

DRUG-RELATED PROBLEMS ENCOUNTERED BY COMMUNITY-DWELLING OLDER PERSONS IN THE KLANG VALLEY, MALAYSIA: AN EXPLORATORY STUDY

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Abstract

Introduction: The population of Malaysia is ageing rapidly. Due to the relatively greater incidence of non-communicable diseases among older adults, polypharmacy is highly prevalent in this population. This polypharmacy along with other age-related factors increases the risk of drug-related problems to several folds. Currently, no study in Malaysia or even Asia has determined the type and nature of drug-related problems among non-institutionalised older adults. Therefore, this study aims to highlight common drug-related problems among community-dwelling older persons (≥ 65 years) with polypharmacy.

Materials and Methods: A cross-sectional exploratory study was carried out where in-depth home medication reviews were carried out by two pharmacists. Participants were recruited from geriatric and fall clinics of the University of Malaya Medical Centre located in the urban area of the Federal Territory of Malaysia. The total numbers of drug-related problems were classified using the Pharmaceutical Care Network Europe (PCNE) classification V9.0. Recommendations and referral letters were provided based on the pharmaceutical care issues identified.

Results: Thirty participants were recruited, among whom 178 drug-related problems were identified with a median value of six [range 1-11] drug-related problems per participant. The majority of problems were related to the effectiveness of prescribed treatment (69.1 %), followed by the possibility of adverse effects (28.7 %).

Conclusion: Home medication review identifies numerous medication-related issues and allows for patient education and detailed counselling in an informal and patient-friendly manner. Future studies to determine the longitudinal effect of home medication review on patient outcome, cost implications, and overall healthcare utilization are now indicated.

Keywords: Drug-related problems, Geriatric, Medication review, Older adults, Pharmacist

Introduction

The population pyramid of Malaysia currently exhibits a bulge in the middle-aged population which will translate into an "older age bulge" in two decades. In addition, the life expectancy of the Malaysian population in 2019 was 76.07 years, a 0.19 % increase from 2018, and 0.26 % from 2015 (1). These figures lead to the projection that the segment of population aged 60 years and above in Malaysia is expected to rise from 9.2 % in 2015 to 14.4 % in 2030 (2).

While Malaysians are living longer, it does not mean that they are living longer in better health. Non-communicable

diseases (NCDs) represent the main health concerns among older Malaysians (3). These chronic conditions tend to co-exist with increasing age, leading to an increased use of medications otherwise known as polypharmacy (4). Polypharmacy alongside other physiological changes secondary to age leads to a higher risk of drug-related problems (DRPs) in older persons (5, 6). A DRP is defined as "an event or circumstance involving drug therapy that actually or potentially interferes with the desired health outcome" (7). A DRP may occur at any point from prescribing up to drug administration and may potentially lead to adverse drug events (ADEs), with the resultant

hospitalisation and other forms of healthcare utilisation, burdening the healthcare system (8).

Previous local studies have established the prominent prevalence of polypharmacy as well as potentially inappropriate medications (PIMs) among older Malaysians. The prevalence of polypharmacy among older adults residing at nursing homes was reported to be as high as 56.9 % (9). Meanwhile, PIMs among community-dwelling older adults living in urban areas was estimated to be 36 % (10). A more recent study conducted among geriatric residents of nursing homes reported a PIMs prevalence ranging from 9.7 % to 21.3 % (11). However, to date, there is little information on the prevalence, types, and causes of DRPs among community-dwelling older persons in lower to middle-income countries including Malaysia. This study aims to explore the types and attributable factors associated with DRPs faced by community-dwelling older persons living in an urban area in Malaysia.

Materials and methods

This cross-sectional exploratory study was conducted between April and June 2019. A random sampling method was employed to recruit eligible individuals attending the geriatric and falls clinic of a tertiary teaching hospital in Malaysia. Computer generated random numbers between 1 - 70 were used to select patients by referring to their waiting number given to see the doctor at the clinic. When a selected patient refused participation, the next patient corresponding to the subsequent number in the random number list was approached. This strategy ensured selection bias was kept at the minimum. Inclusion criteria applied were individuals aged ≥ 65 years, consuming five or more regular prescription medications to manage their chronic conditions and living alone or with their family in the Klang Valley. Individuals residing in care/nursing homes were excluded. Due to the exploratory nature of the study and labour-intensive nature of the intervention, target sample sizes of 30 participants were set at the beginning of the study. Ethics approval was acquired from the Medical Research Ethics Committee of the University Malaya Medical Centre (Ref. No. 201922-7094).

