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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030106
Article Type:	Research
Date Submitted by the Author:	27-Feb-2019
Complete List of Authors:	Kua, Chong-Han; Monash University - Malaysia Campus, School of Pharmacy; Tan Tock Seng Hospital, Continuing and Community Care Department Mak, Vivienne; Monash University - Parkville Campus, Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences Lee, Shaun Wen Huey ; Monash University - Malaysia Campus, School of Pharmacy; Taylor's University, School of Pharmacy
Keywords:	Deprescribing, Interview, Nursing home, Doctor, Pharmacist, Nurse

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Perspectives of health professionals towards deprescribing practice in nursing homes: an Asian setting

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Trial sponsor: Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore

Running title:

Health Professionals Perspectives Towards Deprescribing

Keywords

Deprescribing; Interview; Nursing home; Doctor; Pharmacist; Nurse

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Word count (exclude abstract): 3946

Version: Amendment 2019-Feb-23

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Abstract

Objective: To examine the determinants of deprescribing among health professionals in nursing homes, focusing on knowledge, practice and attitude.

Design: This was a qualitative study, which comprised of semi-structured in-depth interviews guided by 10 open-ended questions.

Setting: Four nursing homes in Singapore.

Participants: The study involved 17 participants (comprised of 4 doctors, 4 pharmacists and 9 nurses)

Main outcome measures:

Results: Two key themes (facilitators and barriers) portrayed the challenges faced by doctors, pharmacists and nurses towards deprescribing. The subthemes for facilitator identified are: perceptions on deprescribing based on types of medications; life expectancy of patient; teamwork between doctors, pharmacists and nurses; systematic deprescribing practice and educational tools; and benefits of deprescribing. Conversely, the identified subthemes for barriers are: cognitive status of patient and identification of adverse drug reactions; lack of knowledge in patient preferences; lack of coordination between health professionals in hospitals and nursing homes; and limited tools of deprescribing. Our studies further identified areas for improvement for the process of deprescribing, including a more suitable guideline, mentoring and case discussions, better shared decision making, as well as multidisciplinary teamwork. We have also identified first generation antihistamine as an important deprescribing target.

Conclusion: In conclusion, this study identified several issues revolving around health professionals when deprescribing in Asian nursing homes, and how these can impact the success of deprescribing.

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Article Summary

Strengths and limitations of this study

- This is the first deprescribing qualitative interview study in Asia to be carried out in the nursing home setting.
- This study examined important insights and areas for improvement to the process of deprescribing in nursing homes.
- The main limitation of the study is that by being conducted only in one country, the findings may not be reflective of all Asian settings.

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Introduction

Globally, by 2050, one in five individuals or approximately 2.1 billion people will be aged 60 years or older.[1] As one ages, their health conditions will progressively become more chronic and complex to manage.[2] Older adults residing in nursing homes often have significant co-morbidities requiring nursing care.[3] As a result, they are often prescribed multiple medications, leading to a high prevalence of polypharmacy.[4] Polypharmacy comes with an increased risk of negative health outcomes including adverse drug events, drug-interactions, decreased functional status, geriatric syndromes, higher healthcare costs, and non-adherence.[5, 6]

There is evidence that deprescribing, or the process of discontinuation, substitution or reduction of inappropriate or unnecessary medications among older adults,[7,8] improves patient outcomes. Deprescribing in nursing homes can reduce the number of residents with potentially inappropriate medication by 59%, number of fallers by 24% as well as mortality by 26%.[9] As such, an understanding of the facilitators and barriers to deprescribing among health professionals is essential to facilitate successful deprescribing interventions.

Several studies have explored the perceptions, barriers and enablers of general practitioners (GPs) and other health professionals towards deprescribing.[10-13] In a study by Palagyi et al, they conducted focus groups and interviews with GPs, pharmacists, nursing staffs, residents and their relatives to explore perceptions of medication use and deprescribing in Australian long-term care facilities, and identified four major themes - environmental factors (organization systems; policies; staff workload and coordination), skills and abilities (lack of knowledge and skilled personnel), control beliefs and self-efficacy (perceived restricted abilities to query, initiate or manage medication-related issues), as well as attitudes (residents and relatives believing medicines were prolonging their life; GPs' overwhelming workload), which were barriers to deprescribing.[12] Another study conducted by

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Kouladjian et al among GPs, specialist physicians and pharmacists from community and hospital settings identified several enablers and barriers in deprescribing anticholinergic and sedative medications among older adults.[11] They noted that the most noteworthy barrier is the devolving of responsibility between GPs and specialist physicians.

In a nominal group technique study between GPs, nurses and pharmacists by Turner et al, they assessed which factors are important for deprescribing in Australian long-term care facilities and found varying priorities between the professions. The top consideration factors were 'evidence for deprescribing' for doctors, 'clinical appropriateness of therapy' for pharmacists, and 'doctor receptivity' for nurses.[13] Difference in perceptions towards deprescribing is not limited to inter-professions, but also between countries. For example, a study between Sweden and Australia found that deprescribing by general practitioners in advanced care facilities is a complex process, and that behaviour of deprescribing between different countries is much dependent on the larger health care system.[14] When attitudes towards deprescribing were examined, they uncovered 'facilitating a good quality of life' as a theme, particularly in which Swedish general practitioners' goal of medication management was to achieve good quality of life, whereas Australian general practitioners were less clear. Instead the Australian counterparts had greater expression towards the theme of 'interest and disinterest in aged care' and were more concern with the low financial reimbursement associated with providing care to these residents.

There is still a lack in the understanding of the perspectives of health professionals in nursing homes towards deprescribing, particularly in Asia where the concept of deprescribing is still relatively new. Previously, a qualitative meta-synthesis of barriers and enablers of doctors towards minimizing potentially inappropriate medications (PIMs) in community older adults has identified analytical themes intrinsic to the prescriber (beliefs, attitudes, knowledge, skills, behaviour).[15] These analytical themes include problem awareness, inertia secondary to lower perceived value proposition

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for ceasing versus continuing PIMs, and self-efficacy in regard to personal ability to alter prescribing, from which barriers and enablers to minimising PIMs emerged.

Aims of the study

The aims of this study are to examine the determinants of deprescribing among health professionals in nursing homes, focusing on knowledge, practice and attitude.

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Methods and analysis

This was a qualitative study in which semi-structured in-depth interviews with doctors, pharmacists and nurses were conducted to determine the factors that affect their views and acceptance of deprescribing in Singapore nursing homes. The interviews were conducted prior to the implementation of a deprescribing stepped-wedge randomised controlled study.[16]

Potential participants were approached by the principal investigator by convenience sampling at the study sites during their routine visits. Participants must satisfy the following inclusion criteria: 1) provided informed consent; and 2) is involved in the care of nursing home residents. Participants may opt out at any time during the study.

Participants and Settings

The interviews were conducted in four nursing homes (one with approximately 400 beds, two with 200 beds and one with 150-beds) across Singapore. The pharmacists were community-based whom have provided weekly or fortnightly medication review services to the residents for at least a year. These pharmacists have completed or undertaken their postgraduate studies (Master of Clinical Pharmacy) or board certification in geriatric training. Nurses were full-time employees (staff nurses or enrolled nurses) of the nursing homes. The doctors were general practitioners who provided clinical services at the time of the interview. Most of the doctors visited the homes at least once weekly or fortnightly.

Semi-structured interviews

All interviews were conducted in a private area (nurse's office or doctor's consultation room) within the nursing homes at a time convenient for each participant. The principal investigator, CHK, conducted all interviews. The interview was guided by 10 open-ended questions on knowledge,

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practice and attitude towards deprescribing (Table 1), and were qualitatively analysed using thematic analysis. The questions were developed in consultation with a geriatrician.

<Table 1>

Data Analysis

Each interview was audio recorded and transcribed verbatim with the participant's consent. We used QSR NVivo 11 to assist in analysis of the data, and both inductive approach as well as deductive approach were used in our analysis, to explore both intended issues and other unexpected aspects of participants' experience.[17] In conventional content analysis (inductive approach), we determined the various demographic and clinical characteristics of our participants that can affect success of deprescribing. These are used to develop themes for the thematic analysis, as well as to develop a coding scheme. Following which using the interview questions, we employed directed content analysis (deductive approach) to collate qualitative data and the transcript data placed into themes. Coding was done using a combination of open, axial and selective coding.

Reporting of this manuscript followed the SRQR reporting guidelines.[18]

Patient Involvement

This research was done without patient involvement.

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Results

Study participants

Nineteen participants were approached for the interview, and all agreed to participate. However, two (a pharmacist and a doctor) declined consent for recording. Their data was not analysed as only short response to the questions were transcribed. Seventeen (89.5% of all approached subjects) consented to be audio recorded. They comprised of 4 doctors, 4 pharmacists and 9 nurses. Eleven (64.7%) of the participants were female. No specific demographic profile was collected due to confidentiality concerns of the nursing homes. Generally, we found the participants had some knowledge about what to deprescribe, tried to practice it within their area of knowledge, and displayed enthusiasm towards deprescribing practice.

Theme: Facilitators to deprescribing (D = Doctor, N = Nurse, P = Pharmacist)

Subtheme: Perceptions on deprescribing based on types of medications

Pharmacists and doctors primarily viewed gastroprotective agents (proton pumps inhibitors, histamine-2 receptor antagonists) as unnecessary medications. This may be due to previous local awareness campaign on proton pumps inhibitor deprescribing.[19] Other types of medication viewed as potential targets for deprescribing include those with high risk profiles, such as sedative first-generation antihistamines and benzodiazepines. There was an emphasis from doctors on the risk-benefits ratio of the medication to be considered for taking off.

"…medicine that does not benefit the patient or there is the poor risk-benefit profile. These are the medicine that I think should be deprescribed" (D10, male)

In contrast, nurses often perceive that supplements such as multivitamins, iron, calcium and glucosamine should be the target for deprescribing. As described by one nurse *"calcium because these people [often do] not on moving around" (N3, female)*

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Oral hypoglycaemic agents and antihypertensives were also viewed by some doctor and nurses as targets for deprescribing. For some patients, dietary plans provided within nursing homes (moderate salts and sugar) were sufficient to control the patients' medical conditions.

Furthermore, pharmacokinetics differ in the older population. With declining hepatic and renal functions, metabolism and clearance of the medications may be reduced, thus increasing serum drug concentration. Deprescribing prevents the patient from going to hypoglycaemia or hypotensive level if we were to follow their pre-admission doses. In addition, medication with years to outcomes such as statins and bisphosphonates were also brought up to be unnecessary by some.

"if like the medication takes a longer -- like you see the effect only after years, I think there's no point to have them on. Uh, those osteoporosis medications, bisphosphonates, etc." (P19, female)

Subtheme: Life expectancy of the patient

Life expectancy of the older patient was actively being noted by all groups in the consideration to deprescribe.

"If the patient's life expectancy is not too great and most of them are already on the advanced care plan. Then of course, all of these preventive medicines, we do not really need them. Whether I actively remove the one, it depends case by case. A patient has a lot of pill burden, but then, yes, I would actively try to deprescribe. But I think that sometimes, the patient doesn't have a lot of medicine. They might be on some preventive ones like, some people only have these, and all of the others leave it" (P12, female)

A pharmacist brought up that she would not actively start adding medication, as quality of life was also an important consideration for older patients.

"But if he's taking 10 to 20 years, I think it's (deprescribing) like giving quality of life to the patient, ah. They're eating a lot of medication" (N8, female)

Lifetime cost and functional status were important factors to doctors in deciding whether to start or stop a medication. In addition, nurses tend to follow the surrogate markers (laboratory values) rather

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than life expectancy.

Subtheme: Teamwork between doctors, pharmacists and nurses

Most participants agreed that teamwork is important in deprescribing, as doctors manage patient's overall condition, while pharmacists have medication knowledge, and nurses are able to monitor side effects and efficacy. One doctor felt teamwork is not needed as those medication being deprescribed are non-essential medications. On the other hand, nurses also felt that pharmacist is important to help check what doctors and nurses missed out.

