Impact of clinical pharmacist medication review to improve appropriate prescribing in elderly patients: A randomized, controlled trial

Background

Inappropriate prescribing is common among elderly patients.1 Inappropriate prescribing in elderly is associated with drug-related hospital admission and readmission. Prior study has shown that clinical pharmacist intervention improved inappropriate prescribing in elderly patients2.

Objective

The study aims to evaluate the impact of clinical pharmacist medication review to improve appropriate prescribing as demonstrated by Medication Appropriateness Index (MAI) in comparison to standard care.

Study Design & Setting

This is a prospective randomized controlled trial, which will be conducted in Specialized Out-patient Clinic (SOPC) of the Department of Medicine in Pamela Youde Nethersole Eastern Hospital. Patients are eligible for the study if they 1) attend medical follow up in Specialized Out-patient Clinic (SOPC) of the Department of Medicine, 2) are65 years or older, 3) have hyper-polypharmacy (defined as 10 or more regular drugs3,4 and 4) agree to provide oral informed consent. Exclusion criteria are 1) patients who are cognitively impaired (defined as a clinical diagnosis of dementia or mild cognitive impairment and/or not communicable and do not have care-givers, 2)patients who had received pharmacist medication review within six months prior to randomization.

Patients who will attend the SOPC are screened for eligibility. Block randomization is used. Eligible patients will be randomized using computer generated number into either Pharmacist Medication Review (PMR) group or standard of care (SOC) group.

For the PMR group, medication chart review and corresponding written recommendation will be performed by clinical pharmacists for all randomized patients. Medication chart review includes assessing the appropriateness of each of the regular medications based on laboratory findings, medication lists, consultation and discharge notes, procedures and test results. Face-to-face interview will be conducted with patients prior to the SOPC follow-up. Clinical pharmacists will assess drug use history, identify drug-related problems and provide drug therapy interventions through written pharmacist note to physicians during the SOPC follow-up, based on the medication chart review and the above pharmaceutical assessments. After the SOPC follow up, clinical pharmacist will provide education on drug-related problem identified before the visit, reinforce physician’s instruction, and encourage drug compliance using written patient educational leaflets. Phone follow follow-up will be conducted 1months after the SOPC visit.

For patients randomized to the SOC group, they will attend the medical follow-up as usual and receive usual care.

All patients will be followed up for 1 months post-SOPC visit. Data collection will be conducted at baseline and1monthafter the SOPC visit.

Patients attending SOPC follow-up are screened for eligibility

Randomization by computer generated number

Pharmacist Medication Review (PMR) group

Standard of Care (SOC) group

Interview patient by clinical pharmacist

Pharmacist drug therapy intervention to physician at SOPC follow-up

if necessary

SOPC follow-up as scheduled

Patient education and counselling by clinical pharmacist after SOPC follow-up

Phone follow-up at1 month after the SOPC visit

Patients who are eligible for the study

Medication chart review and generate written recommendation

The study will be conducted according to the Declaration of Helsinki regarding the Ethical Principles for Medical Research Involving Human Subjects. Approval by local institutional review board, Hong Kong East Cluster Ethics Committee will be sought.

Outcome Measurement

Primary outcome of the study is Medication Appropriateness Index (MAI)5, which will be measured at baseline (prior to physician visit), and at 1 month post SOPD follow-up.

MAI is a validated instrument to assess the appropriateness of a medication based on ten criteria: indication, effectiveness, dosage, correct directions, practical directions, drug–drug interactions, drug–disease interactions, duplication, duration and cost effectiveness. Each criterion is rated on a three-point Likert scale, appropriate or marginally appropriate responses are scored 0 and inappropriate responses scored 1. Don’t know and not applicable responses were also scored as 0. The 10 criteria were then combined using a validated weighting scheme, a weight of 3 is given for indication and effectiveness, a weight of 2 for dosage, directions, drug–drug interaction and drug–disease interaction, and a weight of 1 for practical directions, duplication, duration and cost effectiveness. Thus, a total combined score of 0-18 is produced for each medication, with lower score indicating more appropriate use of medications. Combining the total MAI score for each medication will yield a score for each patient, which depends on the number of drugs a patient is using and the MAI score per medication.

Secondary outcome of the study include:

* + Change in number of drugs
	+ Potentially Inappropriate Medications (PIMs) identified by Screening Tool of Older Persons’ Prescription (STOPP)6
* Potential Prescription Omission (PPOs) identified by the Screening Tool to Alert Doctors to the Right Treatment (START)6
	+ Changes in total number of drug related problems
	+ Number of pharmacist intervention made and physician acceptance rate
1. Physician acceptance rate is defined as number of recommendation with which the primary physician complied over the total number of recommendations made
	* 30 day-unplanned hospital admission
	* 30 day- AED visit
	* Medication adherence measured by Morisky Score (MMAS-4)8
	* Patient satisfaction will be assessed by four questions from the Health Care Attitude Questionnaire9 at the end of study, which will be rated by a 5-point Likert scales (questions on (1) general health care satisfaction with the service, pharmacy-related health care satisfaction: (2) directions received for taking medications, (3) explanation of side effects associated with the medications (4) number and types of drugs they were taking)

Other demographic data including age, sex, social status, comorbidity measured by Charlson Comorbidity Index8, medication history, previous hospitalization and AED visit within a year and previous fall within a year.

