Research in Social and Administrative Pharmacy 19 (2023) 1520–1530

Contents lists available at ScienceDirect

Research in Social and Administrative Pharmacy

journal homepage: www.elsevier.com/locate/rsap

Medication use problems and factors affecting older adults in primary healthcare

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ARTICLE INFO

Keywords:
Challenges
Community pharmacies
Issues
Health clinics
Services

ABSTRACT

Background: As the largest demographic group utilizing primary healthcare facilities, older adults often face the challenge of managing multiple chronic illnesses, leading to numerous medications.
Objective: The present study aims to assess medication use problems among older adults and explore the factors affecting them in primary healthcare settings.
Methods: A mixed-method study was conducted to establish a baseline understanding of the perspectives and challenges faced by older adults, with regards to medication use. Translated Medication Use Questionnaire (MedUseQ), a patient-centered tool, was distributed to older adults above 60 in primary healthcare settings to assess their frequency of problems related to medication use. Fifteen semi-structured interviews were conducted to explore this topic in depth. Descriptive and inferential analyses were conducted with quantitative data. Interviews were transcribed verbatim, and thematic analysis was conducted. Quantitative and qualitative findings data were triangulated.
Results: The study involved 393 participants. The most common problems with regards to medication use were polypharmacy (55.4%), administration difficulties (48.4%), limited awareness about adverse drug events (47.3%), issues with adherence (46.5%), and accessibility to primary healthcare (42.7%). Approximately 55% were satisfied with the older adult-centered medication use services by pharmacist and doctors. The qualitative findings showed that major factors affecting medication use were forgetfulness, language barriers, lack of awareness, transportation problems, long waiting times, and multiple visits to healthcare facilities.
Conclusion: The findings of this study reveal that a significant proportion, around 50%, of the older adult population face challenges with medication use in Penang. These difficulties mainly stem from medication administration, adherence, accessibility, polypharmacy, and inadequate medication knowledge. The qualitative analysis further highlighted several factors that contribute to such medication-related problems. Given the rapidly aging Association of Southeast Asian Nations (ASEAN) population, it is essential to devise effective solutions and strategies to tackle medication use-related issues among older adults.

1. Introduction

Older adults now represent a significant proportion of the overall population in many countries and regions worldwide.[1] Population ageing is also a major demographic trend among Southeast Asian countries; 37% of the world's older population lives in this region.[1] The increasing longevity among the older adult population is associated with greater morbidity and mortality. Malaysia, a Southeast Asian nation of

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https://doi.org/10.1016/j.sapharm.2023.08.001
Received 14 May 2023; Received in revised form 1 August 2023; Accepted 8 August 2023
Available online 9 August 2023

approximately 32 million people, officially became an ageing country recently, with older adults above 60 representing 7.0% (2.3 million) of the total population.[2] This number is predicted to reach up to 17.6% of the population by 2040.[3]

The increasing older adult population has overstretched the primary healthcare system, which is already struggling to meet the increasing demand for clinical care and medicines in the community. The Malaysian healthcare system is a combination of public and private healthcare services. The public healthcare system is funded by the government through taxpayers' money and offers healthcare services at heavily subsidized or completely free of cost. On the other hand, private healthcare is funded through out-of-pocket payments or private health insurance. The healthcare system includes primary, secondary, and tertiary care. Primary care is the first point of care for older adults living in the community. Primary healthcare comprises healthcare services provided by doctors, nurses, midwives, and allied health professionals such as medical assistants, pharmacists, dieticians, occupational therapists, and psychologists.[4] The percentage of older adults visiting primary healthcare is notably higher than other age groups, which is approximately 40%.[5] The primary healthcare system has the central role in coordinating care for older adults living with various health conditions and in helping them with appropriate medication use. Several studies have reported that Malaysian older adults have difficulties adhering and administrating medications.[6,7] Recent study provided evidence that polypharmacy issues still affected 51% of older adults in a primary care setting.[8] There is a need to integrate medication management into the care of older adults in primary care settings.[9] Therefore, proper utilization of medicines for older adults needs to be an integral part of older adults' primary healthcare. In Malaysia, the public health system remains the main provider of primary healthcare for older adults. According to the National Health and Morbidity Survey (NHMS) 2019, almost 60% of older adults visit public health clinics and outpatients where treatment and medications are heavily subsidized by the government.[10] While tertiary healthcare settings were given more importance in Malaysia, several significant strategies were recently initiated in primary healthcare. Various services such as preventive care, health education, basic healthcare and medicines, reproductive care services, and immunization were being catered to by public and private primary healthcare. However, the difference lies significant in terms of cost, where the public sectors provide free services, while the private sector charges cost to the public.[11,12] Increase and prolonged hospitalization rates were linked to older adults with their improper medication use.[13,14]