"Yes, because the nurses are the closest ones to the patients, so they can actually tell you if the medications are working or not and if there's any side effects to them better than anyone else. Pharmacists obviously being the drug expert, have an obvious role to play in the suggesting which medications can be deprescribed. And you need the doctors help to deprescribe them because we don't have the power to stop them" (P19, female)

"…because in this medical field, we really need collaboration. Team work…because the doctors are not here always" (N13, male)

Subtheme: Systematic deprescribing practice and educational tools

The participants suggested that a more systematic guideline, clear-cut algorithm and multidisciplinary efforts are needed to ensure understanding and smoothen the process. Face-to-face doctor-pharmacist discussion, as well as deprescribing quick reminder guide are also areas of improvement to facilitate deprescribing practice.

"…it would be better if we had something standardized to follow. So that all homes can have the same, sort of, deprescribing procedures." (P12, female)

Additionally, nurses noted that mentoring, case studies, lectures, and guidebooks would be useful to get more nurses to participate in deprescribing.

"lecture plus this…booklet so that…easy to pick up" (N4, male)

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Subtheme: Benefits of deprescribing

Most felt deprescribing is important to reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors and improve quality of life. In addition, healthcare burden is also frequently brought up.

"Sometimes, yeah. They've been spending four years medication but, uh, it's not useful to the, uh, health condition, right" (N14, male)

"… if there are a lot of drugs and certain drugs that they decided to reduce or increase. Then it come in blister packets so it's really tedious to actually open and then re-change the drugs. Yes, it's very time consuming" (N17, female)

Theme: Barriers to deprescribing

Subtheme: Cognitive status of patient and identification of adverse drug reactions (ADR)

Generally, pharmacists and doctors felt that adverse drugs events often went undetected. Many patients have poor cognitive status (e.g. dementia), physical status (e.g. immobile or bedridden) or difficulty in communication, rendering them unable to inform and report any adverse events.

"Those patients are…unaware that these are side effects of the medication. They think that…these are just part of aging… they don't think that there was have any alternative…And probably, partly family also have some of these perspectives. So sometimes even if they complain, family will also just simply brush off (as) just part of aging" (D11, female)

Nurses on the other hand felt that underreporting is uncommon as they are around the patients most of the time but do agree that symptoms like dizziness may be hard to detect as they are multifactorial and can be precipitated with poor diet. A doctor also brought up that underreporting can be due to reasons such as nurses' knowledge of side effects.

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Subtheme: Lack of knowledge in patient preferences

Most health professionals would take into account patient's ability (such as ability to swallow) and cost, more that patient's personal preference in deciding medication choice. Whether the patient can communicate to the doctors and nurses also played a big role in letting patient decides. Pharmacists tend to go with the nurses' feedback rather than patient's preference.

"Yes, but I think that in this nursing home setting, a lot of the patients are not able to give preference, or it could be the family's preference.... I guess, it's more like, if patient is tube feeding, then I'll take into account what dosage forms are more suitable for that route of the administration. And so, -- yeah. It's not really preference." (P12, female)

"If they can come and we can explain, that would be very good. But most of the time, the residents and the family can't even come. And even (if) you talk over the phone to talk about all these small complex things…(sometimes) their family, similarly, are not (well) educated…you try to explain all these over the phone. It's like very difficult" (D11, female)

Subtheme: Lack of coordination between health professionals in hospitals and nursing homes

"The other one is if this patient is a complex patient that is seeing a lot of specialists in a hospital. I don't have that amount of information and really, I shouldn't be the one to end up prescribing-deprescribing because I don't have enough information for the complex patient…(medications prescribed by general practice) usually…I can just cancel...whereas, the specialist side, I don't have enough information on my side, and-and the family probably still prefer to listen to the specialist, which is rightfully so" (D11, female)

Doctors also stated that deprescribing should begin at hospital before discharging to the nursing homes. In particular, receptiveness by other doctors towards deprescribing, as well as receptiveness by other healthcare institutions following up with the patients (general practitioners and specialists) were deemed as important steps to improve deprescribing practice.

"But when they're admitted everything goes back to square one again because it's prescribed… the

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prescription actually arrives from the hospital before they are discharged. And once they are discharged, immediately there (should be) a suggestion to discontinue this, or reduce this" (D5, male)

Subtheme: Subtheme: Limited tools of deprescribing

The most common deprescribing guidelines known by doctors and pharmacists are the START/STOPP (Screening Tool to Alert doctors to Right Treatment/Screening Tool of Older Person's Prescriptions) criteria,[20] as well as the Beers criteria,[21] but most found them to be too stringent to be practical for the patients. They do not always use it but noted that a guideline would be useful.

"A standard guideline that would help, because we have so many pharmacists with different ways of practicing and different habits" (P12, female)

Nurses would usually follow doctors and pharmacists' recommendations and relying on laboratory results rather than initiate deprescribing.

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Discussion

Overall, we witnessed a consistency that deprescribing was viewed as important to nursing home residents, to reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors and improve quality of life. Similar to a study on Dutch general practitioners which found the deprescribing of preventive medication difficult due to a lack of risk-benefits information,[22] findings from this study showed that most physicians focus on the risk-benefits ratio when considering deprescribing. Our findings support the notion that prescribing based on younger adults' guidelines may not be practical given the limited risk-to-benefit ratio in older adults.[23] Conversely, this might further add to their pill burden and cost, impacting on their quality of life.

There are a few facilitators to deprescribing that were uncovered in this study. Firstly, our findings suggest an improved 'deprescribing' procedure and algorithm can facilitate deprescribing practice in nursing homes. Turner et al had similarly identified a need to standardize the process of deprescribing.[13]

Our study also highlighted that most participants, in particular nurses and pharmacists, agreed that multidisciplinary effort between doctors, pharmacists and nurses in the nursing homes is an important facilitator in deprescribing. Unfortunately, unlike acute care hospitals, pharmacists and doctors are usually not available in nursing homes, which may hinder communication. As such, this aspect can be one of the areas which can be improved,[24] such as establishing a mechanism for face-to-face communications between doctors and pharmacists. In addition, our results also reflect that mentoring and case studies may also be helpful to increase the healthcare professional's confidence, especially among nurses.

Medication favoured for deprescribing by doctors and pharmacists are similar to findings from a

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Canadian Delphi consensus, where benzodiazepines, statins, and proton pump inhibitors were identified, corresponding to mental health, cardiovascular, and gastroenterological conditions.[25] In addition, our study highlighted first generation antihistamine as a prioritised class for deprescribing in our Asian setting. It was also commented in our study that a lot of patients are on good diet control in the nursing homes, and their diabetes and hypertension may be well-controlled without the need of these medications.

The study also noted several barriers to deprescribing. Firstly, we found psychotropic class of medication rarely get reviewed by doctors as they are usually prescribed by the consultants. Studies have found that doctors expressed reluctance to interfere with medication prescribed by a colleague or medication specialist, possibly due to a lack of confidence in deprescribing skills and fear of litigation or conflict.[12, 26] Doctors in our study similarly expressed reluctance to deprescribe medication prescribed by consultants. One of the solution could be to have a better communication channel between specialists, doctors, and pharmacists and the institutions, consistent with a New Zealand's general practitioner study.[10] With the recent launch of the nationwide Nursing Home IT Enablement Program (NHELP) in Singapore that focused on incorporating patient management and electronic medical record (EMR) from hospitals and polyclinics with nursing homes, this barrier may be reduced in future.

Secondly, doctors and pharmacists felt that underreporting of adverse drug reactions might be common, given that many patients have communicative issues and taking the symptoms as part of the aging process. Palagyi et al had similarly reported a lack of recognition in medication-related adverse drug reactions in both residents and their relatives, including the well-established increased risk of falls as well as impaired physical and cognitive function.[12] However in our study, nurses felt underreporting is rare, given that they are by the side of the patients most of the time.

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Thirdly, patient's preference seemed to take less precedence over patient's ability (e.g. ability to swallow) in deciding treatment selection. Other contributing factors include inability to communicate and limited visitation by next-of-kins being contributing factors to making deprescribing preferences. Furthermore, pharmacists seldom have direct contact with patients, and their treatment selections are determined primarily by nurses' feedback, as doctors are not always present. These may have deliberated deprescribing which would have otherwise taken place, as shared decision making is lacking. However, it was also noted by others that shared decision making may not be always possible in this setting. For example, Weir et al have identified that while some older adults preferred a proactive role in decision-making, others preferred to leave the decisions to their doctors.[27]

Lastly, our study found that most doctors and pharmacists were aware of START/STOPP criteria,[20] as well as the Beers criteria,[21] but most found these guidelines to be too stringent for deprescribing, making changes that are too impractical for an older patient. Our results supported the findings from study by Ailabouni et al, which highlighted that lack of access to user friendly evidence-based guidelines as a barrier to general practitioners in New Zealand,[10] thus emphasizing the need of a better criteria-based guideline in deprescribing.

In comparison with existing literatures, while our participants shared many similar facilitators and barriers to deprescribing, our results evidenced that first generation antihistamine is perceived as an important target for deprescribing in our setting. Anticholinergic and sedative drug exposure have been associated with poorer physical and cognitive functions,[28] and deprescribing of unnecessary first-generation antihistamine would potentially improve outcomes for this frail population. In addition, we also saw that mentoring and case studies are perceived as important to facilitate and increase confidence in deprescribing for health professionals, especially for nurses in nursing homes, where knowledge and experience in deprescribing may be lacking.

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To our best knowledge, this is one of the first known qualitative interview in Asia studying the perceptions of deprescribing among health professionals in Singapore's nursing homes. Our results add to existing findings to assist in improving deprescribing practice for health professionals in nursing homes and may be applicable to other healthcare settings.

There are several limitations to this study. Although we achieved saturation, there is a limited number of doctors and pharmacists available to participate in this study, as there is usually only one pharmacist and a handful of doctors covering each home, thus it may not be a true representative of all the healthcare workers working in the nursing homes. The fact that it was conducted face-to-face with the interviewer (whom is a pharmacist) and being audio-recorded may give rise to biasness in their answering of the questions.

Ethics

Ethics approval was granted by Domain Specific Review Board of National Healthcare Group, Singapore (2016/00422) and Monash University Human Research Ethics Committee (2016-1430-7791).

Funding statement

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests

The authors declare that they have no conflict of interests.

Data sharing statement

As per the study ethics approval from the Domain Specific Review Board, data from the study (audio

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and interview transcripts) are kept in a secured, locked location. Any electronic files are password-protected on the research team's drive and will be destroyed after a period of 6 years from when the data was collected. Only the research team has access to the data at the Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore. Accessed to the file is monitored with an access log file documenting person, date and time.

Study protocol

Kua C, Yeo CYY, Char CWT, et al Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. BMJ Open 2017;7:e015293. doi: 10.1136/bmjopen-2016-015293

Author contributions

CK drafted the manuscript. All authors have reviewed and approved the manuscript.

Acknowledgement

We thank Associate Professor Ian Leong, Tan Tock Seng Hospital Singapore, for his kind assistance in devising the guiding questions for the interview.

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References

1. United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Ageing 2017 - Highlights (ST/ESA/SER.A/397).
2. Araujo de Carvalho I, Epping-Jordan J, Pot AM, et al. Organizing integrated health-care services to meet older people's needs. *Bull World Health Organ.* 2017;95:756-63.
3. Ferreira AR, Martins S, Fernandes L. Comorbidity and polypharmacy in elderly living in nursing homes. *Eur Psychiatry.* 2016;33:S585.
4. Jokanovic N, Tan EC, Dooley MJ, et al. Prevalence and factors associated with polypharmacy in long-term care facilities: a systematic review. *J Am Med Dir Assoc.* 2015;16:535-e1-12.
5. Lee SW, Chong CS, Chong DW. Identifying and addressing drug‐related problems in nursing homes: an unmet need in Malaysia? *Int J Clin Pract.* 2016;70:512.
6. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf.* 2014;13:57-65.
7. Woodward MC. Deprescribing: achieving better health outcomes for older people through reducing medications. *J Pharm Pract Res.* 2003;33:323-8.
8. Lee SW, Mak VS. Changing demographics in Asia: a case for enhanced pharmacy services to be provided to nursing homes. *J Pharm Pract Res.* 2016;46:152-5.
9. Kua CH, Mak VS, Lee SW. Health outcomes of deprescribing interventions among elderly residents in nursing homes: a systematic review and meta-analysis. *J Am Med Dir Assoc.* 2019;20:362-372.
10. Ailabouni NJ, Nishtala PS, Mangin D, et al. Challenges and enablers of deprescribing: a general practitioner perspective. *PLoS One.* 2016;11:e0151066.
11. Kouladjian L, Gnjidic D, Reeve E, et al. Health care Practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Ann Pharmacother.* 2016;50:625-36.
12. Palagyi A, Keay L, Harper J, et al. Barricades and brickwalls–a qualitative study exploring

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perceptions of medication use and deprescribing in long-term care. *BMC Geriatr.* 2016;16:15.