After obtaining informed consent, the researcher arranged for a home medication review (HMR) according to the participant's and pharmacist's availability. Two pharmacists were involved in the delivery of HMR in this study. One was a pharmacist affiliated to a health clinic under the Ministry of Health Malaysia while the other was a pharmacist affiliated with the tertiary hospital under study. Both pharmacists had more than ten years of experience in practicing as a pharmacist in Malaysia. The pharmacists were recruited on a volunteer basis. Upon consent, they were provided with a step-by-step guide

for performing the HMR. This was followed by a briefing by the researcher to ensure the HMR will be conducted according to the given guide and consistently between the two pharmacists. During the home visit, the pharmacist conducted medication review according to a framework prepared by the research team. This comprised a four-stage process including (1) Self-introduction: The pharmacist started the session by establishing contact with the participant and explaining the purpose of the medication review; (2) Information gathering: The pharmacist gathered patients' medical and medication history by interviewing the patient and/or caregiver, as well as, physically checking and recording all prescription and non-prescription medications used by patients at home; (3) Assessment for DRPs: Based on the information gathered, the pharmacist assessed the presence of any issues related to medication safety (e.g. wrong use, wrong dose, expired medications, improper storage condition), treatment efficacy (under or over usage), and presence of untreated symptoms; (4) Developing an individualised pharmaceutical care plan: For each of the DRPs identified, the pharmacist described the problem and documented the action to be taken (intervention) to resolve the DRPs. The intervention included patient counselling/education and/or referral to the prescriber using a standardised referral form.

A standardised data collection form was used to document participants' demographic details, medical and medication history, relevant vital signs, and laboratory results (if available) and drug allergies. This was followed by a section on the description of the DRPs identified by the pharmacist and the intervention(s) recommended.

Demographic details of the participants and the total number of DRPs identified were presented using descriptive statistics where continuous data were presented as median and range and categorical data presented as numbers and percentages. Two researchers independently classified each DRPs reported by the pharmacist into a problem, cause(s), and intervention(s) using the PCNE classification V9.0. Any discrepancy was discussed until a consensus was reached between the two researchers.

Results

A total of 53 randomly selected patients satisfying the inclusion and exclusion criteria were approached, out of which 39 consented to participate in the study. However, nine participants further dropped out as they declined the HMR when contacted by the researcher due to a lack of interest or availability issues. The overall study response rate was, therefore, 56.6 %. The HMR by the pharmacist was eventually conducted for 30 participants. The demographic details of the participants are presented in Table 1.

Table 1: Demographic details of participants

Characteristics	n (%)
Gender	
Male	13 (43.3)
Female	17 (56.7)
Age (years)	
Median age [range]	82 [67, 98]
Ethnicity	
Malay	2 (6.7)
Indian	11 (36.7)
Chinese	17 (56.7)
Co-morbidities	
Median [range]	4 [2, 5]
Number of medications	
Median [range]	12 [5, 26]

Based on the PCNE classification V9.0, a total of 178 DRPs were identified among 30 participants, leading to a median value of six [range 1-11] DRPs per participant. The number and proportion of DRPs identified according to the different categories of the PCNE classification V9.0 are presented in Table 2. Overall, 69.1 % of DRPs identified were related to the lack of treatment effectiveness.

Table 2: Types of drug-related problems identified among community-dwelling older persons in the Klang Valley

Primary Domain	Drug-related problems	N (%)
Treatment effectiveness	No effect of drug/treatment	13 (7.3)
	Effect of drug/treatment not optimal	74 (41.6)
	Untreated symptoms/indication	36 (20.2)
Treatment safety	Adverse event (possibly) occurring	51 (28.7)
Others	Unnecessary treatment	4 (2.2)
Total		178 (100)

A total of 196 potential attributable factors to the 178 DRPs were identified (Table 3). The majority of DRPs were caused by patients taking fewer medications prescribed or not taking the prescribed drug at all (24 %), followed by the absence of or incomplete treatment in spite of existing indication (17.3 %) and necessary information was not provided during medication dispensing (9.2 %).