Older adults often face various problems with using their medication, such as polypharmacy, non-adherence to medication, adverse effects, and complex medication regimens, all of which highlight the need for regular medication reviews and deprescribing.[6,15–18] Several studies have described these problems by investigating older adults' challenges and their perspectives on medication use.[19–21]

Medication use problems among older adults are complex and in-depth exploration is needed to assess the problems and factors affecting them. While there have been various quantitative studies on medication use among older adults in Malaysia, qualitative data exploring medication use-related problems in depth is limited. Some of the practical problems faced by older adults include difficulty in physically accessing their medications and differentiating between the various medicines they consume, potentially leading to poor medication adherence.[6,22] Additionally, older adults often struggle to understand the instructions on medication labels, with up to 75% unable to differentiate between generic and brand names.[22] While previous studies have identified practical problems such as medication management, problems with adherence, belief systems affecting medication administration, and awareness issues, there is still a lack of studies exploring the full range of issues related to medication use, particularly focusing on accessibility, polypharmacy, knowledge, and satisfaction, from the perspective of older adults.[6,22] Furthermore, there is a dearth of qualitative data on medication use-related problems among older Malaysians. Since the proportion of older adults is high in the northern state of Malaysia, Penang, hence this study was conducted to assess issues related to medication use problems and explore the perspectives of older adults on factors affecting medication use, particularly in primary healthcare settings.

2. Methods

2.1. Study design

A convergent parallel mixed method approach was adopted, and the findings were triangulated during the interpretation stage to evaluate the older adults' medication use problems and explore their perspectives in depth.[23,24] A cross-sectional study and a semi-structured interview with older adults visiting primary healthcare settings were conducted. The study was done between January to May 2022. Ethics This study obtained ethical approval from the Malaysian Research Ethical Committee (MREC), NMRR-20-3136-56763.

2.2. Study setting

The study was conducted in Penang, a northern state in Malaysia. This state has the highest population density at 1688/km2 in Malaysia, with a population of approximately 1.8 million and significant proportions of older adults, compromising 14.9% of the total population.[25] The proportions of Malay (45.0%) and Chinese (44.7%), which are the most significant communities in Penang, are remarkably similar, and the rest of the state's population was made up of 9.7% Indians and 0.6% others.[25] Moreover, the proportion of older adults in Penang is higher than in other states in Malaysia.[26] Penang has five main districts; thus, a quota proportion was maintained from each district (80 each) to represent the entire state of Penang. Ethnicity proportion was also applied to project the actual population characteristics of Penang, where the ethnic Chinese population have similar demographics to the ethnic Malay population.

2.3. Study participants

The sample size required for the survey questionnaire was 384 (calculated using the formula by the Raosoft calculator, based on the prevalence of the older population in Penang with a confidence interval of 95% and a margin of error of 5%).[27] Dropout rates were estimated at 20%, and 461 participants were approached for the survey questionnaire. For the qualitative study, interviews were conducted until data saturation was achieved, with fifteen participants interviewed.

2.4. Sampling method

The sampling frame has been identified from primary healthcare settings, which are the first point of care for older adults. Participants from primary healthcare facilities, i.e., community pharmacies and private and public health clinics in Penang, Malaysia, were invited to participate in the study. Inclusion criteria were (1) Participants aged above 60 years(the cut-off age adopted by the United Nations (UN)[28]; (2) Participants being able to converse, read and understand the Malay language or English language. For the survey questionnaire, convenience sampling with quota proportion was used as the sampling method. Data were from clinics and pharmacies with a high proportion of older adults' visits (facilities which were advised by chief pharmacists of public health clinics and community pharmacies and general practitioners of both public and private health clinics). In the semi-structured interviews, participants were purposively selected to represent diverse sociodemographic backgrounds. In addition, snowball sampling was utilized by getting participants' recommendations at the end of the interviews.

2.5. Study tool

2.5.1. Quantitative

A questionnaire was adapted, translated and modified from the Medication Use Questionnaire (MedUseQ) to assess medication use among older adults in Penang.[29] This tool was chosen because it was a patient-centered tool targeting older adults that can be used to assess a wide range of medication use problems. The key domains in the questionnaire focus on challenges that older adults face regarding medication use, i.e., medication adherence, medication administration, accessibility, polypharmacy, satisfaction, and knowledge of their medications. In this study, polypharmacy was defined as having multiple medications, which is more than five and excessive polypharmacy means more than ten.[30,31] This includes prescription medications, over-the-counter and complementary medications. Demographics of each participant, including household income, were collected. In Malaysia, household income is divided into three categories which are Bottom 40% (B40), Middle 40% (M40) and Top 20% (T20). B40 is defined as having income of MYR 4850 and below, while M40 is MYR4851-MYR10970, and T20 is defined as having more than MYR10971 per month.[32]