13. Turner JP, Edwards S, Stanners M, et al. What factors are important for deprescribing in Australian long-term care facilities? Perspectives of residents and health professionals. *BMJ open.* 2016;6:e009781.
14. Bolmsjö BB, Palagyi A, Keay L, et al. Factors influencing deprescribing for residents in Advanced Care Facilities: insights from General Practitioners in Australia and Sweden. *BMC Fam Pract.* 2016;17:152.
15. Anderson K, Stowasser D, Freeman C, et al. Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. *BMJ open.* 2014;4:e006544.
16. Kua CH, Yeo CYY, Char CWT, et al. Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. *BMJ Open.* 2017;7:e015293.
17. Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol.* 2013;13:117.
18. O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med.* 2014;89:1245-51.
19. Pharmaceutical Society of Singapore. Pharmacy Week 2016. https://www.pss.org.sg/sites/default/files/PW/PW16/deprescribing_slides_2016.pptx (Accessed 10th Feb 2019).
20. O'mahony D, O'sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing.* 2015;44:213-8.
21. American Geriatrics Society 2015 Beers Criteria Update Expert Panel, Fick DM, Semla TP, et al. American Geriatrics Society 2015 updated beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2015;63:2227-46.
22. Schuling J, Gebben H, Veehof LJ, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. *BMC Fam Pract.*

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2012;13:56.

23. Naganathan V. Cardiovascular drugs in older people. *Aust Prescr.* 2013;36:190-194.

24. Mak VS, Lee SW, March G. Pharmacists' roles in nursing homes in Malaysia. *J Pharm Pract Res.* 2018;48:493-4.

25. Farrell B, Tsang C, Raman-Wilms L, et al. What are priorities for deprescribing for elderly patients? Capturing the voice of practitioners: a modified delphi process. *PloS one.* 2015;10:e0122246.

26. Pype P, Mertens F, Helewaut F, et al. Potentially inappropriate medication in primary care at the end of life: a mixed-method study. *Acta Clinica Belgica.* 2018;73:213-9.

27. Weir K, Nickel B, Naganathan V, et al. Decision-Making Preferences and Deprescribing: Perspectives of Older Adults and Companions About Their Medicines. *J Gerontol B Psychol Sci Soc Sci.* 2018;73:e98-e107.

28. Hilmer SN, Mager DE, Simonsick EM, et al. A Drug Burden Index to Define the Functional Burden of Medications in Older People. *Arch Intern Med.* 2007;167:781–7.

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Table legends

Table 1: Interview questions

Knowledge:
1) Which type of medications do you think should be deprescribed in elderly?
2) Do you think under-reporting of possible adverse drug events by attributing to old age is common, and why?
3) Do you use or feel a need for guidelines for deprescribing, and why? & If you are using guidelines, which are you aware of and which edition?
Practice:
1) Do you think taking medications to prevent diseases are necessary, and why?
2) Do you think nurses, doctors and pharmacists have to work together in deprescribing practice, & why?
3) Do you consciously practice deprescribing?
4) Do you take into account of your patients' preference in treatment selection?
Attitude:
1) Do you think deprescribing is important, and in which aspect/s you can think of?
2) If you are already practising deprescribing, how do you think you can do it better?
3) If you are not practising deprescribing, what will increase your confidence in doing it?

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Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251.

	Reporting Item	Page Number
#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	3
#2	Summary of the key elements of the study using the abstract format of the intended publication; typically	3

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		includes background, purpose, methods, results and conclusions	
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	5-6
Purpose or research question	#4	Purpose of the study and specific objectives or questions	7
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	9
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	8

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Context	#7	Setting / site and salient contextual factors; rationale	8
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	8, 19
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	19
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	9
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	8-9
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	10
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and	9

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		security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	9
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	19-20
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	10-15
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	10-15
Intergration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	16-19
Limitations	#19	Trustworthiness and limitations of findings	19
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were	19

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		managed	
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	19

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BMJ Open

Perspectives of health professionals towards deprescribing practice in Asian nursing homes: a qualitative interview study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030106.R1
Article Type:	Original research
Date Submitted by the Author:	22-Jun-2019
Complete List of Authors:	Kua, Chong-Han; Monash University - Malaysia Campus, School of Pharmacy; Tan Tock Seng Hospital, Continuing and Community Care Department Mak, Vivienne; Monash University - Parkville Campus, Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences Lee, Shaun Wen Huey ; Monash University - Malaysia Campus, School of Pharmacy; Taylor's University, School of Pharmacy
Primary Subject Heading:	Geriatric medicine
Secondary Subject Heading:	General practice / Family practice, Qualitative research
Keywords:	Deprescribing, Interview, Nursing home, Doctor, Pharmacist, Nurse

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Perspectives of health professionals towards deprescribing practice in Asian nursing homes: a qualitative interview study

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Trial sponsor: Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore

Running title:

Health Professionals Perspectives Towards Deprescribing

Keywords

Deprescribing; Interview; Nursing home; Doctor; Pharmacist; Nurse

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Word count (exclude abstract): 4869

Version: Amendment 2019-Jun-18

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Abstract

Objective: To examine the determinants of deprescribing among health professionals in nursing homes, focusing on knowledge, practice, and attitude.

Design: This was a qualitative study comprised of semi-structured face-to-face interviews guided by 10 open-ended questions. Interviews were conducted until saturation when no new ideas were formed. The interviews were audio-recorded, transcribed verbatim, and analysed for themes. To derive themes, we employed directed content analysis of transcript data. Coding was completed using a combination of open, axial, and selective coding.

Setting: Four nursing homes in Singapore.

Participants: The study involved 17 participants (comprised of 4 doctors, 4 pharmacists, and 9 nurses)

Main outcome measures:

Results: Two key themes (facilitators and barriers) characterized the enablers and challenges faced by doctors, pharmacists, and nurses towards deprescribing. The identified subthemes for facilitators of deprescribing were: 1) awareness of medications that are unnecessary or could be targeted for deprescribing; 2) improving quality of life in limited life expectancy of the patient; 3) teamwork between doctors, pharmacists, and nurses; 4) systematic deprescribing practice and educational tools; and 5) acknowledgement of possible benefits of deprescribing. Conversely, the identified subthemes for barriers of deprescribing were: 1) symptoms not acknowledged as possibly drug-related; 2) lack of knowledge in patient and family members' preferences; 3) lack of coordination between health professionals in hospitals and nursing homes; and 4) limited tools of deprescribing. We identified further methods that can help support the process of deprescribing, including the development of a local guideline, mentoring and case discussions, better shared decision making, and multidisciplinary teamwork. We also identified first-generation antihistamines as important deprescribing targets.

Conclusion: Through this study, we identified several opportunities and challenges when health professionals deprescribe in Asian nursing homes, and how these can affect the success of deprescribing.

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Article Summary

Strengths and limitations of this study

- We studied deprescribing practices by conducting interviews in an underrepresented setting; Asian nursing homes.
- This study identified important insights and areas for improvement in the process of deprescribing in nursing homes.
- As the study was only conducted in one country, findings may not be representative of other Asian countries and settings worldwide.

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Introduction

Many nursing home residents are plagued by advanced frailty and confusion.[1] Medication management for these residents is further challenged by multiple healthcare providers, hospital admissions, rigid organisational structures, resource limitations, medical hierarchies, contrasting care expectations of family and doctors, and the variable life priorities of each individual resident.[2] Older adults residing in nursing homes often have multiple co-morbidities requiring nursing care.[3] As a result, they are often prescribed multiple medications, leading to a high prevalence of polypharmacy (defined as 5 or more medications).[4] Polypharmacy comes with an increased risk of negative health outcomes including adverse drug events, drug-interactions, decreased functional status, geriatric syndromes, higher healthcare costs, and non-adherence.[5,6]

There is evidence that deprescribing, or the process of reducing, tapering, and discontinuing inappropriate or unnecessary medications among older adults can potentially improve patient outcomes.[7,8] Deprescribing in nursing homes can reduce the number of residents with potentially inappropriate medication by 59%, the number of fallers by 24%, and mortality by 26%.[9] As such, an understanding of the facilitators and barriers to deprescribing among health professionals is essential to facilitate successful deprescribing interventions.

Several studies have explored the perceptions, barriers, and enablers of general practitioners (GPs) and other health professionals towards deprescribing.[2,10-12] These studies found that factors such as existing organization systems and policies, self-perceived restriction in the ability to be involved in medication-related issues, lack of knowledgeable and skilled personnel, as well as attitudes (including devolving of responsibility between GPs and specialist physicians) were barriers to deprescribing.[2,11]

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There were varying priorities between the professions on factors that are important for deprescribing in long-term care facilities. Some of the key considerations include: 'evidence for deprescribing', 'clinical appropriateness of therapy' as well as 'clinician receptivity', with different behaviors and attitudes reported between countries.[12,13] For example, Swedish general practitioners' expressed that their main concern in medication management was to achieve a good quality of life, while among Australian general practitioners, they were more concerned with the low financial reimbursement associated with providing care to these residents.[13]

Although there was numerous literature that explored the perceptions, barriers, and enablers of health professionals towards deprescribing, there is a limited understanding of the perspectives of health professionals towards deprescribing in nursing homes, particularly in Asia where the concept of deprescribing is still relatively new and the populations are rapidly aging. Previously, a qualitative meta-synthesis of barriers and enablers of doctors towards minimizing potentially inappropriate medications (PIMs) in community older adults had identified analytical themes intrinsic to the prescriber (beliefs, attitudes, knowledge, skills, behaviour).[14] These analytical themes include problem awareness, inertia secondary to lower perceived value proposition for ceasing versus continuing PIMs, and self-efficacy in regard to personal ability to alter prescribing, from which barriers and enablers to minimising PIMs emerged. In order to develop processes of deprescribing that work in a particular health care system, gaining an understanding of the barriers and enablers first is pertinent in developing the right process that can ensure successful uptake of deprescribing.

Aims of the study

The aims of this study are to examine the factors that affect the views and acceptance of deprescribing among health professionals in nursing homes, focusing on knowledge, practice and attitude.

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Methods and analysis

This was a qualitative study in which semi-structured interviews with doctors, pharmacists, and nurses were conducted to determine the factors that affect their views and acceptance of deprescribing in Singapore nursing homes. The interviews were conducted prior to the implementation of a deprescribing stepped-wedge randomised controlled study.[15]

Doctors and pharmacists were approached by the principal investigator (CHK) at the study sites during their routine visits. We did not apply any inclusion criteria to the doctors and pharmacists due to their limited number across the four participating nursing homes. For nurses in the nursing homes, convenience sampling rotated across the four homes was employed until data saturation was reached. Participants had to satisfy the following inclusion criteria: 1) provide informed consent; and 2) was involved in the care of nursing home residents. Participants could opt out at any time during the study.

Participants and Settings

The interviews were conducted in four nursing homes (one with approximately 400 beds, two with 200 beds, and one with 150-beds) across Singapore. The pharmacists were community-based pharmacists who have provided weekly or fortnightly medication review services to the residents for at least a year. These pharmacists have completed or undertaken their postgraduate studies (Master of Clinical Pharmacy) or board certification in geriatric training. Nurses were full-time employees (staff nurses or enrolled nurses) of the nursing homes. The doctors were general practitioners who provided clinical services at the time of the interview. Most of the doctors visited the homes at least once weekly or fortnightly.

Semi-structured interviews

All interviews were conducted in a private area (nurse's office or doctor's consultation room) within

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the nursing homes at a time convenient for each participant. The principal investigator, CHK, conducted all interviews. The interview was guided by 10 open-ended questions on knowledge, practice and attitude (KAP) towards deprescribing (Table 1), and were qualitatively analysed using thematic analysis. The KAP conceptual framework was employed in this study. The questions were developed by expert opinions between the researchers (CHK, SWHL, VSLM) and a senior consultant geriatrician working in the settings. The interview was piloted on a doctor, a pharmacist, and a nurse to determine the clarity and comprehensibility of the questions, as well as the time taken to complete the interview. No changes were required for the original interview questions.

