symptoms on attempting to stop them." [44]
	Stopping is a lower priority issue[38 40 44 45 49]	Antidepressants (1), Benzos (1), Misc PIMs (1), PPIs (2); Older (3) & all ages (2); Primary (4) & secondary (1) care.	"... We are always faced with multiple problems and PPIs are just one issue..." [44]
PRESCRIBER BEHAVIOUR	Devolve responsibility [29 34 35 40-43 49]	Antidepressants (2), Benzos (1) & minor opiates (1), Hypnotics (1), Misc PIMs (2), Psychotropics (1); Older (5) & all ages (3); Primary (5), secondary (1) & residential aged (2) care.	'They [the physicians] recognized that the inappropriate use of psychotropic medication for elderly patients was a public health problem, but they felt that it was beyond the scope of the individual physician.' [35] *"(...) I ask them if it should be a sleeping pill or another of the available options and mostly they have a need for sleeping pills."* [43] *"I have been running this practice for twelve years. I took it over from an older colleague. I took over all his patients. They were mostly old people. Prescribing policy has been rather liberal, and I have continued this policy."* [34]
SELF-EFFICACY			
SKILLS/ KNOWLEDGE	Skills/knowledge gaps[30-35 40 45 49]	Antidepressants (1), Benzos & minor opiates (1), Misc PIMs (1), Polypharm (4), PPIs (1), Psychotropics (1); Older (7) & all ages (2); Primary (8) & secondary (1) care.	*"I don't have enough time for education about the newest information on psychiatric disorders, and better communication with specialists would be very helpful." [41]* 'Side effects are not always recognised as such.' [32] "*When house officers come on our ward, they haven't necessarily been trained in geriatrics. So they arrive here, and then they start with 10mg of morphine every four hours. That's too much*." (Hospital based geriatrician) [49] *"You look at the medication list and want to reduce it but then you can't find things you can eliminate."* [31]
INFORMATION/ INFLUENCERS	Lack of evidence[30 31 33]	Polypharm (3); Older age (3); Primary care (3).	*"To me, the guidelines are kind of a hindrance. At the moment they do not cater for older patients"* [31]
	Incomplete clinical picture [30-33 40 41 46 47 49]	Antidepressants (1), Benzos (1), Misc PIMs (3), Polypharm (4); Older (7) & all ages (2); Primary (8) & secondary (1) care.	*"The problem is that the medication lists of the doctors involved are not exchanged and are consequently inconsistent."* [31] *"One has discovered that they might have completely different expectations than what the doctor had from the beginning. Do they want to survive for five more years or? And so on. What are their expectations?"* [30] '…Medicines, (mainly for chronic conditions) were sometimes not appropriately reviewed because there was no written information on indication and follow-up or because this was not readily available.' [49] "...sometimes the older people decide for themselves to reduce some of their medication or to adjust the doses without telling their GP. Therefore as their GP you can have the wrong impression about their medication intake..." [32]
	Guidelines/specialists[30-33 38	Benzos (1), Misc PIMs (2), Polypharm (4),	'When existing guidelines are debated, GPs felt deceived and insecure... The importance of individualising

	44 46 49]	PPIs (1); Older (6) & all ages (2); Primary (7) & secondary (1) care.	treatment was also expressed and many guidelines were perceived as too rigid leading to a standardized 'kit' of medicines per indication...' [30] *"I have difficulty not following the guidelines if I don't have good reasons to do so."* [31] *"When the hospital consultant recommends a treatment it's difficult… for us not to prescribe unless there is a very good reason. To some extent we feel obliged to carry on when they have initiated it."* [46]
	Other Health Professionals (Aged Care) [42 43]	Antidepressants (1) & Hypnotics (1); Older patients (2); Aged care (2).	*"(…) in such a situation it amounts to the sleeping pill, because everybody else's need is the sleeping pill, and I would have to fight tooth and nail if really I wanted to avoid this."* [43] *"They (RACF nurses) called me on the carpet to tell me that withdrawing antidepressants was not a clever thing to do because the patient became angrier and resisted care. They therefore demanded that I reinstate medication."* [42]
FEASIBILITY			
PATIENT	Ambivalence/resistance to change [29-32 35 37 38 40 43 44 46 48 49]	Antidepressants (2), Benzos (2), Hypnotics (1), Misc PIMs (4), Polypharm (3), PPIs (1), Psychotropics (1); Older (9) & all ages (4); Primary (11), secondary (1) & residential aged (1) care.	*"When I said initially we wanted her to come off it, she said, oh no, I've been on that for ages, and I don't want to come off it."* [48] *"The discontent rarely lies with the patient themselves."* [31]
	Poor acceptance of alternatives[37 38 42-44]	Antidepressants (1), Benzos (2), Hypnotics (1), PPIs (1); Older (3) & all ages (2); Primary (3) & residential aged (2) care.	*"… these types of people and they tend not to want to help themselves, you know they won't take the hypnotherapy and they won't go to yoga classes and they won't do anything else. They just want a quick fix."* [37]
	Difficult & intractable adverse circumstance [34 35 37 39 40]	Antidepressants (1), Benzos (2) & minor opiates (1), Psychotropics (1); Older (2) & all ages (3); Primary care (5).	*"I think they have horrible lives, a lot of them… I think it's a combination of all things, their health, their social circumstances… I think a lot of people are on antidepressants because of everything put together. And you can't… change most of the factors that cause it."* [40]
	Discrepant goals to prescriber [30 33]	Polypharmacy (2); Older age (2); Primary care (2).	*"I kind of get aggravated that half of the medicines that I think are totally rubbish are the ones that the patient really wants to take."* [33]
RESOURCES	Time and effort[30 33 34 37 38 40-42 46 48 49]	Antidepressants (2), Benzos (3) & minor opiates (1), Misc PIMs (3), Polypharm (2); Older (7) & all ages (4); Primary (9), secondary (1) & residential aged (1) care.	*"We have a big problem with long-term hypnotic use. It would take an awful lot of work and it's purely a time and work problem".* [46]
	Insufficient reimbursement[37 38]	Benzos (2); Older (1) & all ages (1); Primary (2) care.	'… a lack time or resources to provide counselling, especially due to the absence of remuneration for doing so.' [37]
	Limited availability of effective alternatives [37 38 41-43]	Antidepressants (1), Benzos (3), Hypnotics (1); Older (3) & all ages (2); Primary (3) & residential aged (2) care.	'…There is hardly any alternative to medicamentous therapy.' [43]
WORK PRACTICES	Prescribe without review [34 35 42 43 45-47]	Antidepressants (1), Benzos & minor opiates (1), Hypnotics (1), Misc PIMs (2),	*"(…) then he gets something and he continues this pill, and then the issue is over for him, then it's quiet, and then he has his pill and then he sleeps through, and from time to time you may enquire, it if occurs to*

