Pharmacist-initiated deprescribing in hospitalised elderly: prevalence and acceptance by physicians

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ABSTRACT

Objectives Deprescribing can help reduce polypharmacy in the elderly and hospitalisation presents an opportunity to re-evaluate the use of medications. The aim of this study was to describe the drugs that were commonly suggested by pharmacists to be deprescribed in hospitalised elderly, and the factors associated with acceptance by physicians.

Methods A retrospective, cross-sectional study was conducted in a tertiary hospital in Singapore. All pharmacist interventions on deprescribing in inpatient elderly aged ≥65 years, made between July and December 2015 were included. Comparisons between groups were made and independent factors associated with physician acceptance were determined.

Results A total of 503 interventions were included and 392 (77.9%) were accepted by physicians. Most interventions were on gastrointestinal agents (49.7%) and supplements (42.7%). The common reasons for deprescribing were: overduration of treatment (44.5%), unclear indication (23.9%) and the overdosage (20.7%). No significant differences were found between the reasons for deprescribing and acceptance by physicians. Use of <9 medications (OR 1.92, 95% CI 1.20 to 3.07), gastrointestinal agents (OR 3.46, 95% CI 1.06 to 11.26) and supplements (OR 3.20, 95% CI 1.06 to 9.69) were associated with higher physician acceptance (p<0.05).

Conclusions In our cohort of hospitalised elderly, gastrointestinal agents and supplements were most commonly suggested by pharmacists to be deprescribed and at least three quarters of these interventions were accepted by physicians.

INTRODUCTION

Advances in medical practice and drug development have contributed to longer life expectancy. As chronic diseases accumulate with age, the prevalence of polypharmacy in the elderly also increases.[1] Elderly with multiple comorbidities are at increased risk for adverse drug reactions (ADRs) from polypharmacy, drug–drug and drug–disease interactions. Polypharmacy is also associated with mortality, hospitalisation, nursing home placement, hypoglycaemia, fractures, malnutrition, non-adherence to therapy, functional and cognitive decline in the elderly.[2–6] The geriatric population also has lower organ reserve capacities and slower homeostatic mechanisms, thus is more vulnerable to ADRs compared with younger adults.[1]

Deprescribing can be used to address polypharmacy. It is the systematic process of reviewing, tapering and withdrawing drugs in which existing or potential harms outweigh the benefits within the context of an individual patient's goals of care, level of functioning, life expectancy, values and preferences.[7] Recent studies have provided evidence that supports deprescribing, and focused mainly on the cessation of drugs known to increase fall risk or cause cognitive decline in the elderly.[8–10]

Many studies on deprescribing were done in the community and comparatively, there was lesser information on deprescribing practices in the inpatient care setting.[8–12] During hospitalisation, functional status, goals of care and prognosis of an elderly could change and these changes may alter the risk-benefit profile of the prescribed medication. A study done in Australia on hospitalised elderly reported a reduction of at least two regular medicines in 84% of the subjects with the help of a decision support tool that guided physicians during medication review.[11] Pharmacist, as drug expert, plays a key role in deprescribing by identifying unnecessary medications and working in collaboration with other healthcare providers to implement changes to drug regimen that best suits the patient. Studies have shown that medication review by pharmacists led to significantly lesser number of fall-risk medications and the number of falls in the elderly.[10 13]

To date, there are no studies that quantify and describe the types of pharmacist-initiated deprescribing interventions in seniors in the acute setting. Our study aims to describe the drugs that were commonly suggested by pharmacists for deprescribing in hospitalised elderly and the factors associated with acceptance by physicians.

METHODS

Design, setting and participants

This was a retrospective, cross-sectional study conducted in an acute, 1200-bed hospital in Singapore. As part of routine care, ward pharmacist performed medication reconciliation and review for patients admitted to the hospital, and any medication issues were raised to the primary team. The pharmacist reviewed the appropriateness of medications based on the concepts proposed by Strand, who defined eight drug-related problems that can result in poorer outcome: untreated indications, improper drug selection, subtherapeutic dosage, failure to receive drugs, overdosage, ADRs, drug interactions and unclear indication.[14] Intervention made by pharmacist was categorised accordingly based on the types of drug-related problems identified. The decision to deprescribe was made based on individual pharmacist's judgement on whether should a medication be stopped or the dosage reduced. Medications were classified according to their therapeutic classes based on the British National

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Formulary.[14] British National Formulary and Drug Information Handbook were used to guide medication review, such as determining the appropriate indication, duration and dose of a prescribed medication for an individual.[15 16] All pharmacist interventions made on patients aged 65 and above who were admitted during the period of July 2015 to December 2015 were included in our study. Interventions that were not on deprescribing were excluded. Ethics approval was obtained from the National Healthcare Group Domain Specific Review Board prior to study commencement.