<Table 1>

Data Analysis

Each interview was audio recorded and transcribed verbatim with the participant's consent. We used QSR NVivo 11 to assist in analysis of the data. Both an inductive and deductive approach were used to explore both intended issues and other unexpected aspects of participants' experience.[16] In conventional content analysis (inductive approach), we assessed the various clinical characteristics of the doctors, pharmacists, and nurses across the four nursing homes in general (such as primary place of practice, any specialization, length of practice in nursing homes, any access to education infrastructure). These were used to develop themes and a coding scheme. Following which, we employed directed content analysis (deductive approach) to collate qualitative data and the transcript data placed into themes. Coding was done using a combination of open, axial, and selective coding. Reporting of this manuscript followed the Standards for Reporting Qualitative Research (SRQR) reporting guidelines.[17]

Patient Involvement

Patients and the public were not involved in the design or planning of the study.

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Results

Study participants

Nineteen participants were approached for the interview, and all agreed to participate. However, two (a pharmacist and a doctor) declined consent for recording. Their data was not analysed as only short responses to the questions were transcribed. Seventeen (89.5% of all approached subjects) consented to be audio recorded. The interviews lasted 14 minutes on average. They comprised of 4 doctors, 4 pharmacists and 9 nurses. Eleven (64.7%) of the participants were female. No specific demographic profile was collected due to confidentiality concerns of the nursing homes.

Two key themes (facilitators and barriers) were identified in the interviews (Table 2).

<Table 2>

Theme: Facilitators to deprescribing (D = Doctor, N = Nurse, P = Pharmacist)

Subtheme: Awareness of medications that are unnecessary or could be targeted for deprescribing

Pharmacists and doctors primarily viewed gastroprotective agents (proton pumps inhibitors, histamine-2 receptor antagonists) as unnecessary medications. This may be due to a previous local awareness campaign to deprescribe proton pumps inhibitor in Singapore.[18] Other types of medication viewed as potential targets for deprescribing include medications with high-risk profiles, such as sedative first-generation antihistamines, and benzodiazepines. There was an emphasis from doctors on the risk-benefit ratio of the medication to be considered for taking off.

"…medicine that does not benefit the patient or there is the poor risk-benefit profile. These are the medicine that I think should be deprescribed" (D10, male)

In contrast, nurses often perceived that supplements such as multivitamins, iron, calcium, and glucosamine should be the target for deprescribing.

Oral hypoglycaemic agents and antihypertensives were also viewed by some doctor and nurses as

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targets for deprescribing. For some patients, dietary plans provided within nursing homes (moderate salts and sugar) were sufficient to control the patients' medical conditions.

Furthermore, pharmacokinetics differ in the older population. With declining hepatic and renal functions, metabolism and clearance of the medications may be reduced, thus increasing serum drug concentration. Deprescribing prevents the patient from going to a hypoglycaemia or hypotensive level if we were to follow their pre-admission doses. In addition, medication which needed years to achieve outcomes such as statins and bisphosphonates were also brought up to be unnecessary by some.

"if like the medication takes a longer -- like you see the effect only after years, I think there's no point to have them on. Uh, those osteoporosis medications, bisphosphonates, etc." (P19, female)

Subtheme: Improving the quality of life in limited life expectancy of the patient

The life expectancy of older patient was a consideration by all groups to deprescribe.

"If the patient's life expectancy is not too great and most of them are already on the advanced care plan. Then of course, all of these preventive medicines, we do not really need them. Whether I actively remove the one, it depends case by case. A patient has a lot of pill burden, but then, yes, I would actively try to deprescribe. But I think that sometimes, the patient doesn't have a lot of medicine. They might be on some preventive ones like, some people only have these, and all of the others leave it" (P12, female)

A pharmacist brought up that she would not actively start adding medication, as quality of life was also an important consideration for older patients.

"But if he's taking 10 to 20 years, I think it's (deprescribing) like giving quality of life to the patient, ah. They're eating a lot of medication" (N8, female)

Lifetime cost and functional status were important factors for doctors in deciding whether to start or stop a medication.

Subtheme: Teamwork between doctors, pharmacists, and nurses

"And also the doctor as…a team to practice it (deprescribing). But currently, I just like…review the

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patient individually" (P15, female)

".. is good if they can work as a team…basically if they have a common understanding" (D5, male)

Most participants agreed that teamwork was important in deprescribing, as doctors manage patient's overall condition, while pharmacists have medication knowledge, and nurses are able to monitor side effects and efficacy. One doctor believed teamwork was not needed as those medications being deprescribed were considered non-essential medications. On the other hand, nurses believed that pharmacists were important to help re-evaluate what doctors and nurses missed out.

"Yes, because the nurses are the closest ones to the patients, so they can actually tell you if the medications are working or not and if there's any side effects to them better than anyone else. Pharmacists obviously being the drug expert, have an obvious role to play in the suggesting which medications can be deprescribed. And you need the doctors help to deprescribe them because we don't have the power to stop them" (P19, female)

"…because in this medical field, we really need collaboration. Team work…because the doctors are not here always" (N13, male)

Subtheme: Systematic deprescribing practice and educational tools

The participants suggested that a more systematic guideline, clear-cut algorithm, and multidisciplinary efforts were needed to ensure understanding and smoothen the process.

"A standard guideline that would help, because we have so many pharmacists with different ways of practicing and different habits. So it would be better if we had something standardized to follow. So that all homes can have the same, sort of, deprescribing procedures." (P12, female)

"And where is the guide you see, there's actually no clear guideline sometimes… I think, local guidelines. The expert opinion...more specific guideline, with regard to certain medication, common medication that would be useful." (D5, male)

"I think guideline…If there's a clear-cut algorithm…We're pharmacists are algorithm people. So we

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love algorithm" (P1, female)

Also, participants suggested other areas of improvement including face-to-face doctor-pharmacist discussions, as well as a deprescribing quick reminder guide.

"I think…discussion…sometimes…where we intervene…the deprescribing, maybe we miss out some of the important information. For example, we are not aware of the latest condition but doctor's the one who also, work closer with the nurse and also the family. Doctor also examine the patient regularly that's why doctor will know, more about the patient" (P15, female)

"...like, small cuts, a reminder to try to cut off PPIs, if there's no clear indication. Because a lot of current usage has a lot of unclear indication. If they -- now they have this very thick standard, black and white thing that pharmacists are more confident in cutting down medications" (P12, female)

Additionally, nurses noted that mentoring, case studies, lectures, and guidebooks would be useful to get more nurses to participate in deprescribing.

"I think those senior ones will not have much of a problem; they know their medication..these are for the juniors…Mostly they just follow the orders, until they get to the stage where they can mostly be on their own" (N8, female)

"So just in the endorsement we will talk about the resident's condition and if he benefits (from) the medicine or if he does not benefit (from) the medicine so we can off it…Like…the case study" (N6, male)

"lecture plus this…booklet so that…easy to pick up" (N4, male)

Subtheme: Acknowledgement of possible benefits of deprescribing

Most felt deprescribing was important to reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors, and improve quality of life. In addition, burden to the healthcare system was also frequently brought up.

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"One, it (deprescribing) reduces and side effects...Two, it reduces pill burdens...the cost...It also reduces manpower...And with less...medication error" (D11, female)

"... reduces the cost...maybe side effect" (N7, female)

"Sometimes, yeah. They've been spending four years medication but, it's not useful to the, health condition, right" (N14, male)

"... if there are a lot of drugs and certain drugs that they decided to reduce or increase. Then it come in blister packets so it's really tedious to actually open and then re-change the drugs. Yes, it's very time consuming" (N17, female)

Theme: Barriers to deprescribing

Subtheme: Symptoms not acknowledged as possibly drug-related

Generally, pharmacists and doctors believed that adverse drugs events often went undetected as symptoms were not acknowledged as possibly drug-related, and therefore lacked acknowledgement that deprescribing was possible. Many patients have poor cognitive status (e.g. dementia), physical status (e.g. immobile or bedridden) or difficulty in communication, rendering them unable to inform and report any adverse events.

"Those patients are…unaware that these are side effects of the medication. They think that…these are just part of aging… they don't think that there was have any alternative…And probably, partly family also have some of these perspectives. So sometimes even if they complain, family will also just simply brush off (as) just part of aging" (D11, female)

Nurses, on the other hand, felt that underreporting was uncommon as they are around the patients most of the time but do agree that symptoms like dizziness may be hard to detect as these were multifactorial and can be precipitated by poor diet. One doctor also thought that underreporting could be due to the nurses' lack of knowledge on the side effects of medications.

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Subtheme: Lack of knowledge of patient and family members' preferences

Most health professionals would take into account the patient's condition (such as the ability to swallow) and cost, more than the patient's personal preference in deciding medication choice. Whether the patient can communicate to the doctors and nurses also played a big role in letting the patient decides. However, health professionals were often unable to assess the patient's preference due to their speech or cognitive disabilities, and difficulties in contacting their family members. Pharmacists tend to go with the nurses' feedback rather than the patient's preference as mentioned in the intervviews.

"Yes, but I think that in this nursing home setting, a lot of the patients are not able to give preference, or it could be the family's preference.... I guess, it's more like, if patient is tube feeding, then I'll take into account what dosage forms are more suitable for that route of the administration. And so, -- yeah. It's not really preference." (P12, female)

"If they can come and we can explain, that would be very good. But most of the time, the residents and the family can't even come. And even (if) you talk over the phone to talk about all these small complex things…(sometimes) their family, similarly, are not (well) educated…you try to explain all these over the phone. It's like very difficult" (D11, female)

Subtheme: Lack of coordination between health professionals in hospitals and nursing homes

"The other one is if this patient is a complex patient that is seeing a lot of specialists in a hospital. I don't have that amount of information and really, I shouldn't be the one to end up prescribing-deprescribing because I don't have enough information for the complex patient…(medications prescribed by general practice) usually…I can just cancel...whereas, the specialist side, I don't have enough information on my side, and-and the family probably still prefer to listen to the specialist, which is rightfully so" (D11, female)

This was an important point, as its signified that specialists have a major influence on GPs' autonomy

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and competence when considering stopping medicines. Thus, GPs are more reluctant to change medicines started by specialists.

Doctors also stated that deprescribing should begin at the hospital before discharge to the nursing homes. In particular, receptiveness by other doctors towards deprescribing, as well as receptiveness by other healthcare institutions following up with the patients (general practitioners and specialists) were deemed as important steps to improve deprescribing practice.

"But when they're admitted everything goes back to square one again because it's prescribed… the prescription actually arrives from the hospital before they are discharged. And once they are discharged, immediately there (should be) a suggestion to discontinue this, or reduce this" (D5, male)

Subtheme: Limited tools of deprescribing

The most common deprescribing screening criteria known by doctors and pharmacists were the START/STOPP (Screening Tool to Alert doctors to Right Treatment/Screening Tool of Older Person's Prescriptions) criteria,[19] as well as the Beers criteria,[20] but most health professionals found them to be too stringent to be practical for the patients. They reported that they seldom referred to these tools but noted that these were useful guidelines.

"A standard guideline that would help, because we have so many pharmacists with different ways of practicing and different habits" (P12, female)

Nurses claimed to follow doctors and pharmacists' recommendations and rely on laboratory results rather than initiate deprescribing.

"Usually, I'm also reading the notes of the pharmacist or...if the doctors are doing laboratory tests...We're just waiting again, for the next monthly (input) from the doctor. We're just waiting again for the next lab test" (N13, male)

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Discussion

Overall, we found the participants had some knowledge regarding deprescribing. They tried to practice it within their area of knowledge and displayed enthusiasm towards deprescribing. The comments from the participants were summarised in two conceptual themes: facilitators and barriers to deprescribing. Several subthemes surrounding facilitators of deprescribing were identified. The awareness of the possible benefits of deprescribing, as well as the medications that were unnecessary or could be targeted for deprescribing were important to initiate deprescribing. In the deprescribing process, teamwork (between doctors, pharmacists and nurses), systematic deprescribing practice and educational tools were important facilitators in the process of deprescribing. Improving quality of life in limited life expectancy during deprescribing is an emphasis for this frail population. Several subthemes in barriers to deprescribing were also identified including the lack of acknowledgement of symptoms as possibly drug-related, as well as the lack of knowledge of patient and family members' preferences. During the process of deprescribing, participants also lamented the limited number of tools for deprescribing, as well as a lack of coordination between health professionals in hospitals and nursing homes, which hinder successful deprescribing.