		PPIs (1), Psychotropics (1); Older (4) & all ages (3); Primary (5) & residential aged (2) care.	*you while looking at his medication."* [43]*"When we work in a large health centre, then we sign prescriptions for each other... when a colleague is absent, we issue prescriptions for him that day. Any prescription I issue is my responsibility, but if you are asked to prescribe a particular drug [for a colleague] then you sign it in the reception. I don't check which other drugs that person uses."* [47]
MEDICAL CULTURE	Respect prescriber's right to autonomy & hierarchy [29 30 34 37 45 46 49]	Benzos (1) & minor opiates (1), Misc PIMs (3), Polypharm (1), PPIs (1); Older (2) & all ages (5); Primary (6) & secondary (1) care.	'The GPs rarely contact colleagues, for example, hospital specialists, as there is a perceived lack of routines for this as well as an informal understanding not to pursue colleagues' motivations for prescriptions. ' [30]
HEALTH BELIEFS & CULTURE	Culture to prescribe more[32 42 47]	Antidepressants (1), Misc PIMs (1), Polypharm (1); Older patients (3), Primary (2) & residential aged (1) care.	*"The number of medications grows slowly. There is a complaint, we give new medication, it continues without really stopping it after a while… and it is our responsibility to try and withdraw it from the patient"* [32]
	Prescribing validates illness[34 40 43]	Antidepressants (1), Benzos & minor opiates (1), Hypnotics (1); Older (2) & all ages (1); Primary (2) & residential aged (1) care.	*"They feel that unless they are on a tablet for it then they are not having any treatment. There are a lot of those kinds of people."* [40]
REGULATORY	Quality measure driven care [33]	Polypharm (1); Older (1); Primary care (1).	*"Another factor that we experience at the VA is these electronic reminders that tell you to do things…What I do really depends on who is in front of me…So the reminder comes up and it makes no sense. This guy's LDL is 101.8… Should I go from 40 to 80 of simvastatin? And what's the risk and benefit there?"* [33]

Benzos = Benzodiazepines; Misc = Miscellaneous, PIMs = Potentially inappropriate medications; Polypharm = Polypharmacy, PPIs = Proton Pump Inhibitors.* Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Table 4 – Illustrative quotations for enabler themes and subthemes

Analytic & Descriptive themes	Subtheme	Characteristics of studies from which subthemes were derived including: Type of PIMs; Age range*; Setting (number of references).	Illustrative quotations *"Italicised text"* = Primary quote (i.e. quote from a study participant from an included paper) 'Non-italicised text' = Secondary quote (i.e. quote from study authors' findings from an included paper)
AWARENESS			
	Review, observation, audit & feedback [46 47 49]	Misc PIMs (3); Older (2) & all ages (1); Primary (2) & secondary (1) care.	As above.[46]
INERTIA			
PRESCRIBER BELIEFs/ATTITUDE	Fear of negative/unknown consequences of continuation [44]	PPIs (1); All ages (1); Primary care (1).	*"Miracle all right, but too good of anything can be dangerous. Would just like to reiterate that, let me say they [PPIs] even work too well, what worries me is won't there be long-term missed cancers?"* [44]
	Positive attitude toward deprescribing [31]	Polypharm (1); Older age (1); Primary care (1).	*"You can have a field day with crossing off medication: 'sure, scrap half of it'."* [31]
	Stopping brings benefits [36 37 48]	Benzos (2) & Misc PIMs (1); Older (2) & all ages (1); Primary care (3).	*"O ya, and she was delighted, I stopped some of her other medications because she was in front of me and I had a bit of time to do it."* [48]
PRESCRIBER BEHAVIOUR	Devolve responsibility [29 40 44]	Antidepressants (1), Misc PIMs (1), PPIs (1);	'Some [GPs] preferred to wait until the patient went to hospital where they would be taken off their drugs without the GP being blamed. The GP might even write and ask a hospital doctor to do this.' [29]