Data collection

A standardised data collection form was used to ensure consistency of the data collected. Data sources used were case notes, inpatient medication charts, electronic health records and pharmacy intervention database. Details of all interventions were captured to determine the reason for deprescribing of a particular medication. An intervention was considered to be accepted by physician if the deprescribed medication was not represcribed on discharge.

Statistical analysis

Power calculation was not done as this study adopted a descriptive, cross-sectional design and no previous study on pharmacist intervention in deprescribing was available for comparison. Logistic regression was used to correlate variables that may influence the acceptance of physician towards the proposed intervention. We adjusted for confounders such as functional dependency, specialty and types of intervention as these factors were found to influence prescriber's acceptance towards deprescribing or pharmacist intervention.[14–18] χ^2 test and Mann-Whitney U test were used to determine differences in baseline characteristics and intervention outcomes. Alpha level of 5% was used for all tests as cut-off for statistical significance. Data were entered into Microsoft Excel V.2010 spreadsheets and analysed using Predictive Analytics Software V.18.0 (SPSS).

RESULTS

Between July 2015 and December 2015, a total of 55 666 interventions were made by inpatient pharmacists on 12 684 unique individuals. A total of 503 (0.9%) interventions that were related to deprescribing were made on 483 elderly aged 65 and above. The overall acceptance rate by physicians was 77.9%; 392 interventions made on deprescribing were accepted. Table 1 outlined the baseline characteristics of the subjects, stratified into two groups based on whether intervention made was accepted or rejected. The baseline characteristics between both groups were similar except for the median number of medications on admission (p=0.015).

Medications for gastrointestinal conditions and supplements represented the bulk of the interventions made (49.7% and 42.7%, respectively). Cardiovascular medications made up 5.4% of the total interventions and the remaining 2.2% were on medications otherwise not classified under these three major categories. Omeprazole (39.0%), folic acid (16.5%) and high-dose vitamin B_{12} (14.1%) were the three most common medications that were suggested to be deprescribed (table 2). For the gastrointestinal agents, 222 (44.1%) interventions were on proton pump inhibitors (PPIs). Among the supplements, 83 (16.5%) interventions were on folic acid, 71 (14.1%) interventions were on high-dose vitamin B_{12} preparations and the rest were on calcium, iron, vitamin D and glucosamine. Statins (1.6%) were the most frequently intervened class among the cardiovascular agents. Acceptance rates by physicians for gastrointestinal agents, supplements, cardiovascular medications and miscellaneous medications were 78.4%, 78.1%, 63.0% and 100.0%, respectively. Table 2 summarised the common medications suggested by pharmacists to be deprescribed, stratified according to drug classes.

The top three most common reasons to initiate deprescribing were: overduration of treatment (44.5%), unclear indication (23.9%) and overdosage (20.7%). There were no statistical differences in acceptance rates between the various reasons for deprescribing (table 3).

Table 1 Baseline characteristics of subjects

Variables	Intervention accepted, n=392 (%)	Intervention rejected, n=111 (%)	p Value
Age, median	79 (IQR, 73–85)	79 (IQR, 73–84)	0.60*
Gender Male	192 (49)	46 (41.4)	0.16†
Presence of carer	363 (92.6)	101 (91)	0.58†
Functional status			0.98†
Independent	192 (49.2)	54(48.6)	
Assisted	137 (34.9)	40 (36.0)	
Dependant	62 (15.8)	17(15.3)	
Number of medications, median	8 (IQR, 6–11)	10 (IQR, 7–12)	0.015*
Hypertension	310 (79.1)	90 (81.1)	0.69†
Hyperlipidaemia	247 (63.0)	71 (64.0)	0.86†
Diabetes	148 (37.8)	49 (44.1)	0.22†
Dementia	80 (20.4)	23 (20.7)	0.94†
Stroke	112 (28.6)	34 (30.6)	0.67†
Chronic kidney disease	108 (27.6)	29 (26.1)	0.77†
Anaemia	157 (40.1)	49 (44.1)	0.44†
Peptic ulcer diseases	54 (13.8)	19 (17.1)	0.38†
Cancer	69 (17.6)	17 (15.3)	0.57†