There are a few facilitators to deprescribing that were uncovered in this study. Firstly, our findings suggest an improved 'deprescribing' procedure and algorithm can facilitate deprescribing practice in nursing homes. Turner et al had similarly identified a need to standardize the process of deprescribing.[12]

Our study also highlighted that most participants, in particular nurses and pharmacists, agreed that multidisciplinary effort between doctors, pharmacists and nurses in the nursing homes is an important facilitator in deprescribing. Unfortunately, unlike acute care hospitals, pharmacists and doctors are usually not around in the nursing homes most of the time, which may hinder communication. As such,

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this aspect can be one of the areas which can be improved,[21] such as establishing a mechanism for face-to-face communications between doctors and pharmacists. In addition, our results also reflect that mentoring and case studies may also be helpful to increase the healthcare professional's confidence, especially among nurses, where knowledge and experience in deprescribing may be lacking.

Medication favoured for deprescribing by doctors and pharmacists are similar to findings from a Canadian Delphi consensus, where benzodiazepines, statins, and proton pump inhibitors were identified, corresponding to mental health, cardiovascular, and gastroenterological conditions.[22] In addition, our study highlighted first-generation antihistamine as a prioritised class for deprescribing in our Asian setting. It was also commented in our study that a lot of patients are on good diet control in the nursing homes, and their diabetes and hypertension may be well-controlled without the need for these medications.

The study also noted several barriers to deprescribing. Firstly, we found psychotropic class of medication rarely get reviewed by doctors as they are usually prescribed by the consultants. Studies have found that doctors expressed reluctance to interfere with medication prescribed by a colleague or medication specialist, possibly due to a lack of confidence in deprescribing skills and fear of litigation or conflict.[2, 23] Doctors in our study similarly expressed reluctance to deprescribe medication prescribed by consultants. One of the solutions could be to have a better communication channel between specialists, doctors, and pharmacists and the institutions, consistent with a New Zealand's general practitioner study.[10] With the recent launch of the nationwide Nursing Home IT Enablement Program (NHELP) in Singapore that focused on incorporating patient management and electronic medical record (EMR) from hospitals and polyclinics with nursing homes, this barrier may be reduced in future.

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Secondly, doctors and pharmacists felt that underreporting of adverse drug reactions might be common, given that many patients have communicative issues and taking the symptoms as part of the aging process. Palagyi et al had similarly reported a lack of recognition in medication-related adverse drug reactions in both residents and their relatives, including the well-established increased risk of falls as well as impaired physical and cognitive function.[2] However, in our study, nurses felt underreporting is rare, given that they are by the side of the patients most of the time.

Thirdly, the patient's preference seemed to take less precedence over patient's ability (e.g. ability to swallow) in deciding treatment selection. Other contributing factors include the inability to communicate and limited visitation by next-of-kins being contributing factors to making deprescribing preferences. Furthermore, pharmacists seldom have direct contact with patients, and their treatment selections are determined primarily by nurses' feedback, as doctors are not always present. These may have deliberated deprescribing which would have otherwise taken place, as shared decision making is lacking. However, it was also noted by others that shared decision making may not be always possible in this setting. For example, Weir et al have identified that while some older adults preferred a proactive role in decision-making, others preferred to leave the decisions to their doctors.[24]

Lastly, our study found that most doctors and pharmacists were aware of START/STOPP criteria,[19] as well as the Beers criteria,[20] but most found these guidelines to be too stringent for deprescribing, making changes that are too impractical for an older patient. Our results supported the findings from a study by Ailabouni et al, which highlighted that lack of access to user-friendly evidence-based guidelines as a barrier to general practitioners in New Zealand,[10] thus emphasizing the need of a better criteria-based guideline in deprescribing. There was no indication of the use of other deprescribing tools during the interviews, except the Beers and STOPP criteria as well as the local deprescribing guide developed for proton pump inhibitors.[18]

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In general, we witnessed a consistent belief in the health professionals interviewed that deprescribing might be a priority for their patients, in which deprescribing can reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors and improve quality of life. Similar to a study on Dutch general practitioners which found the deprescribing of preventive medication difficult due to a lack of risk-benefits information,[25] findings from this study showed that most physicians focus on the risk-benefit ratio when considering deprescribing. Our findings support the notion that prescribing based on younger adults' guidelines may not be practical given the limited risk-to-benefit ratio in older adults.[26] Conversely, this might further add to their pill burden and cost, impacting on their quality of life.

To our best knowledge, this is one of the first known qualitative interview in Asia studying the perceptions of deprescribing among health professionals in Singapore's nursing homes. Our results add to existing findings to improve the uptake of deprescribing in residential care settings and may be applicable to other healthcare settings. Our results confirmed previous findings that the risk-benefit ratio is an important determinant in deprescribing.[10] Our results similarly evidenced that first-generation antihistamine is perceived as an important target for deprescribing in our setting.[11] Anticholinergic and sedative drug exposure have been associated with poorer physical and cognitive functions,[27] and deprescribing of unnecessary first-generation antihistamine would potentially improve outcomes for this frail population. However, our study further found that we need a better process for deprescribing in nursing homes in Singapore. Despite the existence of established tools such as Beers[20] and STOPP criteria[19], our studies identified areas for improvement such as more suitable tools for our setting, mentoring and case discussions, as well as better collaboration and communication in the process of deprescribing. Better explicit deprescribing tools and algorithms that are developed or adapted for the Asian setting for deprescribing may help in greater practicability and comprehensiveness. We also identified that a lack of coordination between health professionals in

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hospitals and nursing homes could possibly hinder successful deprescribing in Singapore nursing homes. Future initiatives should look at increasing collaboration and communication between acute hospitals, nursing homes, and specialist clinics in Singapore. Future initiatives in Singapore can also look at educating health professionals in nursing homes on how to deprescribe and monitor in older adults.

There are several limitations to this study. Although we achieved saturation, there is a limited number of doctors and pharmacists available to participate in this study, as there is usually only one pharmacist and a handful of doctors covering each home, thus it may not be a true representative of all the healthcare workers working in the nursing homes. We acknowledged that most of the data could have been coded came from nurses. This may have an effect on displaying a balanced view of deprescribing from all included parties. We took this into consideration and reported any varied view from doctors, pharmacists, and nurses separately in the subthemes. The fact that it was conducted face-to-face with the interviewer (who is a pharmacist) and being audio-recorded may give rise to biases in their answering of the questions. Although the deprescribing study had yet to commence, there is also a possibility that results of the study could be more biased towards those who were already aware of the deprescribing study, and thus had more motivation and interest in conducting deprescribing.

In conclusion, this study highlighted several themes. Future research could assess how routine case studies and mentoring could improve deprescribing knowledge and practice in the nursing homes, as well as identify patients' perspectives toward deprescribing in other parts of the world with different cultures.

Ethics

Ethics approval was granted by Domain Specific Review Board of National Healthcare Group,

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Singapore (2016/00422) and Monash University Human Research Ethics Committee (2016-1430-7791).

Funding statement

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests

The authors declare that they have no conflict of interests.

Data sharing statement

As per the study ethics approval from the Domain Specific Review Board, data from the study (audio and interview transcripts) are kept in a secured, locked location. Any electronic files are password-protected on the research team's drive and will be destroyed after a period of 6 years from when the data was collected. Only the research team has access to the data at the Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore. Accessed to the file is monitored with an access log file documenting person, date and time.

Study protocol

Kua C, Yeo CYY, Char CWT, et al Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. BMJ Open 2017;7:e015293. doi: 10.1136/bmjopen-2016-015293

Author contributions

CHK contributed to the concept and design, data acquisition, analysis, interpretation for the work, and writing drafts. SWHL and VSLM contributed to the design of the work (including analysis plan),

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interpretation of the data and revising the work critically for important intellectual content. All authors approved the version to be published.

Acknowledgement

We thank Associate Professor Ian Leong, Tan Tock Seng Hospital Singapore, for his kind assistance in devising the guiding questions for the interview.

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References

1. Mitchell P, Koch T. An attempt to give nursing home residents a voice in the quality improvement process: the challenge of frailty. *J Clin Nurs.* 1997;6:453-61.
2. Palagyi A, Keay L, Harper J, et al. Barricades and brickwalls–a qualitative study exploring perceptions of medication use and deprescribing in long-term care. *BMC Geriatr.* 2016;16:15.
3. Ferreira AR, Martins S, Fernandes L. Comorbidity and polypharmacy in elderly living in nursing homes. *Eur Psychiatry.* 2016;33:S585.
4. Jokanovic N, Tan EC, Dooley MJ, et al. Prevalence and factors associated with polypharmacy in long-term care facilities: a systematic review. *J Am Med Dir Assoc.* 2015;16:535-e1-12.
5. Lee SW, Chong CS, Chong DW. Identifying and addressing drug‐related problems in nursing homes: an unmet need in Malaysia? *Int J Clin Pract.* 2016;70:512.
6. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf.* 2014;13:57-65.
7. Woodward MC. Deprescribing: achieving better health outcomes for older people through reducing medications. *J Pharm Pract Res.* 2003;33:323-8.
8. Lee SW, Mak VS. Changing demographics in Asia: a case for enhanced pharmacy services to be provided to nursing homes. *J Pharm Pract Res.* 2016;46:152-5.
9. Kua CH, Mak VS, Lee SW. Health outcomes of deprescribing interventions among elderly residents in nursing homes: a systematic review and meta-analysis. *J Am Med Dir Assoc.* 2019;20:362-372.
10. Ailabouni NJ, Nishtala PS, Mangin D, et al. Challenges and enablers of deprescribing: a general practitioner perspective. *PLoS One.* 2016;11:e0151066.
11. Kouladjian L, Gnjidic D, Reeve E, et al. Health care Practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Ann Pharmacother.* 2016;50:625-36.
12. Turner JP, Edwards S, Stanners M, et al. What factors are important for deprescribing in

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Australian long-term care facilities? Perspectives of residents and health professionals. *BMJ open.* 2016;6:e009781.

13. Bolmsjö BB, Palagyi A, Keay L, et al. Factors influencing deprescribing for residents in Advanced Care Facilities: insights from General Practitioners in Australia and Sweden. *BMC Fam Pract.* 2016;17:152.
14. Anderson K, Stowasser D, Freeman C, et al. Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. *BMJ open.* 2014;4:e006544.
15. Kua CH, Yeo CYY, Char CWT, et al. Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. *BMJ Open.* 2017;7:e015293.
16. Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol.* 2013;13:117.
17. O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med.* 2014;89:1245-51.
18. Pharmaceutical Society of Singapore. Pharmacy Week 2016. https://www.pss.org.sg/sites/default/files/PW/PW16/deprescribing_slides_2016.pptx (Accessed 10th Feb 2019).
19. O'mahony D, O'sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing.* 2015;44:213-8.
20. American Geriatrics Society 2015 Beers Criteria Update Expert Panel, Fick DM, Semla TP, et al. American Geriatrics Society 2015 updated beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2015;63:2227-46.
21. Mak VS, Lee SW, March G. Pharmacists' roles in nursing homes in Malaysia. *J Pharm Pract Res.* 2018;48:493-4.
22. Farrell B, Tsang C, Raman-Wilms L, et al. What are priorities for deprescribing for elderly patients? Capturing the voice of practitioners: a modified delphi process. *PloS one.*

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2015;10:e0122246.

23. Pype P, Mertens F, Helewaut F, et al. Potentially inappropriate medication in primary care at the end of life: a mixed-method study. *Acta Clinica Belgica.* 2018;73:213-9.

24. Weir K, Nickel B, Naganathan V, et al. Decision-Making Preferences and Deprescribing: Perspectives of Older Adults and Companions About Their Medicines. *J Gerontol B Psychol Sci Soc Sci.* 2018;73:e98-e107.

25. Schuling J, Gebben H, Veehof LJ, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. *BMC Fam Pract.* 2012;13:56.

26. Naganathan V. Cardiovascular drugs in older people. *Aust Prescr.* 2013;36:190-194.

27. Hilmer SN, Mager DE, Simonsick EM, et al. A Drug Burden Index to Define the Functional Burden of Medications in Older People. *Arch Intern Med.* 2007;167:781–7.