		Older (1) & all ages (2); Primary care (1).	*"Why not be honest and say, the NHS can't afford to keep giving you these drugs unless there's a very good reason. The patients understand that, and in this day and age they understand perfectly well about cost."* [44]
SELF-EFFICACY			
SKILLS/ ATTITUDE	Confidence (to stop therapy/deviate from guidelines)[33 45]	Polypharm (1), PPIs (1); Older patients (1) & all ages (1); Primary care (2).	*"It's not as if the life of the patient is suddenly at risk because I take away a pill, yes. [...] in the worst case heartburn may re-occur or there is upper abdominal discomfort, but that will not immediately cause a bleeding ulcer."* [45] *"I sort of you know tone those goals down. I am not looking for a Hemaglobin A1C of 7 anymore…so I take the pressure off them and I start removing those medications especially the ones that cause hypoglycaemia."* [33]
	Work experience, skills & training [30 45 49]	Misc PIMs (1), Polypharm (1), PPIs (1); Older (2) & all ages (1); Primary (2) & secondary (1) care.	*"Yes, maybe problem oriented when you are new. Maybe now one thinks more about consequences, in another way."* [30]
INFORMATION/ DECISION SUPPORT	Data to quantify benefits/harms [30-32 48]	Misc PIMs (1), Polypharm (3); Older (4); Primary care (4).	*"…because actually what you could do is to give him (patient) some more 'hard core' facts like: 'If you refrain from treatment your chance of stroke is 20%..."* [30]
	Dialogue with patients[29 30 44 46]	Misc PIMs (2), Polypharm (1), PPIs (1); Older (1) & all ages (3); Primary care (4).	'Discussion during the research interview made some patients more willing to consider a change in medication.' [29] 'Adequate discussion with patients was widely recognised as one of the keys to influencing change, but although practiced by some GPs it was not always successful.' [46]
	Access to specialists [40 41 44 49]	Antidepressants (1), Benzos (1), Misc PIMs (1), PPIs (1); Older (2) & all ages (2); Primary (3) & secondary (1) care.	'They (low benzodiazepine prescribing family physicians) desired better co-operation and clear instructions from psychiatrists.' [41]
FEASIBILITY			
PATIENT	Receptivity/motivation to change [33 37 46]	Benzos (1), Misc PIMs (1), Polypharm (1); Older (1) & all ages (2); Primary care (3).	*"He's fairly amenable to tinkering with his pills, so we'll look at that".* [46]
	Poor prognosis[49]	Misc PIMs (1); Older age (1); Secondary care (1).	*"Sometimes people have taken 10 medicines while they were in curative care, and gradually they move on to palliative care. Then we must reconsider all the prescriptions, drug by drug, saying: OK, what's the goal? To improve your comfort? Well, this medicine will make you feel more comfortable; we can stop this other one."* [49]
RESOURCES	Adequate reimbursement [38]	Benzos (1); Older age (1); Primary care (1).	*"Reimbursement is very low... I think if it was something that we did get reimbursed on I think you would see physicians' attitudes a lot different. You'd be more willing to spend time." [38]*
	Access to support services[31 37 41 46]	Benzos (2), Polypharm (1), Misc PIMs (1); Older (1) & all ages (3); Primary care (4).	'Most GPs work closely with a local pharmacist [when undertaking medication review to stop medicines]: the task perception of such pharmacists was an important factor when a GP was looking for decision support in medication review' [31]
WORK PRACTICE	Stimulus to review[29 31 40 44 48 49]	Antidepressants (1), Misc PIMs (3); Polypharm (1), PPIs (1); Older (4) & all ages (2); Primary (5) & secondary (1) care.	'A new patient entering the practice list is welcomed as an opportunity to review their medication.' [31]
REGULATORY	Raise prescribing threshold [44 45]	PPIs (2);	*"I think we are all sitting here and debating about this mainly because of the pressure on us by our*

		All ages (2); Primary care (2)	*pharmaceutical advisors not to prescribe PPIs because of cost implications to the NHS; I bet that this will not be an important topic in 2 years when Losec goes generic."* [44]
	Monitoring by authorities [34]	Benzos & minor opiates (1); All ages (1); Primary care (1).	'The continuous monitoring of prescriptions by health authorities also put stress on the doctors...' [34]

Benzos = Benzodiazepines; Misc = Miscellaneous, PIMs = Potentially inappropriate medications; Polypharm = Polypharmacy, PPIs = Proton Pump Inhibitors. *Age focus refers to the indicative age group of patients who were the focus of participant discussions, as suggested by the terms used in each article, which did not specify exact age ranges.

Fewer enablers were reported than barriers and there was variation in the relative contribution of each study to each theme.

AWARENESS

This theme was apparent in the three papers which utilised audit or informal third-party (e.g. other health professional) observation and feedback. [46 47 49] Poor insight was an observed rather than reported barrier, with interventions to raise prescriber awareness an enabler to minimising the prescription of PIMs. Prescriber beliefs at a population level did not necessarily translate to prescribing practices at an individual level. For example, agreement among prescribers that benzodiazepines should not be used regularly or long-term did not necessarily preclude such prescribing in individual patients. [34 38 41]

INERTIA

Inertia was defined as failure to act, despite awareness that prescribing is potentially inappropriate, because ceasing PIMs was perceived to be a lower value proposition than continuing PIMs.

Fear of unknown/negative consequences of change featured in 15 of 22 papers, and related to consequences for: the prescriber (threatened therapeutic relationship, diminished credibility, increased initial and ongoing workload, potential for litigation, conflict with other prescribers/health professionals); [29-31 34-36 38 40 43-47 49] the patient (withdrawal syndrome, symptom relapse or increased risk of the condition/event for which preventive medication was originally prescribed); [36 38 40 42-47] and other health professionals (increased workload and safety concerns of staff in RACFs). [42 43] The prescriber beliefs that facilitate cessation were the converse , that is, fear of unknown/negative consequences of continuation,[44] a positive attitude to stopping medicines [31] and a belief this practice can bring benefits. [36 37 48]

The barrier belief that drugs appear to work with few adverse effects was apparent in nine papers [34 35 38 39 41 43-45 47] of which two studied 'high-rate' and 'low-rate' benzodiazepine prescribers. 'High-rate' prescribers consistently downplayed risks of harm, whereas 'low/ medium-rate' prescribers were more conscious of such risks. [34 41] The futility and potential harm of cessation in patients of advanced age was a subtheme predominantly present in papers considering psychoactive agents. [34 35 38 43 46 47]