Statistical analysis

The sample size calculation is based on previous study showing clinical pharmacist significantly reduced inappropriate prescribing2. A sample size of 100 per arm is required to provide a 80% power using a two sided alpha-level of 0.05 to detect a mean difference in MAI of 0.4 between the PMR group and SOC group. Sample size is made up to 120 per arm to account for drop out.

Intention-to-treat principle will be used. The study will include all subjects who are randomized, meet all inclusion and exclusion criteria, have provided informed consent, and have at least a baseline MAI score.

For baseline characteristic, Wilcoxon rank sum test will be used for ordinal variables, and chi-square test will be used for categorical variables. Difference in MAI between the intervention group and control group will be compared by Student’s t-test. For other secondary outcome measurement with ordinal variables, Wilcoxon rank sum test will be used, and chi-square test for categorical variables. In all cases, 2-tailed P values of <0.05 will be considered statistically significant.

Reference:

1. Gnjidic D, Le Couteur DG, Pearson S-A, McLachlan AJ, Viney R, Hilmer SN, Blyth FM, Joshy G, Banks E: High risk prescribing in older adults: prevalence, clinical and economic implications and potential for intervention at the population level. BMC Public Health 2013; 13: 115.
2. [Hanlon JT](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hanlon%20JT%5BAuthor%5D&cauthor=true&cauthor_uid=8610730), [Weinberger M](https://www.ncbi.nlm.nih.gov/pubmed/?term=Weinberger%20M%5BAuthor%5D&cauthor=true&cauthor_uid=8610730), [Samsa GP](https://www.ncbi.nlm.nih.gov/pubmed/?term=Samsa%20GP%5BAuthor%5D&cauthor=true&cauthor_uid=8610730)et. al. A randomized, controlled trial of a clinical pharmacist intervention to improve inappropriate prescribing in elderly outpatients with polypharmacy. [Am J Med.](https://www.ncbi.nlm.nih.gov/pubmed/?term=A+RCT+of+a+Clinical+Pharmacist+Intervention+to+improve+inappropriate+prescribing+in+elderly+outpatient+with+polypharmacy+(1)) 1996 Apr;100(4):428-37.
3. Gnjidic D, Hilmer SN, Blyth F, Naganathan V, Cumming RG, Handelsman D, McLachlan AJ, Abernethy DR, Banks E, Le Couteur DG: High risk prescribing and incidence of frailty among older community-dwelling men. ClinPharmacolTher2012, 91:521–528.
4. Gnjidic D, Le Couteur DG, Pearson S-A, McLachlan AJ, Viney R, Hilmer SN, Blyth FM, Joshy G, Banks E: High risk prescribing in older adults: prevalence, clinical and economic implications and potential for intervention at the population level. BMC Public Health 2013; 13: 115.
5. Hanlon JT, Schmader KE, Samsa GP, Weinberger M, Uttech KM, et al. (1992) A method for assessing drug therapy appropriateness. J ClinEpidemiol45: 1045–51
6. [O'Mahony D](https://www.ncbi.nlm.nih.gov/pubmed/?term=O'Mahony%20D%5BAuthor%5D&cauthor=true&cauthor_uid=25324330), O'Sullivan D, [Byrne S](https://www.ncbi.nlm.nih.gov/pubmed/?term=Byrne%20S%5BAuthor%5D&cauthor=true&cauthor_uid=25324330), [O'Connor MN](https://www.ncbi.nlm.nih.gov/pubmed/?term=O'Connor%20MN%5BAuthor%5D&cauthor=true&cauthor_uid=25324330), [Ryan C](https://www.ncbi.nlm.nih.gov/pubmed/?term=Ryan%20C%5BAuthor%5D&cauthor=true&cauthor_uid=25324330), [Gallagher P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Gallagher%20P%5BAuthor%5D&cauthor=true&cauthor_uid=25324330). STOPP/START criteria for potentially inappropriate prescribing in older people: version 2.[Age Ageing.](https://www.ncbi.nlm.nih.gov/pubmed/25324330) 2015 Mar;44(2):213-8
7. 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(8):781–787.
8. [Morisky DE](https://www.ncbi.nlm.nih.gov/pubmed/?term=Morisky%20DE%5BAuthor%5D&cauthor=true&cauthor_uid=3945130), [Green LW](https://www.ncbi.nlm.nih.gov/pubmed/?term=Green%20LW%5BAuthor%5D&cauthor=true&cauthor_uid=3945130), [Levine DM](https://www.ncbi.nlm.nih.gov/pubmed/?term=Levine%20DM%5BAuthor%5D&cauthor=true&cauthor_uid=3945130).Concurrent and predictive validity of a self-reported measure of medication adherence. [Med Care.](https://www.ncbi.nlm.nih.gov/pubmed/3945130) 1986 Jan;24(1):67-74.
9. Helling DK, Hepler CD, Jones ME. Effect of direct clinicalpharmaceutical services on patients perceptions of health care quality. Am J Hosp Pharm. 1979;36:325-329.
10. Charlson ME, Pompei P, Ales KL, MacKenzie CR. (1987) [A new method of classifying prognostic comorbidity in longitudinal studies: development and validation](http://www.ncbi.nlm.nih.gov/pubmed/3558716).J Chronic Dis; 40(5):373-83
11. Crotty M, Rowett D, Spurling L, Giles LC, Phillips PA. Does the addition of a pharmacist transition coordinator improve evidence-based medication management and health outcomes in older adults moving from the hospital to a long-term care facility? Results of a randomized, controlled trial. Am J GeriatrPharmacother. 2004;2:257–264