Table 3: Potentially attributable factors for drug-related problems identified among community-dwelling older persons in the Klang Valley

Primary Domain	Causes of drug-related problem	N (%)
Drug selection	Inappropriate drug as per guidelines/ formulary	2 (1)
	No indication for drug	1 (0.5)
	Inappropriate drug combination or drugs and herbal/dietary supplements	9 (4.6)
	Inappropriate duplication	1 (0.5)
Drug form	No/incomplete treatment in spite of existing indication	34 (17.3)
	Inappropriate drug form for this patient	1 (0.5)
	Drug dose too low	3 (1.5)
Dose selection	Drug dose too high	2 (1)
	Dose timing instructions wrong, unclear or missing	4 (2.1)
	Dispensing	Prescribed drug not available
Necessary information not provided		18 (9.2)
Drug use process	Inappropriate timing of administration/dosing interval	3 (1.5)
	Drug under-administered	3 (1.5)
Patient-related	Patient takes less drug than prescribed/ does not take drug at all	47 (24)
	Patient takes more drug than prescribed	4 (2.1)
	Patient uses unnecessary drug	7 (3.6)
	Patient takes food that interacts	2 (1)
	Patient stores drug inappropriately	10 (5.1)
	Inappropriate timing/dosing interval	2 (1)
	Patient uses drug in wrong way	6 (3.1)
	Patient unable to use drug/ form as directed	10 (5.1)
	Patient unable to understand instructions properly	10 (5.1)
	Others	No or inappropriate outcome monitoring
	Others; cause specified	4 (2.1)
Total		196 (100)

Overall, 233 interventions were carried out by the pharmacist to address the DRPs identified (Table 4). Interventions carried out were direct patient counselling (52.1 %), referral letter to the prescriber (14.5 %), and discussions with family caregivers (14.5 %).

Table 4: Interventions implemented by the pharmacist to resolve the drug-related problems

Primary Domain	Interventions	N (%)
At prescriber level	Prescriber informed only	34 (14.6)
	Intervention proposed to prescriber	2 (0.9)
At patient level	Patient (drug) counselling	122 (52.4)
	Written information provided (only)	8 (3.4)
	Patient referred to prescriber	24 (10.3)
	Spoken to family member/caregiver	34 (14.6)
At drug level	Dosage changed	1 (0.4)
	Changed instruction for use	1 (0.4)
Others	Others	7 (3)
Total		233 (100)

Discussion

A median of six DRPs was identified per person, with suboptimal drug treatment effect being the most common DRP. This is two to five times higher than those reported in the literature where an average of 2.9 DRPs per participant was reported among geriatric patients discharged from the hospital and 1.27 DRPs per participant were reported among geriatric patients institutionalised at care homes (11, 12). Sorensen et al. (13), on the other hand, reported 5.5 DRPs per participant among high-risk individuals living in the community which corresponds closely to the number of DRPs identified in the current study. While different methods used for identification and classification of DRP makes it difficult to directly compare studies, it is still notable that older persons in the community experience a higher prevalence of DRPs. One of the probable reasons for this is the fact that community-dwelling older persons consume and manage their medications without supervision by a healthcare professional as compared to individuals recently discharged from the hospital who just had their medications reviewed by healthcare professionals. Medication taking in institutionalised patients is supervised by qualified individuals. In addition, medication review conducted at the point of discharge would only take into account the prescribed medications from a single institution, whereas medication review conducted at patients' homes will provide a complete picture of medications being used at home which may be obtained from different practitioners and sources including

those over the counter medications, supplements, and herbal products which increases the potential for the occurrence of DRPs (14). It is also evident from our findings that the DRPs are mostly related to the way patients take or store medications that will not be identified at the point of discharge nor among institutionalised patients. The higher prevalence of DRPs among community-dwelling older persons raises concerns for their safety and highlights the need for a regular medication review at patients' homes by a qualified practitioner.