Another barrier was the devolvement to another party of responsibility for the decision to continue or cease a medication (e.g. another prescriber, health professional, society, or the patient). One example was continuation of PIMs in patients that prescribers had inherited from colleagues where the former failed to question the rationale used by the latter in prescribing such drugs. [29 34 41 49] Another example was the provision of PIMs upon the request of RACF nursing staff [42] or patients [34 40 43] without critical prescriber review. Finally inappropriate prescribing of psychotropics, while viewed as a public health concern, was considered beyond the scope of individual prescribers. [35]

SELF-EFFICACY

This analytic theme refers to factors that influence a prescriber's belief and confidence in his or her ability to address PIM use. It involves subthemes relating to knowledge, skill, attitudes, influences, information and decision support.

Knowledge or skill deficits, [30-35 40 45 49] including difficulty balancing the benefits and harms of therapy, [30-33] recognising adverse drug effects [31 32]and establishing clear cut diagnoses/indications for medicines [34 35 40] were challenges prescribers faced in identifying and managing PIMs. Balancing the benefits and harms was perceived to be especially difficult when reviewing preventive medications in multimorbid older people with polypharmacy where shorter life expectancy, uncertain future benefits and higher susceptibility to more immediate adverse drug effects must all be considered. [30-33] On the other hand, better quantification of the benefits and harms of therapy, [30-32 48] confidence to deviate from guidelines and stop medications if thought necessary, [33 45] greater experience, [30 45] and targeted training, especially in prescribing for older people, [49] were seen as enabling factors.

Compounding generic knowledge and skill gaps were information deficits specific to individual prescribing decisions, resulting from poor communication with multiple prescribers and specialists involved in patient care, inadequate transfer of information at care interfaces, fragmented and difficult-to-access patient medical records, and failure of patients to know/disclose their full medical history/medication lists to prescribers. [30-33 40 41 46 47 49] This subtheme linked strongly with time and effort demands on prescribers, and in two papers was associated with low motivation arising from a perceived inability to efficiently access all information required for optimal prescribing. [40 49]

Eight papers discussed the influence of care recommendations from guidelines and specialists. [30-33 38 44 46 49] Guidelines were often viewed negatively, with prescribers feeling pressured to comply with recommendations at odds with the complexities of clinical practice. [30-32 44 46] Pressure from staff to continue prescribing PIMs, often to maintain facility routines, was presented as a barrier unique to RACFs. [42 43] Offsetting this were enablers centred on greater dialogue with patients to increase understanding and facilitate shared decision making,[29 30 44 46] as well as timely access to, and decision support from, specialists, particularly geriatricians and psychiatrists. [37 40 41 44 46 49]

FEASIBILITY

Feasibility refers to factors, external to the prescriber, which determine the ease or likelihood of change. They relate to patient characteristics, resource availability, work practices, medical and societal health beliefs and culture, and regulations.

The most frequently expressed barrier concerning patients was their ambivalence or resistance to change [29-32 35 37 38 40 43 44 46 48 49] and their poor acceptance of alternative therapies. [37 38 42-44] In contrast, receptivity and capacity to change was identified as an enabler in three studies, [33 37 46] as was a poor prognosis which helped crystallise care goals and prompt review of the appropriateness of existing drug regimens. [49]

Limited time and effort to review and discontinue medications [30 33 34 37 38 40-42 46 48 49] was the most common resource constraint followed by limited availability of effective non-drug

treatment options. [35 37 38 41-43] Adequate reimbursement [38]and access to support services such as mental health workers and pharmacists for medication review [31 37 41 46]emerged as enablers.

Certain work practices were raised as barriers to deprescribing, such as provision of repeats for a prescriber's own or colleague's patients, [34 46 47] and the absence of explicit treatment plans or formal or scheduled medication review. [34 43] The mirroring enablers were opportunities to review medication regimens (e.g. hospital admission,[29 49] change of prescriber,[31] specialist[40] or scheduled review). [44 48]

Remaining descriptive themes related to medical and societal health beliefs, cultural and regulatory factors. The most frequently mentioned were discomfort and reluctance to question a colleagues' prescribing decisions [29 30 34 37 45 46 49] associated with respect for professional autonomy or the medical hierarchy when specialist prescribers were involved.

Externally imposed guideline-based quality measures were presented as a barrier to minimising the prescription of PIMs. [33] Raising the prescribing threshold for medications (e.g. through increased cost or restricted access) and monitoring by authorities were seen by prescribers as unwelcome, perverse enablers. [44 45]

DISCUSSION

This systematic review comprehensively investigates prescriber barriers and enablers to minimising the prevalence of chronically prescribed PIMs in adults. The thematic construct we developed from published literature centres on Awareness, Inertia, Self-efficacy and Feasibility. It principally reflects the perspectives of primary care physicians managing older, community based adults. Although the themes and subthemes have been presented separately, the reasons doctors continue to prescribe, or do not cease, PIMs are multi-factorial, highly interdependent and impacted by considerable clinical complexity.

Many subthemes were common to papers regardless of inter-study differences in the PIMs discussed, patient age and clinical setting (e.g. primary, secondary or residential aged care).