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Table legends

Table 1: Interview questions

Knowledge:
1) Which type of medications do you think should be deprescribed in elderly?
2) Do you think under-reporting of possible adverse drug events by attributing to old age is common, and why?
3) Do you use or feel a need for guidelines for deprescribing, and why? & If you are using guidelines, which are you aware of and which edition?
Practice:
1) Do you think taking medications to prevent diseases are necessary, and why?
2) Do you think nurses, doctors and pharmacists have to work together in deprescribing practice, & why?
3) Do you consciously practice deprescribing?
4) Do you take into account of your patients' preference in treatment selection?
Attitude:
1) Do you think deprescribing is important, and in which aspect/s you can think of?
2) If you are already practising deprescribing, how do you think you can do it better?
3) If you are not practising deprescribing, what will increase your confidence in doing it?

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Table 2: Themes and Subthemes

Themes:	Subthemes:
Facilitators of deprescribing	1) Awareness of medications that are unnecessary or could be targeted for deprescribing
	2) Improving quality of life in limited life expectancy of the patient
	3) Teamwork between doctors, pharmacists and nurses
	4) Systematic deprescribing practice and educational tools
	5) Acknowledgement of possible benefits of deprescribing
Barriers of deprescribing	1) Symptoms not acknowledged as possibly drug-related
	2) Lack of knowledge in patient and family members' preferences
	3) Lack of coordination between health professionals in hospitals and nursing homes
	4) Limited tools of deprescribing

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Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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	Reporting Item	Page Number
#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	3
#2	Summary of the key elements of the study using the abstract format of the intended publication; typically	3

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		includes background, purpose, methods, results and conclusions	
Problem formulation	#3	Description and significance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	5-6
Purpose or research question	#4	Purpose of the study and specific objectives or questions	6
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	7-8
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	7

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Context	#7	Setting / site and salient contextual factors; rationale	7
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	7, 20
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	20
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	8
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	7-8
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	9
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and	8

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		security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	8
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	20
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	9-15
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	9-15
Integration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	16-20
Limitations	#19	Trustworthiness and limitations of findings	20
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were	21

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		managed	
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	21

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Perspectives of health professionals towards deprescribing practice in Asian nursing homes: a qualitative interview study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030106.R2
Article Type:	Original research
Date Submitted by the Author:	26-Aug-2019
Complete List of Authors:	Kua, Chong-Han; Monash University - Malaysia Campus, School of Pharmacy; Tan Tock Seng Hospital, Continuing and Community Care Department Mak, Vivienne; Monash University - Parkville Campus, Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences Lee, Shaun Wen Huey ; Monash University - Malaysia Campus, School of Pharmacy; Taylor's University, School of Pharmacy
Primary Subject Heading:	Geriatric medicine
Secondary Subject Heading:	General practice / Family practice, Qualitative research
Keywords:	Deprescribing, Interview, Nursing home, Doctor, Pharmacist, Nurse

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Perspectives of health professionals towards deprescribing practice in Asian nursing homes: a qualitative interview study

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Trial sponsor: Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore

Running title:

Health Professionals Perspectives Towards Deprescribing

Keywords

Deprescribing; Interview; Nursing home; Doctor; Pharmacist; Nurse

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Word count (exclude abstract): 4538

Version: Amendment 2019-Aug-25

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Abstract

Objective: To examine the determinants of deprescribing among health professionals in nursing homes, focusing on knowledge, practice and attitude.

Design: This was a qualitative study comprised of semi-structured face-to-face interviews guided by 10 open-ended questions. Interviews were conducted until data saturation was achieved and no new ideas were formed. The interviews were audio-recorded, transcribed verbatim and analysed for themes. To derive themes, we employed directed content analysis of transcript data. Coding was completed using a combination of open, axial and selective coding.

Setting: Four nursing homes in Singapore.

Participants: The study involved 17 participants (comprised of 4 doctors, 4 pharmacists and 9 nurses).

Results: Two key themes were identified, enablers and challenges. These were enablers and challenges faced by doctors, pharmacists and nurses towards deprescribing. The identified subthemes for enablers of deprescribing were: 1) awareness of medications that are unnecessary or could be targeted for deprescribing; 2) improving quality of life for patients with limited life expectancy; 3) improving communication between doctors, pharmacists, and nurses; 4) systematic deprescribing practice and educational tools; and 5) acknowledgement of possible benefits of deprescribing. The identified subthemes for challenges of deprescribing were: 1) symptoms not acknowledged as possibly drug-related; 2) lack of knowledge in patient and family members' preferences; 3) lack of coordination between health professionals in hospitals and nursing homes; and 4) limited tools for deprescribing. The development of a local guideline, mentoring nurses, case discussions, better shared decision making and improving multidisciplinary communication, may help to support the process of deprescribing.

Conclusion: In conclusion, this study highlighted that deprescribing in the nursing homes is perceived by health professionals to be challenging and future research could assess how routine case studies, mentoring and better multidisciplinary communication could improve deprescribing knowledge and process in the nursing homes.

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Article Summary

Strengths and limitations of this study

- We studied deprescribing practices by conducting interviews in an underrepresented setting; Asian nursing homes.
- This study provided important insights and areas for improvement in the process of deprescribing in nursing homes.
- As the study was only conducted in Singapore, findings may not be representative of other Asian countries and settings worldwide.

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Introduction

Many nursing home residents have advanced frailty and confusion.[1] Older adults residing in nursing homes often have multiple co-morbidities requiring nursing care.[2] As a result, they are often prescribed multiple medications, leading to a high prevalence of polypharmacy (commonly defined as 5 or more medications).[3] Polypharmacy is associated with an increased risk of negative health outcomes including adverse drug events, drug-interactions, decreased functional status, geriatric syndromes, higher healthcare costs and non-adherence.[4,5] Medication management for these residents is further challenged by multiple healthcare providers, hospital admissions, rigid organisational structures, resource limitations, medical hierarchies, contrasting care expectations of family and doctors and the variable life priorities of each individual resident.[6]

There is evidence that deprescribing, or the process of reducing, tapering and discontinuing inappropriate or unnecessary medications among older adults can potentially improve patient outcomes.[7,8] Deprescribing in nursing homes can reduce the number of residents with potentially inappropriate medication by 59%, the number of residents who have experienced a fall by 24% and mortality by 26%.[9] As such, an understanding of the enablers and challenges to deprescribing among health professionals is essential to facilitate successful deprescribing interventions.

Several studies have explored the perceptions, enablers and challenges of general practitioners (GPs) and other health professionals towards deprescribing.[2,10-12] These studies found that challenges to deprescribing included existing organisation systems and policies, self-perceived restriction in the ability to be involved in medication-related issues, lack of knowledgeable and skilled personnel, as well as attitudes (including devolving of responsibility between GPs and specialist physicians).[2,11]

There are varying priorities between the professions on factors that are important for deprescribing in

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long-term care facilities. Some of the key considerations include: 'evidence for deprescribing', 'clinical appropriateness of therapy' as well as 'clinician receptivity', with different behaviours and attitudes reported between countries.[12,13] For example, Swedish general practitioners' expressed that their main concern in medication management was to achieve a good quality of life, while among Australian general practitioners, they were more concerned with the low financial reimbursement associated with providing care to these residents.[13]

Although there was numerous literature that explored the perceptions, enablers and challenges of health professionals towards deprescribing, there is a limited understanding of the perspectives of health professionals towards deprescribing in nursing homes, particularly in Asia where the concept of deprescribing is still relatively new and the populations are rapidly aging. Previously, a qualitative meta-synthesis of enablers and challenges of doctors towards minimizing potentially inappropriate medications (PIMs) in community older adults identified analytical themes intrinsic to the prescriber (beliefs, attitudes, knowledge, skills, behaviour).[14] These include problem awareness, inertia secondary to lower perceived value proposition for ceasing versus continuing potentially inappropriate medications and self-efficacy in regard to personal ability to alter prescribing, from which enablers and challenges to minimising PIMs emerged. Therefore, in order to develop processes of deprescribing within a particular health care system, it is vital to gain an understanding of the enablers and challenges pertinent in developing the right processes that lead to successful uptake of deprescribing.

Aims of the study

The aims of this study are to examine the factors that affect the views and acceptance of deprescribing among health professionals in nursing homes, focusing on knowledge, practice and attitude.

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Methods and analysis

This was a qualitative study with doctors, pharmacists and nurses to determine the factors that affect their views and acceptance of deprescribing in Singapore nursing homes. Semi-structured interviews were conducted prior to the implementation of a deprescribing stepped-wedge randomised controlled study.[15]

Participants had to satisfy the following inclusion criteria: 1) provide informed consent; and 2) is involved in the care of nursing home residents. Participants could opt out at any time during the study. We did not apply any other inclusion criteria due to the limited numbers of doctors and pharmacists across the four participating nursing homes. Doctors and pharmacists were approached by the principal investigator (CHK) at the study sites during their routine visits. Convenience sampling of nurses across the four homes was employed until data saturation was achieved.

Participants and Settings

The interviews were conducted in four nursing homes (one with approximately 400 beds, two with 200 beds and one with 150-beds) across Singapore. The pharmacists were community-based pharmacists who provide weekly or fortnightly medication review services to the residents for at least the past year. These pharmacists were either in progress or have completed a postgraduate study (i.e. Master of Clinical Pharmacy) or board certification in geriatric training. Nurses were full-time employees (staff nurses or enrolled nurses) of the nursing homes. Doctors were general practitioners who provided clinical services at the nursing homes at the time of the interview. Most doctors visited the homes at least once weekly or fortnightly.

Semi-structured interviews

All interviews were conducted in a private room (nurse's office or doctor's consultation room) within

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the nursing homes at a time convenient for each participant. The principal investigator, CHK, conducted all interviews. The interview was guided by 10 open-ended questions on knowledge, practice and attitude (KAP) towards deprescribing (Table 1) and was qualitatively analysed using thematic analysis. The KAP conceptual framework was employed in this study. The questions were developed by expert opinions between the researchers (CHK, SWHL, VSLM) and a senior consultant geriatrician working in the settings. The interview was piloted on a doctor, a pharmacist and a nurse to determine the clarity and comprehensibility of the questions, as well as the time taken to complete the interview. No changes were required to the original interview questions.

<Table 1>

Data Analysis

Each interview was audio recorded and transcribed verbatim with the participant's consent. We used QSR NVivo 11 to assist in analysis of the data. Both an inductive and deductive approach were used to explore both intended issues and other unexpected aspects of participants' experience.[16] In conventional content analysis (inductive approach), we assessed the various clinical characteristics of the doctors, pharmacists and nurses across the four nursing homes in general (such as primary place of practice, any specialisation, length of practice in nursing homes, any access to education infrastructure). These were used to develop themes and a coding scheme. Following which, we employed directed content analysis (deductive approach) to collate qualitative data and the transcript data placed into themes. Coding was done using a combination of open, axial and selective coding. Reporting of this manuscript followed the Standards for Reporting Qualitative Research (SRQR) reporting guidelines.[17]

Patient Involvement

Patients and the public were not involved in the design or planning of the study.

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Results

Study participants

Nineteen participants were approached for the interview and all agreed to participate. However, two (a pharmacist and a doctor) declined consent for recording and their data was not included in the study. The interviews lasted 14 minutes on average. Participants comprised of 4 doctors, 4 pharmacists and 9 nurses. Eleven (64.7%) of the participants were female. No other demographic profile was collected due to confidentiality concerns of the nursing homes.

Two key themes (enablers and challenges) were identified in the interviews (Table 2).

<Table 2>

Theme: Enablers to deprescribing (D = Doctor, N = Nurse, P = Pharmacist)

Subtheme: Awareness of medications that are unnecessary or could be targeted for deprescribing

Acceptance of participants towards deprescribing is facilitated by an increased awareness of the medications that are unnecessary or inappropriate (poor risk-benefit profile) for older patients. Pharmacists and doctors primarily viewed gastroprotective agents (proton pump inhibitors, histamine-2 receptor antagonists) as unnecessary medications. This may be due to a previous local awareness campaign to deprescribe proton pump inhibitors in Singapore.[18] Other types of medication viewed as potential targets for deprescribing include medications with high-risk profiles, such as sedative first-generation antihistamines and benzodiazepines. There was an emphasis from doctors on the risk-benefit ratio of the medication to be considered for taking off.