DRPs identified in the current study were broadly grouped into three primary domains, with the help of the PCNE classification system, each case having a different description for its type and cause (as mentioned in Tables 1 and 2). Among 24 % of these cases, participants were either not taking their medications at all, or were taking lower doses than the actual prescribed dose. They were found to self-adjust the doses as per their perceived benefits, not complying with the supplied information, administered medications in the wrong way (wrong dose, time or duration) or maintained inadequate stock of medications (i.e. leftover from previously dispensed medications). None of the patients interviewed could demonstrate proper use of inhalation pumps or metered-dose inhalers (MDI), which is one of the potential reasons for poor asthma control in asthmatic patients. Medication containers with missing labels that are intended to provide instructions for use may have also contributed to inappropriate use of medications. These practices may have contributed to the high number of DRPs related to treatment effectiveness (69.1 %) in this study. These findings were consistent with those of Jimmy and Jose (15), who believed that failure to adhere to treatment is a serious problem and is a primary determinant of treatment success. This problem may be addressed by providing appropriate recommendations verbally and/or written form by a pharmacist as an intervention to the participants for a better understanding of medication used.

Participants were also found to store different strengths of the same or different medications in the same envelope, unaware of the purpose/dose of the medications leading to unnecessary or inappropriate use. These participants were using expired eye drops, expired inhalers, and wrong medication for wrong indications (anti-diabetic medication to relieve body rash and antibiotic eye drops to treat dry eye). Therapeutic duplication was also seen where participants were using medications discontinued at the previous clinic visit along with those prescribed to substitute discontinued medications. Among the factors that may have led to this inappropriate medication storage and use practices are 'doctor shopping' where patients visited different doctors for the same complaint (16) and/or obtained similar medications without knowing or realising it due to misleading labelling (17). Similar findings on medication-use habits of patients were reported by other researchers (18, 19), who suggested that approaches involving patient educations may reduce

such inappropriate use of medications leading to improved patient safety.

Twenty percent of DRPs were related to inadequate treatment whereby participants were living with untreated symptoms. Participants reported that those symptoms were not discussed with the doctor at the clinic. There could be several possible reasons attributing to these unreported indications including limited available time for the consultation during clinic appointment (20) and/or age-related forgetfulness common among older adults (21). The HMR, therefore, provided the participant with an additional opportunity to have previously unaddressed symptoms seen to, in an unintimidating environment. Older persons may also withhold information from their doctors as they perceived these symptoms as mild and did not want to trouble the doctor who appeared busy, or they were embarrassed to mention it (22). Having a trained professional who is not a doctor may help overcome some of the difficulties for a number of older adults who are "afraid of doctors".

Those who were not taking the drugs prescribed to them did so either due to unavailability of the drug at the hospital's pharmacy, inability to purchase, disapproval of the taste of the preparation, or unhappy for switching to another alternative drug by the prescribing doctor. Older adults with polypharmacy often tend to prioritise medications either by considering them unnecessary due to unavailability or denial of illness or due to their perceived effects, unpleasant characteristics or financial limitations (23, 24). It is well-established that compliance is affected by the availability and affordability of medicines. Due to our hierarchical society, the older adults or their family caregiver may be afraid to challenge a doctor who had overlooked verification that the older adults or their adult children could afford the prescribed drug. An additional review process will help to identify these issues that would otherwise be easily overlooked, and the older persons labelled non-compliant without identifying the real reason. The lack of available stock in public hospital pharmacies is common but can be an issue with any pharmacy or doctor's clinic, as it is impossible to ensure that stocking is always able to predict needs. Furthermore, the study site is considered a government entity where it is a teaching hospital under the purview of the Ministry of Education and is assigned to an allocation from the health expenditure of the Federal budget apart from the Ministry of Health. Treatment is only partially subsidized, but payments are often not honoured as older persons, in particular, have no health insurance and adult children of older persons have often encountered financial difficulties from their parents' medical treatment. Stocks in public pharmacies are sometimes disrupted as the hospital can only afford to stock a limited amount of drugs due to cash flow issues.

In contrast to participants not taking their prescribed medicines, others were found to self-medicate or who consumed a large number of unwarranted supplements suggested by acquaintances. Other studies have also

found that the use of supplements and traditional Chinese medicine is a popular practice amongst the Malaysian population (25, 26) which may contribute to adverse patient outcomes. A regular medication review can help to highlight inappropriate drug-use practices and might be helpful to report untreated symptoms thus improving patient's quality of life in general.