Subthemes varied according to whether studies focussed on polypharmacy or single PIMs or classes of PIMs, which was also associated with differing levels of prescriber insight and certainty. In the four studies focussed on polypharmacy, prescribers were aware of polypharmacy-related harm but could not easily identify which medications were inappropriate, as reflected by the subthemes 'difficulty/inability to balance benefits and harms of therapy', [30-33] 'inability to recognise adverse drug effects, [31 32]'lack of evidence' [30 31 33] and 'incomplete clinical picture'. [30-33] In other studies focussing on specific classes of over-prescribed medications, prescribers were aware of this inappropriateness, but in response voiced various rationalisations for continued prescribing such as 'drugs work, few adverse effects', [34 35 38 39 41 43-45 47] 'prescribing is kind and meets needs', [34 37-41 43 44] 'stopping is difficult, futile, has or will fail', [34 36-38 42 43 47] 'poor (patient) acceptance of alternatives', [37 38 42-44] and 'difficult and intractable adverse (patient) circumstance'. [34 35 37 39 40]

However, in other studies focussing on miscellaneous PIMs, prescribers were generally not aware of their inappropriate prescribing until this was revealed to them (e.g. through audit and feedback). [46 47 49]

No definite thematic pattern was observed from the subthemes of six studies which did not specifically focus on the care of older people [29 37 39 41 44 45] compared to the remaining 15 which did. Compared to studies in primary care, unique themes emerged from papers set in RACFs and acute care settings. For example, pressure on prescribers to continue prescribing PIMs at the request of RACF nursing staff was unique to this setting. [42 43] The one study set in acute care highlighted inexperience and training deficiencies of junior prescribers, as viewed by three geriatricians. [49]

The finding that poor insight into potentially inappropriate prescribing practices was only apparent in studies where prescribers were made aware of this is unsurprising, given prescribers do not intentionally prescribe medications inappropriately. It demonstrates the importance of awareness-raising strategies for prescribers. Inertia, as in failure to deprescribe when appropriate, sits at odds with the more traditional use of the word as symbolising failure to intensify therapy when indicated. [50] Inertia has been linked to 'omission bias' where individuals deem harm resulting from an act of commission to be worse than that resulting from an act of omission.[51 52] In the case of deprescribing as an act of commission, it becomes more a matter of reconciling a level of expected utility (accrual of benefits) with a level of acceptable regret (potential to cause some harm). [53] Fear of negative consequences resulting from deprescribing contributes to inertia and is not easily allayed by the current limited evidence base regarding the safety and efficacy of deprescribing. [54] In the same papers in which prescribers rationalised continuation of therapy with the belief that drugs work and have few adverse effects, [34 35 38 39 41 43-45 47] prescribers also identified different thresholds for initiating versus continuing the same therapy. This anomaly suggests either a lack of prescriber insight, clear differences in prescribers' attitudes toward initiation versus continuation, or a social response bias towards a false belief induced by the methodology used by interviewers.

Relevance to previous literature

One meta-synthesis of seven papers has recently been published online exploring prescribers' perspectives of why potentially inappropriate prescribing (PIP) occurs in older people.[55] Compared to our review, this study had a generic focus on PIP, including under-prescribing and its search strategy retrieved fewer articles (n= 7). Scanning their reference list did not reveal any additional papers which would have met our selection criteria and their results yielded no additional themes.

Our findings are consistent with literature (largely focused on *initiation* of therapy) suggesting that pharmacological considerations are not the only factors impacting doctors' prescribing decisions. [56] Rather, prescribing decisions result from interacting clinical, social and cultural factors impacting on both the patient and prescriber. [56-58]

Reeve *et al* recently published a review of patient barriers and enablers to deprescribing [20] and have emphasised the importance of a patient-centred deprescribing process. [59] When

comparing their results with ours, prescribers' barriers are concordant with those of patients with respect to resistance to change, poor acceptance of non-drug alternatives, and fear of negative consequences of discontinuation. However, prescribers also underestimate enabling factors including patients' experiences /concerns of adverse effects, dislike of multiple medicines, and being assured that a ceased medication can be recommenced if necessary. Patients also reported their primary care physician could be highly influential in encouraging them to discontinue therapy, a perception not echoed amongst prescribers.[20] Prescribers need to discuss, rather than assume, patient attitudes towards their medicines and to deprescribing, in the context of their current care goals.

Previous reviews of interventions to reduce inappropriate prescribing/polypharmacy in older patients have not been able to conclude with certainty that multi-faceted interventions are more effective than single strategies.[60 61] Although our findings suggest the former are likely to be more successful, further research is required to identify the barriers and enablers with the greatest potential for impact in designing targeted deprescribing interventions.

Strengths and limitations

Inconsistent terminology and poor indexing of search terms relating to deprescribing and inappropriate therapy greatly hampered our ability to identify relevant studies. Our mitigation efforts comprised a comprehensive pre-scoping exercise, a highly iterative search strategy tailored to each database, and snowballing from reference lists and related citations.

Despite no search restrictions on patient age, clinical setting, or type of PIM, most study participants were experienced primary care physicians caring for older, community-based adults. Caution is therefore needed when transferring our results to other settings or patient groups. However, two recent cross-sectional studies looking at barriers to discontinuation of benzodiazepines and antipsychotics in nursing homes reflected subthemes identified in our review - fear of negative consequences of discontinuation such as poorer quality of life, symptom recurrence, greater workload and a lack of available, effective, non-drug alternatives. [62 63]

Many of the papers focussed on relatively few drug classes (psychotropics and PPIs) and only four focussed on polypharmacy. Although some subthemes were common to all types of studies (single and miscellaneous PIMs and polypharmacy papers), others were not. It is possible that, had more medication classes been studied, some of our results may have been different.

The strengths of our review included adherence to a peer-reviewed, documented methodology for thematic synthesis, COREQ assessment of studies allowing assessment of potential for bias, compliance with ENTREQ reporting requirements and a multi-disciplinary team of investigators to validate theme identification and synthesis.