2.5.2. Qualitative

An interview guide was developed to assess older adults' perspectives and challenges in depth. The interview guide was subsequently piloted with five participants to assess the comprehensiveness of the questions. Pilot findings showed that the interview guide was easy to understand, comprehensively assessed medication use problems and explored older adults' perspectives. The validated interview guide included questions on accessibility, medication administration, medication adherence, polypharmacy, adverse drug events, medication knowledge, and satisfaction levels.

2.6. Data collection

Permission was obtained from each facility before collecting patient data for the quantitative study. The survey was administered via Qualtrics online and distributed to older adult communities through various organizations and leaflets with QR scan codes. Surveys were conducted in-person, over the phone, or face-to-face for those who had difficulty with the online survey. For the qualitative study, participants were asked for consent to record the interview and were assured confidentiality. Interviews were conducted via various platforms, and audio was recorded using the iPhone app (VoiceMemos).

2.7. Data analysis

The quantitative analysis was performed using IBM SPSS Statistics version 26.0 (IBM Corp, Armonk, NY), including descriptive statistics to assess participants' characteristics and medication use problems reported as percentage and frequency. Nonparametric data analyses were conducted due to non-normal distribution. The median frequency of each medication use domain, i.e. medication administration, medication adherence, polypharmacy and accessibility, knowledge of medication use and satisfaction among older adults, was calculated to compare the domains. Further inferential analysis was done with the Chi-square test of independence to examine the association between demographics. Mann-Whitney and Kruskal Wallis tests were conducted to analyze the differences between demographic groups on the continuous dependent variable. Pairwise comparisons using the Bonferroni approach were executed to compare groupings based on their perceived preference difference. Finally, ordinal regression methods were executed to determine the predictor contributing to medication use problems among older adults with a 95% confidence interval.

A thematic analytical approach was used for each in-depth interview. This approach provided a systematic generation of codes and themes and a flexible analysis process.[33] Transcription was conducted by one author and checked for validity by another academic author. Emergent sub-themes were grouped and assigned to themes. Reliability and trustworthiness were ensured by repeated reviews and discussions of sub-themes by all researchers. Nvivo 12 was used to assist with organizing the data for analysis.[34]

3. Results

3.1. Quantitative

A final sample size of 393 was obtained, with a response rate about 89%. Overall 78.9% of the study participants were in the 60–70 age group. The majority of the study participants belonged to the ethnic Chinese group. Almost 72% of participants have either a secondary or tertiary level of education. Among the study participants, 28.8% (n = 113) of older adults had insurance, and 24.9%(n = 98) had healthcare treatment and medication expenses. Government clinics were the most frequently visited primary care facilities (64.6%, n = 321), followed by

Table 1
Demographic profile of questionnaire responded participants.

Demographic variable	Number (Percentage, %)
Sex	
Male	201 (51.1)
Female	192 (48.9)
Age (66.48 ± 5.74) [a]	
60–65	204 (51.9)
66–70	106 (27.0)
71–75	47 (12.0)
76–80	27 (6.9)
Above 80	9 (2.3)
Ethnicity	
Malay	143 (36.4)
Chinese	200 (50.9)
Indian	49 (12.5)
Others	1 (0.3)
Education level	
No formal education	28 (7.1)
Primary	82 (20.9)
Secondary	202 (51.4)
Tertiary	81 (20.6)
Living arrangement	
Alone	49 (12.5)
Aged/Nursing home	7 (1.8)
Family	337 (85.8)
Living income source	
Working	90 (22.9)
Pension	117 (29.8)
EPF/Retired fund	57 (14.5)
Social welfare support	12 (3.8)
Family support	114 (29.0)
Household income	
B40 (Less than MYR4850)	264 (67.2)
M40 (MYR4851-MYR10970)	112 (28.5)
T20 (More than MYR10971)	17 (4.3)
Do you have health insurance?	
Yes	113 (28.8)
No	280 (71.2)
Do you spend on healthcare monthly?	
Yes	98 (24.9)
No	295 (75.1)
Average	MYR 280 (MYR50-MYR4000)
Number of medications	
1–3	223 (56.7)
4–6	130 (33.1)
7–10	32 (8.1)
More than 10	8 (2.0)
Primary care visitation	
Government health clinics	321 (64.6)
Private clinics	64 (12.9)
Community Pharmacies	112 (22.5)

[a] Age (Mean with Standard deviation).

community pharmacies (22.5%, n = 112) and private clinics (12.9%, n = 64) (Table 1).