*Mann-Whitney U test, α=0.05.
†χ^2 test, α=0.05.

Table 2 Acceptance rates of top three drugs that were most frequently suggested for deprescribing, as stratified by therapeutic classes

Drug classes	Intervention accepted	Intervention rejected	Acceptance rate (%)
Cardiovascular agents (n=27)			
Simvastatin	6	3	66.7
Fenofibrate	6	2	75.0
Atorvastatin	2	2	50.0
Gastrointestinal agents (n=250)			
Omeprazole	152	44	77.6
Esomeprazole	19	7	73.1
Famotidine	18	3	85.7
Supplements (n=215)			
Folic acid	67	16	80.7
High-dose vitamin B_{12}	57	14	80.3
Cholecalciferol	8	6	57.1
Others (n=11)			
Haloperidol	2	0	100.0
Hydroxyzine	2	0	100.0
Mirtazapine	2	0	100.0

Univariate analysis on acceptance of intervention did not demonstrate any statistical significance between groups in terms of age, polypharmacy, categories and types of drugs intervened (table 4). However, after adjusting for functional status, admitting specialty and types of interventions, the number of medications and category of drugs intervened were significantly associated with the acceptance by physicians towards deprescribing. The adjusted OR for an intervention to be accepted in patients with 0–4 medications was 2.76 (95% CI 1.20 to 6.32, $p<0.05$) and 1.75 (95% CI 1.07 to 2.87, $p<0.05$) for patients with 5–8 medications, as compared with patients with 9 or more medications. The adjusted OR for an intervention to be accepted for gastrointestinal agents was 3.46 (95% CI 1.06 to 11.26, $p<0.05$) and 3.2 (95% CI 1.06 to 9.69, $p<0.05$) for supplements, as compared with cardiovascular medications (table 4).

DISCUSSION

This study highlighted that physicians accepted about three quarters of the interventions made by pharmacists on deprescribing in hospitalised elderly in Singapore. Acceptance rates were higher for gastrointestinal agents and supplements as compared with cardiovascular medications. Patients with higher degree of polypharmacy were also found to have lower odds of having their medications stopped or dose reduced by physicians despite recommendation from pharmacists to deprescribe. We have also identified three most common reasons for pharmacists to initiate deprescribing: overduration of treatment, drug use without clear indications and overdosage. We have also demonstrated that gastrointestinal agent and supplements were more readily deprescribed.

The deprescribing process involves identifying and withdrawing medication when the risks of the drug outweigh its clinical benefits, taking into account an individual's functional status, goals of care, life expectancy and preferences.[4 6 7] In a five-step person-centred deprescribing approach described by Reeve *et al*, deprescribing starts with (1) conducting a comprehensive medication history, followed by (2) identifying potentially inappropriate medication, (3) determining if medication can be stopped, (4) initiating withdrawal of medication and, finally, (5) incorporating monitoring plans with appropriate support and documentation that complete the whole deprescribing process.[5]

The inpatient ward is a good setting for deprescribing as the decision can be made in the best interest of the patient by the physician in collaboration with a clinical pharmacist. Access to patient data and the ability to monitor for medication withdrawal events allow all five steps of deprescribing to be carried out in the acute setting. In our study, ward pharmacist performed full medication reconciliation with patient interview within 24 hours of admission and the list was then made available to physicians. Studies have shown that comprehensive medication history and reconciliation completed by pharmacists resulted in lower length of stay, mortality, medication errors and ADRs.[17–19] Following medication reconciliation, steps 2–5 in the deprescribing approach can then be incorporated into the inpatient medication review process. Both clinician and pharmacist are responsible in ensuring that the medications prescribed are of appropriate indication, dose, route and duration. Deprescribing, which encompasses the concept of person-centred care, should also include patient's decision as part of the process.[4 6 7] However, this may pose a challenge in the acute setting. The inclusion of patient participation was made difficult due to the retrospective nature of this study, and in instances where ADR was the reason for admission, or if an inappropriate medication was identified with risks that clearly outweigh its clinical benefits. However, we acknowledged that patient involvement in deprescribing could still be incorporated into acute care as part of holistic care management. Balancing patient autonomy against the clinical evidence is challenging, but respecting patient's decision may further enhance the success of deprescribing in the elderly.