Implications for clinicians and policy makers and future research

The results of this review disclose prescriber perceptions of their own cognitive processes as well as patient, work setting and other health system factors which shape their behaviour towards continuing or discontinuing chronically prescribed PIMs. The thematic synthesis

provides a clear conceptual framework to understand this behaviour. Rendering these issues visible for both clinicians and policy makers is the first stage in minimising inappropriate prescribing in routine clinical practice. It facilitates what has been lacking in deprescribing intervention studies to date - a pragmatic approach towards identifying and accounting for local barriers and enablers which will determine overall effectiveness of targeted interventions.

Further high quality prospective clinical trials are urgently needed in demonstrating the safety, benefits and optimal modes of deprescribing, especially in relation to multimorbid older people.[61 64] The fog of polypharmacy clouds a prescriber's capacity and confidence to identify PIMs which, to be overcome, requires complete and accurate clinical information and decision support.

Professional organisations and colleges have an important role in encouraging the necessary cultural and attitudinal shifts towards 'less can be more' in appropriate patients. The push for guideline adherence and intensification of therapy needs to be counterbalanced by the view that judicious reduction, discontinuation or non-initiation of medication, in the context of shared decision making and agreed care goals, is an affirmation of highest quality, individualised care.[65] This view needs to be embraced in the education and training of all health professionals, not just doctors, who influence the prescribing process.

Prescribers are making decisions in the face of immense clinical and health system complexity. Appropriate deprescribing needs to be regarded as equally important and achievable as appropriate initiation of new medications. Understanding how prescribers perceive and react to prescribing and deprescribing contexts is the first step to designing policy initiatives and health system reforms that will minimise inappropriate over-prescribing.

Acknowledgements

We thank University of Queensland librarians Mr Lars Eriksson and Ms Jill McTaggart for their assistance in developing the search strategy and Ms Debra Rowett for her invaluable insights when scoping the search and developing the manuscript.

Competing Interests

Ms Anderson received a speaker honorarium for an Australian Association of Consultant Pharmacy presentation. Dr Stowasser reports personal fees from National Prescribing Service, outside the submitted work. A.Prof Scott and Dr Freeman report no conflicts of interest directly relevant to this work.

Funding

Ms Anderson and A/Prof Scott are funded through a National Health and Medical Research Council grant under the Centre of Research Excellence Quality & Safety in Integrated Primary/Secondary Care (Grant ID, GNT1001157).

Contributorship

IS conceived the paper, the scope of which was refined by all authors. KA searched the literature, lead data analysis and drafted the manuscript. IS and DS read articles and assessed data analysis for comprehensiveness and reliability. IS, DS and CF provided critical comments and contributed to the interpretation of analysed results and framework development. All authors read, revised and accepted the final draft.

Data Sharing

Data used to develop the tables and figures presented in this article are available by emailing the corresponding author, Kristen Anderson, k.anderson8@uq.edu.au .

REFERENCES

1. Morgan T, Williamson M, Pirotta M, et al. A national census of medicines use: a 24-hour snapshot of Australians aged 50years and older. Med J Aust 2012;196(1):50 - 53
2. Qato DM, Alexander G, Conti RM, et al. Use of prescription and over-the-counter medications and dietary supplements among older adults in the united states. JAMA 2008;300(24):2867-78 doi: 10.1001/jama.2008.892[published Online First: Epub Date]|.
3. Price SD, Holman CD, Sanfilippo FM, et al. Are older Western Australians exposed to potentially inappropriate medications according to the Beers Criteria? A 13-year prevalence study. Australasian journal on ageing 2014 doi: 10.1111/ajag.12136[published Online First: Epub Date]|.
4. Guaraldo L, Cano FG, Damasceno GS, et al. Inappropriate medication use among the elderly: a systematic review of administrative databases. BMC geriatrics 2011;11:79 doi: 10.1186/1471-2318-11-79[published Online First: Epub Date]|.
5. Aparasu R, Mort J. Inappropriate prescribing for the elderly: beers criteria-based review. Ann Pharmacother 2000;34(3):338 - 46
6. Opondo D, Eslami S, Visscher S, et al. Inappropriateness of medication prescriptions to elderly patients in the primary care setting: a systematic review. PLoS One 2012;7(8):e43617
7. Roughead EE, Anderson B, Gilbert AL. Potentially inappropriate prescribing among Australian veterans and war widows/widowers. Intern Med J 2007;37(6):402-5 doi: 10.1111/j.1445-5994.2007.01316.x[published Online First: Epub Date]|.
8. Byles JE, Heinze R, Nair BK, et al. Medication use among older Australian veterans and war widows. Intern Med J 2003;33(8):388-92
9. Stafford AC, Alswayan MS, Tenni PC. Inappropriate prescribing in older residents of Australian care homes. Journal of clinical pharmacy and therapeutics 2011;36(1):33-44 doi: 10.1111/j.1365-2710.2009.01151.x[published Online First: Epub Date]|.
10. Somers M, Rose E, Simmonds D, et al. Quality use of medicines in residential aged care. Australian family physician 2010;39(6):413-6
11. Cahir C, Bennett K, Teljeur C, et al. Potentially inappropriate prescribing and adverse health outcomes in community dwelling older patients. Br J Clin Pharmacol 2014;77(1):201-10 doi: 10.1111/bcp.12161[published Online First: Epub Date]|.
12. Dedhiya SD, Hancock E, Craig BA, et al. Incident use and outcomes associated with potentially inappropriate medication use in older adults. The American journal of geriatric pharmacotherapy 2010;8(6):562-70 doi: 10.1016/s1543-5946(10)80005-4[published Online First: Epub Date]|.
13. Kalisch LM, Caughey GE, Barratt JD, et al. Prevalence of preventable medication-related hospitalizations in Australia: an opportunity to reduce harm. International Journal for Quality in Health Care 2012;24(3):239-49
14. Carey IM, De Wilde S, Harris T, et al. What factors predict potentially inappropriate primary care prescribing in older people? Analysis of UK primary care patient record database. Drugs Aging 2008;25(8):693-706
15. Lai HY, Hwang SJ, Chen YC, et al. Prevalence of the prescribing of potentially inappropriate medications at ambulatory care visits by elderly patients covered by the Taiwanese National Health Insurance program. Clin Ther 2009;31(8):1859-70 doi: 10.1016/j.clinthera.2009.08.023[published Online First: Epub Date]|.
16. Meurer WJ, Potti TA, Kerber KA, et al. Potentially inappropriate medication utilization in the emergency department visits by older adults: analysis from a nationally