The majority of previous studies focused on the prescribing aspect in the identification of DRPs by using explicit tools e.g. the BEERS, START/STOPP, STOPP II criteria, and medication appropriateness index (MAI) (9, 27-30). However, those tools only provide a superficial analysis of the prescribed medications. In this study, pharmacists conducted a comprehensive review of all medications being used and stored at patients' homes which lead to a very rich understanding of DRPs faced by older persons living in the community.

The low response rate of 56.6 % is one of the limitations of our study. We believe this low response rate is partly attributable to the low awareness on HMR and its benefits among Malaysians which is a common finding in developing countries as reported previously (31). Additionally, the sample size appeared small in this study, but it is justified given the exploratory nature of the study and the fact that HMR are time-consuming. In order to get a clearer picture, HMR can be conducted on a larger scale to determine the association between DRPs and different patient characteristics to highlight problems arising due to disparities in prescription drug used among different patients (31). This would however require more resource allocation in terms of longer study duration, a greater number of pharmacist involvements and a higher cost to cover for pharmacists' service and transportation to patients' homes. Despite the small sample size, the problems highlighted in this study corresponded to the general problems pertaining to old age and medication use practices among older adults that served to provide preliminary information required to develop an appropriate intervention in the future.

Conclusion

This study highlights some of the common DRPs faced by community-dwelling older persons with polypharmacy. The volume of issues identified in this study evaluated to a median of six DRPs per participant. This suggests that older Malaysians often experience DRPs and that HMR in our older population is likely to yield a great wealth of issues. HMR is an appropriate approach to highlight patient-related aspects of medication used and may help to render patient-centred solution to the problems. The findings of this study will help to contribute to a larger intervention study to evaluate the effects of HMR on patient outcome, cost implications, and overall healthcare utilization.

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Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical clearance

Ethical approval was obtained from the Medical Research Ethics Committee of University Malaya Medical Centre (Ref. No. 201922-7094, Date 25/02/2019). Written informed consent was obtained from all participants of the study.