Deprescribing is also a complex process and can be complicated by many factors.[20–24] The unawareness and lack of skills to cease inappropriate medications, fear of unintended consequences from deprescribing (disease exacerbation, perceived lack of negative effects from continuation of therapy) were often quoted as barriers to deprescribing.[21–24] In contrast, physicians welcomed decision-support tools, training and reimbursement for deprescribing.[21–24] Pharmacist can help

Table 3 Acceptance rates of physicians towards pharmacist intervention, stratified by reasons for deprescribing

Reasons for deprescribing	Intervention accepted, n=392 (%)	Intervention rejected, n=111 (%)	Acceptance rate (%)	p Value
Presence of adverse drug reactions	2 (0.5)	2 (1.8)	50.0	0.18*
Better alternatives available	19 (4.8)	4 (3.6)	82.6	0.58†
Unclear indication	87 (22.2)	33 (29.7)	72.5	0.10†
Overdosage	84 (21.4)	20 (18.0)	80.8	0.43†
Overduration of treatment	179 (45.7)	45 (40.5)	79.9	0.34†
Simplification of regimen	21 (5.4)	7 (6.3)	75.0	0.70†

*Fisher's exact test, $\alpha=0.05$.
†χ^2 test, $\alpha=0.05$.

Table 4 Crude and adjusted OR on drug factors and acceptance by physician on pharmacist interventions

Variables	Intervention rejected	Intervention accepted	Crude OR (CI)	p Value	Multivariate OR (CI)*	p Value
Number of medications						
9 or more	67	192	Reference		Reference	
5–8	35	148	1.48 (0.93 to 2.34)	0.1	1.75 (1.07 to 2.87)	0.03
0–4	9	52	2.02 (0.94 to 4.31)	0.07	2.76 (1.20 to 6.32)	0.02
Category of drugs intervened						
Cardiovascular	10	17	Reference		Reference	
Gastrointestinal	54	1	2.14 (0.92 to 4.93)	0.08	3.46 (1.06 to 11.26)	0.04
Supplements	47	168	2.1 (0.9 to 4.9)	0.09	3.20 (1.06 to 9.69)	
Others	0	11	–	–	–	–
Type of drugs intervened						
Preventive	63	202	Reference	0.28	Reference	
Acute	36	149	1.29 (0.81 to 2.05)	0.86	1.09 (0.54 to 2.17)	0.82
Chronic	12	41	1.07 (0.52 to 2.15)		1.77 (0.68 to 4.64)	0.25

*Multivariate logistic regression, α=0.05. Adjusted for functional status, admission specialty and types of intervention.

to successfully bridge some of these barriers by assisting the prescriber in making better decisions and contributing to deprescribing efforts through medication review and interprofessional collaboration.[9 10] Our study has demonstrated this success in the acute care setting.

The majority of deprescribing interventions in our study were on PPIs and supplements. There are currently evidence-based algorithms available internationally and in Singapore for deprescribing of PPIs.[25 26] These algorithms have guided successful deprescribing and have led to reduction in PPI usage.[27] However, there are no existing algorithms to guide deprescribing of supplements and there is also lack of safety data on discontinuing them. The unnecessary pill burden and the perceived lack of negative consequences from deprescribing of supplements could have possibly encouraged physicians to accept interventions more readily. However, stopping supplements that are used to treat conditions such as anaemia (folic acid, vitamin B_{12}) or falls (vitamin D) may have ill effects subsequently and therefore monitoring is warranted to minimise rebound of medical condition. The lower acceptance of physicians to stop cardiovascular medications may be attributed to the lack of deprescribing evidence and the discomfort associated with stopping this class of medications. Presence of cardiovascular risk factors and hope for future benefits were barriers to discontinue preventive cardiovascular medications, even though risk may outweigh the benefit from treatment.[22] Yet, there is equally insufficient good quality evidence on the protective benefits of statins, for example, in frail elderly.[28] Henceforth, it is of interest to develop guidelines on supplements and cardiovascular medications in the elderly to drive safe and appropriate deprescribing practices.