representative sample. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 2010;17(3):231-7 doi: 10.1111/j.1553-2712.2010.00667.x[published Online First: Epub Date]|.
17. Alldred DP. Deprescribing: a brave new word? The International journal of pharmacy practice 2014;22(1):2-3 doi: 10.1111/ijpp.12093[published Online First: Epub Date]|.
18. World Health Organisation. Guide to Good Prescribing - A Practical Manual. Chapter 11. STEP 6: Monitor (and stop?) the treatment, 1994.
19. NPS: Better Choices BH. Competencies required to prescribe medicines: putting quality use of medicines into practice. Sydney: National Prescribing Service Limited, 2012.
20. Reeve E, To J, Hendrix I, et al. Patient Barriers to and Enablers of Deprescribing: a Systematic Review. Drugs & Aging 2013:1-15 doi: 10.1007/s40266-013-0106-8[published Online First: Epub Date]|.
21. Dixon-Woods M, Bonas S, Booth A, et al. How can systematic reviews incorporate qualitative research? A critical perspective. Qualitative Research 2006;6(1):27-44 doi: 10.1177/1468794106058867[published Online First: Epub Date]|.
22. Tong A, Flemming K, McInnes E, et al. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Med Res Methodol 2012;12:181 doi: 10.1186/1471-2288-12-181[published Online First: Epub Date]|.
23. Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. Journal of Health Services Research & Policy 2005;10(suppl 1):6-20 doi: 10.1258/1355819054308576[published Online First: Epub Date]|.
24. InterTASC Information Specialists' Sub-Group. Filters to Identify Qualitative Research. Secondary Filters to Identify Qualitative Research. https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/filters-to-identify-qualitative-research.
25. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua 2007;19(6):349-57 doi: 10.1093/intqhc/mzm042[published Online First: Epub Date]|.
26. Hannes K. Chapter 4: Critical appraisal of qualitative research. In: Noyes J, Booth A, Hannes K, et al., eds. Supplementary Guidance for Inclusion of Qualitative Research in Cochrane Systematic Reviews of Interventions: Cochrane Collaboration Qualitative Methods Group, 2011.
27. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med Res Methodol 2008;8:45 doi: 10.1186/1471-2288-8-45[published Online First: Epub Date]|.
28. Tong A, Lesmana B, Johnson DW, et al. The perspectives of adults living with peritoneal dialysis: thematic synthesis of qualitative studies. American journal of kidney diseases : the official journal of the National Kidney Foundation 2013;61(6):873-88 doi: 10.1053/j.ajkd.2012.08.045[published Online First: Epub Date]|.
29. Britten N, Brant S, Cairns A, et al. Continued prescribing of inappropriate drugs in general practice. Journal of clinical pharmacy and therapeutics 1995;20(4):199-205
30. Moen J, Norrgard S, Antonov K, et al. GPs' perceptions of multiple-medicine use in older patients. Journal of Evaluation in Clinical Practice 2010;16(1):69-75

31. Schuling J, Gebben H, Veehof LJG, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. BMC Family Practice 2012;13:56
32. Anthierens S, Tansens A, Petrovic M, et al. Qualitative insights into general practitioners views on polypharmacy. BMC Fam Pract 2010;11:65 doi: 10.1186/1471-2296-11-65[published Online First: Epub Date]|.
33. Fried TR, Tinetti ME, Iannone L. Primary care clinicians' experiences with treatment decision making for older persons with multiple conditions. Arch Intern Med 2011;171(1):75-80 doi: 10.1001/archinternmed.2010.318[published Online First: Epub Date]|.
34. Dybwad TB, Kjolsrod L, Eskerud J, et al. Why are some doctors high-prescribers of benzodiazepines and minor opiates? A qualitative study of GPs in Norway. Fam Pract 1997;14(5):361-8
35. Damestoy N, Collin J, Lalande R. Prescribing psychotropic medication for elderly patients: some physicians' perspectives. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 1999;161(2):143-5
36. Iliffe S, Curran HV, Collins R, et al. Attitudes to long-term use of benzodiazepine hypnotics by older people in general practice: findings from interviews with service users and providers. Aging & mental health 2004;8(3):242-8 doi: 10.1080/13607860410001669778[published Online First: Epub Date]|.
37. Parr JM, Kavanagh DJ, Young RM, et al. Views of general practitioners and benzodiazepine users on benzodiazepines: A qualitative analysis. Social Science and Medicine 2006;62(5):1237-49
38. Cook JM, Marshall R, Masci C, et al. Physicians' perspectives on prescribing benzodiazepines for older adults: a qualitative study. J Gen Intern Med 2007;22(3):303-7 doi: 10.1007/s11606-006-0021-3[published Online First: Epub Date]|.
39. Rogers A, Pilgrim D, Brennan S, et al. Prescribing benzodiazepines in general practice: a new view of an old problem. Health (London, England : 1997) 2007;11(2):181-98 doi: 10.1177/1363459307074693[published Online First: Epub Date]|.
40. Dickinson R, Knapp P, House AO, et al. Long-term prescribing of antidepressants in the older population: a qualitative study. Br J Gen Pract 2010;60(573):e144-55 doi: 10.3399/bjgp10X483913[published Online First: Epub Date]|.
41. Subelj M, Vidmar G, Svab V. Prescription of benzodiazepines in Slovenian family medicine: a qualitative study. Wiener klinische Wochenschrift 2010;122(15-16):474-8 doi: 10.1007/s00508-010-1413-2[published Online First: Epub Date]|.
42. Iden KR, Hjorleifsson S, Ruths S. Treatment decisions on antidepressants in nursing homes: a qualitative study. Scand J Prim Health Care 2011;29(4):252-6 doi: 10.3109/02813432.2011.628240[published Online First: Epub Date]|.
43. Flick U, Garms-Homolová V, Röhnsch G. "And mostly they have a need for sleeping pills": Physicians' views on treatment of sleep disorders with drugs in nursing homes. Journal of Aging Studies 2012;26(4):484-94
44. Raghunath AS, Hungin APS, Cornford CS, et al. Use of proton pump inhibitors: An exploration of the attitudes, knowledge and perceptions of general practitioners. Digestion 2005;72(4):212-18
45. Wermeling M, Himmel W, Behrens G, et al. Why do GPs continue inappropriate hospital prescriptions of proton pump inhibitors? A qualitative study. Eur J Gen Pract 2013 doi: 10.3109/13814788.2013.844787[published Online First: Epub Date]|.