References

1. Macrotrends. Malaysia life expectancy 1950-2020. 2019. Available at: <https://www.macrotrends.net/countries/MYS/malaysia/life-expectancy>. Accessed 2 June 2020.
2. United Nations. World population prospects: The 2015 revision. United Nations Econ Soc Aff. 2015;33(2):1-66.
3. Tey NP, Siraj S, Kamaruzzaman SB, Chin AV, Tan MP, Sinnappan GS, *et al.* Aging in multi-ethnic Malaysia. *Gerontologist*. 2015;56(4):603-9.
4. Bushardt RL, Massey EB, Simpson TW, Ariail JC, Simpson KN. Polypharmacy: misleading, but manageable. *Clin Interv Aging*. 2008;3(2):383-9.
5. Hilmer S, Gnjjidic D. The effects of polypharmacy in older adults. *Clin Pharmacol Ther*. 2009;85(1):86-8.
6. Zou D, Tannenbaum C. Educational needs, practice patterns and quality indicators to improve geriatric pharmacy care. *CPJ*. 2014;147(2):110-7.
7. Pharmaceutical Care Network Europe. The PCNE Classification V 9.0. 2019. Available at: <https://www.pcne.org/working-groups/2/drug-related-problem-classification>. Accessed 2 June 2020.
8. Karuppanan M, Nee TK, Ali SM, Thong WK, Boardman H. The prevalence of adverse drug event-related admissions at a local hospital in Malaysia. *APP*. 2013;4(4):160-7.
9. Lim LM, McStea M, Chung WW, Azmi NN, Aziz SAA, Alwi S, *et al.* Prevalence, risk factors and health outcomes associated with polypharmacy among urban community-dwelling older adults in multi-ethnic Malaysia. *PLoS One*. 2017;12(3):e0173466.
10. Hasan SS, Kow CS, Verma RK, Ahmed SI, Mittal P, Chong DW. An evaluation of medication appropriateness and frailty among residents of aged care homes in Malaysia. *Medicine*. 2017;96(35):e7929.
11. Liew NY, Chong YY, Yeow SH, Kua KP, Saw PS, Lee SWH. Prevalence of potentially inappropriate medications among geriatric residents in nursing care homes in Malaysia: a cross-sectional study. *Int J Clin Pharm*. 2019;41(4):895-902.
12. Ahmad A, Mast MR, Nijpels G, Elders PJ, Dekker JM, Hugtenburg JG. Identification of drug-related problems of elderly patients discharged from hospital. *Patient Prefer Adherence*. 2014;8:155-65.
13. Sorensen L, Stokes JA, Purdie DM, Woodward M, Elliott R, Roberts MS. Medication reviews in the community: results of a randomized, controlled effectiveness trial. *Br J Clin Pharmacol*. 2004;58(6):648-64.
14. Blenkinsopp A, Bond C, Raynor DK. Medication reviews. *Br J Clin Pharmacol*. 2012;74(4):573-80.
15. Jimmy B, Jose J. Patient medication adherence: measures in daily practice. *Oman Med J*. 2011;26(3):155-9.
16. Worley J, Hall JM. Doctor shopping: a concept analysis. *Res Theory Nurs Pract*. 2012;26(4):262-78.
17. Bryan R, Aronson JK, Williams A, Jordan S. The problem of look-alike, sound-alike (LASA) name errors: drivers and solutions. *Br J Clin Pharmacol*. 2021;87(2):386-94.
18. Gürman M, Demirdamar R, Basgut B. The Research and Evaluation of Drug-use Habits of People in North Cyprus. *Eurasia J Math Sci Technol Educ*. 2017;13(3):791-801.
19. Seehusen DA, Edwards J. Patient practices and beliefs concerning disposal of medications. *J Am Board Fam Med*. 2006;19(6):542-7.
20. Doval HC, Borracci RA, Darú VD, Giorgi MA, Samarelli M. Perception of consultation length in cardiology and its ethical implications. *Rev Panam Salud Publica*. 2008;24:31-5.
21. Carlsen KH, Carlsen KM, Serup J. Non-attendance, predictors and interventions. In: Davis S, ed. *Adherence in Dermatology*. Adis, Cham. 2016:29-35.
22. White L, Klinner C, Carter S. Consumer perspectives of the Australian Home Medicines Review Program: benefits and barriers. *Res Social Adm Pharm*. 2012;8(1):4-16.
23. Rifkin DE, Laws MB, Rao M, Balakrishnan V, Sarnak MJ, Wilson IB. Medication adherence behavior and priorities among older adults with CKD: a semistructured interview study. *Am J Kidney Dis*. 2010;56(3):439-46.
24. Chandra IS, Kumar KL, Reddy MP, Reddy CMPK. Attitudes toward medication and reasons for non-compliance in patients with schizophrenia. *Indian J Psychol Med*. 2014;36(3):294-8.
25. Othman CN, Farooqui M. Traditional and complementary medicine. *Procedia Soc Behav Sci*. 2015;170:262-71.
26. Ting CY, Lee KS, Tan RTH, Ang WC, Ming LC. An Exploratory Study on the Consumers Use of Medicine in the State of Sarawak, Malaysia. *J Young Pharm*. 2016;8(4):477-82.
27. Chen TF. Pharmacist-Led Home Medicines Review and Residential Medication Management Review: The Australian Model. *Drugs Aging*. 2016;33(3):199-204.
28. Hasan SS, Kow CS, Verma RK, Ahmed SI, Mittal P, Chong DW. An evaluation of medication appropriateness and frailty among residents of aged care homes in Malaysia: A cross-sectional study. *Medicine*. 2017;96(35):431-9.

29. Papastergiou J, Zervas J, Li W, Rajan A. Home medication reviews by community pharmacists: reaching out to homebound patients. *CPJ*. 2013;146(3):139-42.
30. Verdoorn S, Kwint H, Hoogland P, Gussekloo J, Bouvy M. Drug-related problems identified during medication review before and after the introduction of a clinical decision support system. *J Clin Pharm Ther*. 2018;43(2):224-31.
31. Morgan S, Hanley G, Cunningham C, Quan H. Ethnic differences in the use of prescription drugs: a cross-sectional analysis of linked survey and administrative data. *Open Med*. 2011;5(2):87-92.