Interestingly, polypharmacy reduced the odds of acceptance by physicians to deprescribe in our study. The presence of multiple comorbidities in patients with polypharmacy, the uncertainty of drug indications and the fear of withdrawing medications that may have potential benefit could have presented as barriers to deprescribing.[29] It is challenging to initiate deprescribing for drugs with questionable indication that were prescribed by other clinicians. It is also difficult to differentiate symptoms that arise from medical or iatrogenic causes, or to balance the risks and benefits of each medication in an individual.[24] In contrast, medications with documented harm in the elderly were more likely to be deprescribed. Drugs such as haloperidol and hydroxyzine that were deemed inappropriate in the elderly by explicit criteria such as the Beers Criteria were noted to have 100% acceptance rate in our study.[30] This may be explained by the perceived harm over benefit of these drugs in the elderly which made acceptance easier in these situations. Targeted educational programme for physicians to address some of these existing knowledge gaps can also be incorporated into future deprescribing initiatives.

Pharmacists have a significant role to play in deprescribing. Pharmacists can alleviate some of the concerns regarding barriers to deprescribing by critiquing research or developing evidence-based recommendations, obtaining accurate and complete medication history, instituting monitoring of the withdrawal process and providing patient education which can empower patients to participate in the deprescribing process. In our study, we also identified common reasons for pharmacists to initiate deprescribing due to inappropriate medication use. This study was the first to quantify deprescribing interventions initiated by inpatient pharmacists. The study population was likely a good representative of inpatient elderly since our institute is one of the largest multidisciplinary hospitals in Singapore. However, our study had several limitations. The retrospective nature may have allowed uncontrolled confounders such as incomplete documentation to impact our findings, as data were only available for patients who received healthcare in public institutions. Any prescriptions filled in or admissions to private organisations were not captured by our electronic databases. Results may not be generalisable to other population such as in younger adults, or in other care settings such as in the community or nursing home. In addition, this study did not reflect the full spectrum of the deprescribing process due to limited patient involvement, as most decisions were based on clinical judgement of the physician and pharmacist. To address these limitations, we recommend that a prospective study design that also incorporates patients' belief and attitude towards deprescribing be conducted in the future. We believe findings from our study can also act as a springboard for future studies in the acute setting that include physician–pharmacist–patient collaboration as part of the deprescribing process.

CONCLUSIONS

This study highlighted the acceptance of physicians towards pharmacist-initiated deprescribing of medications (especially for supplements and gastrointestinal agents) in hospitalised elderly. More than three quarters of the interventions made by pharmacists on deprescribing were accepted. Future studies could explore the potentials of physician–pharmacist–patient collaboration for successful deprescribing to take place in the acute setting.

Guidelines on supplements and cardiovascular medications are needed to advocate safe, appropriate and evidence-based practices on deprescribing in the future.

What this paper adds

What is already known on this subject

- Deprescribing is the process of systematically tapering and stopping medications with questionable benefit or potential harm in the context of an individual. However, the concept is still controversial and there are existing barriers to deprescribing.
- Pharmacist can contribute to deprescribing in the elderly that can lead to better outcomes as evidence has shown a reduction in falls when pharmacist medication review was conducted.
- Most studies on deprescribing were done in the community setting, although acute setting presents an opportunity to re-evaluate medication use as a result of changes in prognosis or goals of care of an individual.

What this study adds

- Physician acceptance towards pharmacist-initiated deprescribing in hospitalised elderly especially for supplements and gastrointestinal agents was encouraging, as three quarters of the recommendation were accepted. Future studies could explore collaboration between physician, pharmacist and patient to improve deprescribing in the acute setting.
- Supplements (such as folic acid, high-dose vitamin B's, calcium and iron) could be target for future studies or guidelines on deprescribing.

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