"…medicine that does not benefit the patient or there is the poor risk-benefit profile. These are the medicine that I think should be deprescribed" (D10, male)

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In contrast, nurses perceived supplements such as multivitamins, iron, calcium and glucosamine as targets for deprescribing.

Oral hypoglycaemic agents and antihypertensives were also viewed by some doctors and nurses as the focus for deprescribing. For some patients, dietary plans provided within nursing homes (moderate salts and sugar) were sufficient to control the patients' medical conditions.

In addition, one participant identified medications such as statins and bisphosphonates that require a longer time to achieve its outcomes as unnecessary.

"if the medication takes a longer (time to see clinical benefits)…you see the effect only after years, I think there is no point to have them on…those osteoporosis medications, bisphosphonates, etc." (P19, female)

Subtheme: Improving quality of life for patients with limited life expectancy

The life expectancy of older patients was a consideration by all groups to deprescribe. Most participants felt that deprescribing is important in an older patient with limited life expectancy, as there is a lack of evidence of clinical benefits from certain classes of medications.

"If the patient's life expectancy is not too great and most of them are already on the advanced care plan. Then of course, all of these preventive medicines, we do not really need them. Whether I actively remove the one, it depends case by case. A patient has a lot of pill burden…then, yes, I would actively try to deprescribe. But I think that sometimes, the patient does not have a lot of medicine. They might be on some preventive ones…(so) leave it" (P12, female)

A pharmacist explained that she would not actively recommend the addition of medications, as quality of life was also an important consideration for older patients.

"But if he is taking 10 to 20 years, I think it (deprescribing) is…giving quality of life to the patient. They are eating a lot of medication" (N8, female)

Lifetime cost and functional status were important factors for doctors in deciding whether to commence or stop a medication.

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Subtheme: Improving communication between doctors, pharmacists, and nurses

"And also the doctor as…a team to practice it (deprescribing). But currently, I just…review the patient individually" (P15, female)

".. is good if they can work as a team…basically if they have a common understanding" (D5, male)

Most participants agreed that team communication was important in deprescribing, as doctors manage patient's overall condition, while pharmacists are medication experts and nurses are able to monitor its side effects and efficacy. One doctor felt team communication was not needed as those medications being deprescribed were considered non-essential medications. On the other hand, nurses felt that pharmacists were important to help re-evaluate what doctors and nurses missed out. Teamwork between doctors, pharmacists and nurses can be strengthened by improving communication, working towards an aligned care management care plan for older adults and ensuring its continuity.

"Yes, because the nurses are the closest ones to the patients, so they can actually tell you if the medications are working or not and if there is any side effects…better than anyone else. Pharmacists obviously being the drug expert, have an obvious role to play in suggesting which medications can be deprescribed. And you need the doctors' help to deprescribe them because we do not have the power to stop them" (P19, female)

"…because in this medical field, we really need collaboration. Teamwork…because the doctors are not here always" (N13, male)

Subtheme: Systematic deprescribing practice and educational tools

Participants suggested that a more systematic guideline, clear-cut algorithm and multidisciplinary efforts were needed to ensure understanding and smoothen the process.

"A standard guideline that would help, because we have so many pharmacists with different ways of practicing and different habits. So it would be better if we have something standardized to follow. So that all (nursing) homes can have the same, sort of, deprescribing procedures." (P12, female)

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"And where is the guide…you see, there is actually no clear guideline…local guidelines. The expert opinion...more specific guidelines with regard to certain medication, common medication that would be useful." (D5, male)

"I think guideline…If there is a clear-cut algorithm…pharmacists are (taught to follow) algorithm... So we love algorithm" (P1, female)

Also, participants suggested other areas of improvement including face-to-face doctor-pharmacist discussions, as well as a deprescribing quick reminder guide.

"I think…discussion…sometimes…where we intervene…the deprescribing, maybe we missed out some of the important information. For example, we are not aware of the latest condition but doctor (does, he is) the one who also work closer with the nurse and…the family. Doctor also examine the patient regularly that is why doctor will know more about the patient" (P15, female)

"...like small cards, a reminder to try to cut off PPIs (proton pump inhibitors), if there is no clear indication. Because a lot of current usage has…unclear indication. If now they have this very thick standard, black and white thing (guidelines)…pharmacists are more confident in cutting down medications" (P12, female)

Additionally, nurses noted that mentoring, case studies, lectures and guidebooks would be useful to get more nurses to participate in deprescribing.

"I think those senior ones will not have much of a problem; they know their medication...these are for the junior (nurses)…Mostly they just follow the orders, until they get to the stage where they can mostly be on their own" (N8, female)

"So…we will talk about the resident's condition and if he benefits (from) the medicine, or if he does not benefit (from) the medicine so we can off it…(for example) the case study" (N6, male)

"lecture plus…booklet so that…easy to pick up" (N4, male)

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Subtheme: Acknowledgement of possible benefits of deprescribing

Most felt deprescribing was important to reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors and improve quality of life. In addition, burden to the healthcare system was also frequently brought up.

"One, it (deprescribing) reduces and side effects...Two, it reduces pill burdens...the cost...It also reduces manpower...And with less...medication error" (D11, female)

"... reduces the cost...maybe side effect" (N7, female)

"Sometimes…They have been spending for years (on) medication but, it is not useful to the health condition, right" (N14, male)

"… if there are a lot of drugs, and certain drugs that they decided to reduce or increase…(when) it come in blister packets…it is really tedious to actually open and then change the drugs. Yes, it is very time-consuming" (N17, female)

Theme: Challenges to deprescribing

Subtheme: Symptoms not acknowledged as possibly drug-related

Generally, pharmacists and doctors felt that adverse drug events often went undetected as symptoms were not acknowledged as possibly drug-related and therefore lacked acknowledgement that deprescribing was possible. Many patients have poor cognitive status (e.g. dementia), physical status (e.g. immobile or bedridden) or difficulty in communication, rendering them unable to inform and report any adverse events.

"Those patients are…unaware that these are side effects of the medication. They think that…these are just part of aging… they do not think that there was have any alternative…And probably…family also have some of these perspectives. So sometimes even if they complain, (the) family will…simply brush off (as) just part of aging" (D11, female)

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Nurses, on the other hand, felt that underreporting was uncommon as they are around the patients most of the time but do agree that symptoms like dizziness may be hard to detect as these were multifactorial and can be precipitated by poor diet. One doctor also thought that underreporting could be due to the nurses' lack of knowledge on the side effects of medications.

Subtheme: Lack of knowledge of patient and family members' preferences

Most health professionals would take into account the patient's condition (such as the ability to swallow) and cost, more than the patient's personal preference in deciding medication choice. Whether the patient can communicate to the doctors and nurses also played a big role in letting the patient decides. However, health professionals were often unable to assess the patient's preference due to their speech or cognitive disabilities and difficulties in contacting their family members. Pharmacists tend to go with the nurses' feedback rather than the patient's preference as mentioned in the interviews.

"Yes, but I think that in this nursing home setting, a lot of the patients are not able to give preference, or it could be the family's preference…I guess, it is more like, if (the) patient is tube feeding, then I will take into account what dosage forms are more suitable for that route of the administration. And so…it is not really preference." (P12, female)

"If they can come and we can explain, that would be very good. But most of the time, the residents' family cannot…come. And even (if) you talk over the phone…about all these small complex things…(when) their family (member) are not educated (in the medical field, and) you try to explain all these over the phone…it is very difficult" (D11, female)

Subtheme: Lack of coordination between health professionals in hospitals and nursing homes

"…if this patient is a complex patient that is seeing a lot of specialists in a hospital, I do not have that amount of information and really, I should not be the one to end up prescribing-deprescribing because I do not have enough information for the complex patient…usually I can just cancel (for

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medications prescribed by general practice)...whereas (on) the specialist side, I do not have enough information on my side and the family probably still prefer to listen to the specialist, which is rightfully so" (D11, female)

This was an important point, as it signified that specialists have a major influence on GPs' autonomy and competence when considering stopping medications. Thus, GPs are more reluctant to change medications started by specialists.

Doctors also stated that deprescribing should begin at the hospital before discharge to the nursing homes. In particular, receptiveness by other doctors towards deprescribing, as well as receptiveness by other healthcare institutions following up with the patients (general practitioners and specialists) were deemed as important steps to improve deprescribing practice.

"But when they are admitted, everything goes back to square one…because it is prescribed…the prescription actually arrives from the hospital before they are discharged. And once they are discharged, immediately there (should be) a suggestion to discontinue…or reduce" (D5, male)

Subtheme: Limited tools for deprescribing

The most common deprescribing screening criteria known by doctors and pharmacists were the START/STOPP (Screening Tool to Alert doctors to Right Treatment/Screening Tool of Older Person's Prescriptions) criteria,[19] as well as the Beers criteria,[20] but most health professionals found them to be too stringent to be practical for the patients. They reported that they seldom referred to these tools but noted that these were useful guidelines.

"A standard guideline that would help, because we have so many pharmacists with different ways of practicing and different habits" (P12, female)

Nurses claimed to follow doctors' and pharmacists' recommendations and rely on laboratory results rather than initiate deprescribing.

"Usually, I am also reading the notes of the pharmacist or...if the doctors are doing laboratory tests... we are just waiting…for the next monthly (input) from the doctor…(and) for the next lab test" (N13,

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male)

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Discussion

There are a few enablers to deprescribing that were uncovered in this study. Firstly, our findings suggest an improved deprescribing procedure and algorithm can facilitate deprescribing practice in nursing homes. Turner et al had similarly identified a need to standardize the process of deprescribing.[12]

Our study also highlighted that most participants, in particular nurses and pharmacists, agreed that multidisciplinary effort between doctors, pharmacists and nurses in the nursing homes is an important enabler in deprescribing. Unfortunately, unlike acute care hospitals, pharmacists and doctors are usually not around in the nursing homes most of the time, which may hinder communication. As such, this aspect can be one of the areas which can be improved,[21] such as establishing a mechanism for face-to-face communications between doctors and pharmacists. In addition, our results also reflect that mentoring and case studies may also be helpful to increase the healthcare professional's confidence, especially among nurses, where knowledge and experience in deprescribing may be lacking.

Medication favoured for deprescribing by doctors and pharmacists are similar to findings from a Canadian Delphi consensus, where benzodiazepines, statins and proton pump inhibitors were identified, corresponding to mental health, cardiovascular and gastroenterological conditions.[22] In addition, our study highlighted first-generation antihistamine as a prioritised class for deprescribing in our Asian setting. It was also commented in our study that a lot of patients are on good diet control in the nursing homes and their diabetes and hypertension may be well-controlled without the need for these medications.

The study also noted several challenges to deprescribing. Firstly, we found psychotropic class of

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medication rarely gets reviewed by doctors as they are usually prescribed by the consultants. Studies have found that doctors expressed reluctance to interfere with medication prescribed by a colleague or medication specialist, possibly due to a lack of confidence in deprescribing skills and fear of litigation or conflict.[2, 23] Doctors in our study similarly expressed reluctance to deprescribe medication prescribed by consultants. One of the solutions could be to have a better communication channel between specialists, doctors and pharmacists with the institutions, consistent with a New Zealand general practitioner study.[10] With the recent launch of the nationwide Nursing Home IT Enablement Program (NHELP) in Singapore that focused on incorporating patient management and electronic medical record (EMR) from hospitals and polyclinics with nursing homes, this challenge may be reduced in future.

Secondly, doctors and pharmacists felt that underreporting of adverse drug reactions might be common, given that many patients have communicative issues and taking the symptoms as part of the aging process. Palagyi et al had similarly reported a lack of recognition in medication-related adverse drug reactions in both residents and their relatives, including the well-established increased risk of falls as well as impaired physical and cognitive function.[2] However, in our study, nurses felt underreporting is rare, given that they are by the side of the patients most of the time.