46. Cantrill JA, Dowell J, Roland M. Qualitative insights into general practitioners' views on the appropriateness of their long-term prescribing. International Journal of Pharmacy Practice 2000;8(1):20-26
47. Frich JC, Hoye S, Lindbaek M, et al. General practitioners and tutors' experiences with peer group academic detailing: a qualitative study. BMC Fam Pract 2010;11:12 doi: 10.1186/1471-2296-11-12[published Online First: Epub Date]|.
48. Clyne B, Bradley MC, Hughes CM, et al. Addressing potentially inappropriate prescribing in older patients: development and pilot study of an intervention in primary care (the OPTI-SCRIPT study). BMC Health Serv Res 2013;13:307 doi: 10.1186/1472-6963-13-307[published Online First: Epub Date]|.
49. Spinewine A, Swine C, Dhillon S, et al. Appropriateness of use of medicines in elderly inpatients: qualitative study. BMJ 2005;331(7522):935 doi: 10.1136/bmj.38551.410012.06[published Online First: Epub Date]|.
50. Ostini R, Hegney D, Jackson C, et al. Knowing how to stop: ceasing prescribing when the medicine is no longer required. J Manag Care Pharm 2012;18(1):68-72
51. Ritov I, Baron J. Status-quo and omission bias. . Journal of Risk and Uncertainty 1992(5):49-61
52. Spranca M, Minsk E, Baron J. Omission and commission in judgment and choice. Journal of Experimental Social Psychology 1991(27):76-105
53. Tsalatsanis A, Hozo I, Vickers A, et al. A regret theory approach to decision curve analysis: a novel method for eliciting decision makers' preferences and decision-making. BMC medical informatics and decision making 2010;10:51 doi: 10.1186/1472-6947-10-51[published Online First: Epub Date]|.
54. Reeve E, Shakib S, Hendrix I, et al. The benefits and harms of deprescribing. Medical Journal of Australia 2014;201(7):386-89
55. Cullinan S, O'Mahony D, Fleming A, et al. A Meta-Synthesis of Potentially Inappropriate Prescribing in Older Patients. Drugs Aging 2014 doi: 10.1007/s40266-014-0190-4[published Online First: Epub Date]|.
56. Bradley CP. Factors which influence the decision whether or not to prescribe: the dilemma facing general practitioners. Br J Gen Pract 1992;42(364):454-8
57. Butler CC, Rollnick S, Pill R, et al. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. BMJ 1998;317(7159):637-42
58. Cohen D, McCubbin M, Collin J, et al. Medications as Social Phenomena. Health: 2001;5(4):441-69 doi: 10.1177/136345930100500403[published Online First: Epub Date]|.
59. Reeve E, Shakib S, Hendrix I, et al. Review of deprescribing processes and development of an evidence based, patient-centred deprescribing process. Br J Clin Pharmacol 2014 doi: 10.1111/bcp.12386[published Online First: Epub Date]|.
60. Kaur S, Mitchell G, Vitetta L, et al. Interventions that can Reduce Inappropriate Prescribing in the Elderly. Drugs & Aging 2009;26(12):1013-28 doi: 10.2165/11318890-000000000-00000[published Online First: Epub Date]|.
61. Patterson S, Hughes C, Kerse N, et al. Interventions to improve the appropriate use of polypharmacy for older people. Cochrane Database Syst Rev 2012;5:CD008165
62. Azermai M, Vander Stichele RRH, Van Bortel LM, et al. Barriers to antipsychotic discontinuation in nursing homes: An exploratory study. Aging and Mental Health 2014;18(3):346-53 doi: 10.1002/14651858.CD007726. [published Online First: Epub Date]|.

63. Bourgeois J, Elseviers MM, Azermai M, et al. Barriers to discontinuation of chronic benzodiazepine use in nursing home residents: Perceptions of general practitioners and nurses. European Geriatric Medicine 2013
64. Iyer S, Naganathan V, McLachlan A, et al. Medication Withdrawal Trials in People Aged 65 Years and Older. Drugs & Aging 2008;25(12):1021-31 doi: 10.2165/0002512-200825120-00004[published Online First: Epub Date]|.
65. Scott I, Anderson K, Freeman C, et al. First do no harm: a real need to deprescribe in older patients. Medical Journal of Australia 2014;201(7):309-92