Thirdly, the patient's preference seemed to take less precedence over patient's functional status (e.g. ability to swallow) in deciding treatment selection. Other contributing factors include the inability to communicate and limited visitation by next-of-kins being contributing factors to making deprescribing preferences. Furthermore, pharmacists seldom have direct contact with patients and their treatment selections are determined primarily by nurses' feedback, as doctors are not always present. These may have deliberated deprescribing which would have otherwise taken place, as shared decision making is lacking. However, it was also noted by others that shared decision making may not be always possible in this setting. For example, Weir et al have identified that while some older

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adults preferred a proactive role in decision-making, others preferred to leave the decisions to their doctors.[24]

Lastly, our study found that most doctors and pharmacists were aware of START/STOPP criteria,[19] as well as the Beers criteria,[20] but most found these guidelines to be too stringent for deprescribing, making changes that are too impractical for an older patient. Our results supported the findings from a study by Ailabouni et al, which highlighted that lack of access to user-friendly evidence-based guidelines as a challenge to general practitioners in New Zealand,[10] thus emphasizing the need of a criteria-based guideline more suited for our region. Despite an abundance of tools to assist with deprescribing,[25] there was no indication of the use of other deprescribing tools during the interviews, except the Beers and STOPP criteria as well as the local deprescribing guide developed for proton pump inhibitors.[18] Limited awareness of deprescribing tools may be partly attributed to this lack of awareness on deprescribing, since this topic has not been taught in medical, pharmacy, or nursing undergraduate education. This calls for additional professional continuing education, as well as for the medical community to increase the awareness of deprescribing among its members.

In general, we witnessed a consistent belief in the health professionals interviewed that deprescribing might be a priority for their patients, in which deprescribing can reduce pill burden, adverse drug reactions, drug interactions, medication cost, medication errors and improve quality of life. Similar to a study on Dutch general practitioners which found the deprescribing of preventive medication difficult due to a lack of risk-benefits information,[26] findings from this study showed that most physicians focus on the risk-benefit ratio when considering deprescribing. Our findings support the notion that prescribing based on younger adults' guidelines may not be practical given the limited risk-to-benefit ratio in older adults.[27] Conversely, this might further add to their pill burden and cost, impacting on their quality of life.

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To our best knowledge, this is one of the first known qualitative interview in Asia studying the perceptions of deprescribing among health professionals in Singapore's nursing homes. Our results add to existing findings to improve the uptake of deprescribing in residential care settings and may be applicable to other healthcare settings. Our results confirmed previous findings that the risk-benefit ratio is an important determinant in deprescribing.[10] Our results similarly evidenced that first-generation antihistamine is perceived as an important target for deprescribing in our setting.[11] Anticholinergic and sedative drug exposure have been associated with poorer physical and cognitive functions,[28] and deprescribing of unnecessary first-generation antihistamine would potentially improve outcomes for this frail population. However, our study further found that we need a better process for deprescribing in nursing homes in Singapore. Despite the existence of established tools such as Beers[20] and STOPP criteria[19], our studies identified areas for improvement such as more suitable tools for our setting, mentoring and case discussions, as well as better collaboration and communication in the process of deprescribing. Better explicit deprescribing tools and algorithms that are developed or adapted for the Asian setting for deprescribing may help in greater practicability and comprehensiveness. We also identified that a lack of coordination between health professionals in hospitals and nursing homes could possibly hinder successful deprescribing in Singapore nursing homes. Future initiatives should look at increasing collaboration and communication between acute hospitals, nursing homes and specialist clinics in Singapore. Future initiatives in Singapore can also look at educating health professionals in nursing homes on how to deprescribe and monitor in older adults.

There are several limitations to this study. Although we achieved saturation, there is a limited number of doctors and pharmacists available to participate in this study, as there is usually only one pharmacist and a handful of doctors covering each home, thus it may not be a true representative of all the healthcare workers working in the nursing homes. We acknowledged that most of the data could have been coded came from nurses. This may have an effect on displaying a balanced view of

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deprescribing from all included parties. We took this into consideration and reported any varied view from doctors, pharmacists and nurses separately in the subthemes. The fact that it was conducted face-to-face with the interviewer (who is a pharmacist) and being audio-recorded may give rise to biases in their answering of the questions. Although the deprescribing study had yet to commence, there is also a possibility that results of the study could be more biased towards those who were already aware of the deprescribing study and thus had more motivation and interest in conducting deprescribing.

In conclusion, this study highlighted that deprescribing in the nursing homes is perceived by health professionals to be challenging and future research could assess how routine case studies, mentoring and better multidisciplinary communication could improve deprescribing knowledge and process in the nursing homes. Future studies should also explore patients' perspectives toward deprescribing in other parts of the world.

Ethics

Ethics approval was granted by Domain Specific Review Board of National Healthcare Group, Singapore (2016/00422) and Monash University Human Research Ethics Committee (2016-1430-7791).

Funding statement

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests

The authors declare that they have no conflict of interests.

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Data sharing statement

As per the study ethics approval from the Domain Specific Review Board, data from the study (audio and interview transcripts) are kept in a secured, locked location. Any electronic files are password-protected on the research team's drive and will be destroyed after a period of 6 years from when the data was collected. Only the research team has access to the data at the Continuing and Community Care Department, Tan Tock Seng Hospital, Singapore. Accessed to the file is monitored with an access log file documenting person, date and time.

Study protocol

Kua C, Yeo CYY, Char CWT, et al Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. BMJ Open 2017;7:e015293. doi: 10.1136/bmjopen-2016-015293

Author contributions

CHK contributed to the concept and design, data acquisition, analysis, interpretation for the work and writing drafts. SWHL and VSLM contributed to the design of the work (including analysis plan), interpretation of the data and revising the work critically for important intellectual content. All authors approved the version to be published.

Acknowledgement

We thank Associate Professor Ian Leong, Tan Tock Seng Hospital Singapore, for his kind assistance in devising the guiding questions for the interview.

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References

1. Mitchell P, Koch T. An attempt to give nursing home residents a voice in the quality improvement process: the challenge of frailty. *J Clin Nurs.* 1997;6:453-61.
2. Ferreira AR, Martins S, Fernandes L. Comorbidity and polypharmacy in elderly living in nursing homes. *Eur Psychiatry.* 2016;33:S585.
3. Jokanovic N, Tan EC, Dooley MJ, et al. Prevalence and factors associated with polypharmacy in long-term care facilities: a systematic review. *J Am Med Dir Assoc.* 2015;16:535-e1-12.
4. Lee SW, Chong CS, Chong DW. Identifying and addressing drug‐related problems in nursing homes: an unmet need in Malaysia? *Int J Clin Pract.* 2016;70:512.
5. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf.* 2014;13:57-65.
6. Palagyi A, Keay L, Harper J, et al. Barricades and brickwalls–a qualitative study exploring perceptions of medication use and deprescribing in long-term care. *BMC Geriatr.* 2016;16:15.
7. Woodward MC. Deprescribing: achieving better health outcomes for older people through reducing medications. *J Pharm Pract Res.* 2003;33:323-8.
8. Lee SW, Mak VS. Changing demographics in Asia: a case for enhanced pharmacy services to be provided to nursing homes. *J Pharm Pract Res.* 2016;46:152-5.
9. Kua CH, Mak VS, Lee SW. Health outcomes of deprescribing interventions among elderly residents in nursing homes: a systematic review and meta-analysis. *J Am Med Dir Assoc.* 2019;20:362-372.
10. Ailabouni NJ, Nishtala PS, Mangin D, et al. Challenges and enablers of deprescribing: a general practitioner perspective. *PLoS One.* 2016;11:e0151066.
11. Kouladjian L, Gnjidic D, Reeve E, et al. Health care Practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Ann Pharmacother.* 2016;50:625-36.
12. Turner JP, Edwards S, Stanners M, et al. What factors are important for deprescribing in

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Australian long-term care facilities? Perspectives of residents and health professionals. *BMJ open.* 2016;6:e009781.

13. Bolmsjö BB, Palagyi A, Keay L, et al. Factors influencing deprescribing for residents in Advanced Care Facilities: insights from General Practitioners in Australia and Sweden. *BMC Fam Pract.* 2016;17:152.
14. Anderson K, Stowasser D, Freeman C, et al. Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. *BMJ open.* 2014;4:e006544.
15. Kua CH, Yeo CYY, Char CWT, et al. Nursing home team-care deprescribing study: a stepped-wedge randomised controlled trial protocol. *BMJ Open.* 2017;7:e015293.
16. Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol.* 2013;13:117.
17. O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med.* 2014;89:1245-51.
18. Pharmaceutical Society of Singapore. Pharmacy Week 2016. https://www.pss.org.sg/sites/default/files/PW/PW16/deprescribing_slides_2016.pptx (Accessed 10th Feb 2019).
19. O'mahony D, O'sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing.* 2015;44:213-8.
20. American Geriatrics Society 2015 Beers Criteria Update Expert Panel, Fick DM, Semla TP, et al. American Geriatrics Society 2015 updated beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2015;63:2227-46.
21. Mak VS, Lee SW, March G. Pharmacists' roles in nursing homes in Malaysia. *J Pharm Pract Res.* 2018;48:493-4.
22. Farrell B, Tsang C, Raman-Wilms L, et al. What are priorities for deprescribing for elderly patients? Capturing the voice of practitioners: a modified delphi process. *PloS one.*

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2015;10:e0122246.

23. Pype P, Mertens F, Helewaut F, et al. Potentially inappropriate medication in primary care at the end of life: a mixed-method study. *Acta Clinica Belgica.* 2018;73:213-9.

24. Weir K, Nickel B, Naganathan V, et al. Decision-Making Preferences and Deprescribing: Perspectives of Older Adults and Companions About Their Medicines. *J Gerontol B Psychol Sci Soc Sci.* 2018;73:e98-e107.

25. Motter FR, Fritzen JS, Hilmer SN, et al. Potentially inappropriate medication in the elderly: a systematic review of validated explicit criteria. *Eur J Clin Pharmacol.* 2018;74:679-700.

26. Schuling J, Gebben H, Veehof LJ, et al. Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study. *BMC Fam Pract.* 2012;13:56.

27. Naganathan V. Cardiovascular drugs in older people. *Aust Prescr.* 2013;36:190-194.

28. Hilmer SN, Mager DE, Simonsick EM, et al. A Drug Burden Index to Define the Functional Burden of Medications in Older People. *Arch Intern Med.* 2007;167:781–7.

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Table legends

Table 1: Interview questions

Knowledge:
1) Which type of medications do you think should be deprescribed in elderly?
2) Do you think under-reporting of possible adverse drug events by attributing to old age is common and why?
3) Do you use or feel a need for guidelines for deprescribing and why? & If you are using guidelines, which are you aware of and which edition?
Practice:
1) Do you think taking medications to prevent diseases are necessary and why?
2) Do you think nurses, doctors and pharmacists have to work together in deprescribing practice and why?
3) Do you consciously practice deprescribing?
4) Do you take into account of your patients' preference in treatment selection?
Attitude:
1) Do you think deprescribing is important and in which aspect/s you can think of?
2) If you are already practising deprescribing, how do you think you can do it better?
3) If you are not practising deprescribing, what will increase your confidence in doing it?

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Table 2: Themes and Subthemes

Themes:	Subthemes:
Enablers of deprescribing	1) Awareness of medications that are unnecessary or could be targeted for deprescribing
	2) Improving quality of life for patients with limited life expectancy
	3) Improving communication between doctors, pharmacists, and nurses
	4) Systematic deprescribing practice and educational tools
	5) Acknowledgement of possible benefits of deprescribing
Challenges of deprescribing	1) Symptoms not acknowledged as possibly drug-related
	2) Lack of knowledge of patient and family members' preferences
	3) Lack of coordination between health professionals in hospitals and nursing homes
	4) Limited tools for deprescribing

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Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SRQR reporting guidelines, and cite them as:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251.

	Reporting Item	Page Number
#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	3
#2	Summary of the key elements of the study using the abstract format of the intended publication; typically	3

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		includes background, purpose, methods, results and conclusions	
Problem formulation	#3	Description and significance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	5-6
Purpose or research question	#4	Purpose of the study and specific objectives or questions	6
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	7-8
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	7

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Context	#7	Setting / site and salient contextual factors; rationale	7
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	7, 20
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	21
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	8
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	7-8
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	9
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and	8

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		security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	8
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	20-21
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	9-16
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	9-16
Integration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	17-21
Limitations	#19	Trustworthiness and limitations of findings	20-21
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were	21

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		managed	
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	21

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