3.1.1. Medication use problems

Medication use problems that were assessed in this study were administration, adherence, accessibility, and polypharmacy. As for medication adherence and administration, the probable interesting findings that were found are that 44% (n = 174) of older adults skip their medication, thinking it is not working for them and approximately 60% (n = 204) of the older adult participants had difficulties administering it when there was a change of colour, shape and size of medications. In terms of accessibility, 15.5%, n=(61) of study participants, did not have easy access to obtain their medication information from primary healthcare providers. Focusing on polypharmacy, 62.3%(n = 245) of older adults felt they had many medications. Medication use problem frequencies are described in detail in Appendix 1.

3.1.2. Knowledge level of older adults

Questions assessing knowledge level reported that 93.6% (n = 368) of older adults knew the right time, dose, and indication of their medications. Surprisingly, only almost half of older adults, 52.7%(n = 207), were aware of the side effects of their medications. However, one-third of participants (33.6%, n = 132) confirmed not knowing about adverse effects. The findings indicated a lack of knowledge of the side effects of medications among older adults. Further details are reported in Appendix 2.

3.1.3. Satisfaction of older adults

As for government health clinics, almost three-quarters of older adults (n = 273) were satisfied with the medication use services, followed by community pharmacies and private clinics. Dissatisfaction rates were reported with less than 5% towards private clinics (n = 15) and community pharmacies (n = 13). Government health clinics' dissatisfaction rates were 5.8% (n = 23), and the presented reasons were long waiting times, no proper instructions and care, and no medication review. The details are in Appendix 3.

3.1.4. Differences in medication use problems, satisfaction levels and knowledge based on various sociodemographic factors

Table 2 shows the differences between groups for medication use problems, satisfaction levels and knowledge variables. Ethnicity, living arrangements, income levels and educational levels were found to be associated with medication-related problems. Follow-up tests were conducted to evaluate the pairwise comparison differences among the four ethnic groups ($X^2 = 51.834$, p = .009), controlling for type 1 error across tests using the Bonferroni approach. The results of these tests indicate a significant difference between Chinese and Indians. Median (Md) medication administration frequency scores were significantly higher (Md = 5) in Chinese than in Indians (Md = 4), which shows that medication administration problems among Indians were significantly different compared to Chinese older adults. Accessibility problems were significantly better (Md = 4) in Chinese participants than in Malays (Md = 3.5), reflecting that Malay older adults had more difficulty accessing their medication use services at primary care. As for living arrangements, medication administration frequency scores were significantly higher (Md = 5) in older adults staying with family than in aged/nursing homes (Md = 4).

For the level of income groups, pairwise comparison differences in satisfaction scores were significant between the B40 groups and with M40 and T20 groups. ($X^2 = -30.133$, $p = .030$); ($X^2 = -69.783$, $p = .022$) controlling for type 1 error across tests using the Bonferroni approach. T20 groups had higher satisfaction scores (Md = 12) than other income-level groups.

3.1.5. Predictors of medication use, knowledge and satisfaction

A cumulative odds ordinal logistic regression with proportional odds

Table 2
Kruskel-Wallis showing the difference between groups.

Demographic variable	Medication administration		Medication adherence		Polypharmacy		Accessibility		Satisfaction		Knowledge	
	Md	Chiquare,X^2(degree of freedom) p value	Md	X^2 p value	Md	X^2 p value	Md	X^2 p value	Md	X^2 p value	Md	X^2 p value
Ethnicity												
Malay	5	10.544 (3), $p = .014$*	5	4.420 (3), $p =$	4	6.543 (3), p	3.5	12.250 (3), p	3	1.392 (3),	4	8.860 (3) $p =$
Chinese	5		5	.220 (NS)	4	= .088	4	= .007*	4	p=.707	4	.031*
Indian	4		4		4		3.5		4		3	
Other	4		4		5		3.5		3		4	
Level of education												
No formal education	4	22.407 (3) $p < .001$*	4	17.623 (3) $p <$ .001*	4	16.778 (3) p = .079	3.3	6.120 (3) $p =$ .106	3	3.858 (3) $p =$ .277	3	17.016 (3) p = .001*
Primary	4		4		4		3.5		3		3	
Secondary	5		5		4		4		4		4	
Tertiary	5		5		4		3.5		4		4	
Living arrangements												
Alone	4	16.165 (2) p < .001*	4	6.432 (2) $p =$	4	3.356 (2) p	3.5	3.516 (2) $p =$	3	3.661 (2) $p =$	3	3.452(2) $p =$
Aged/Nursing homes	4		4	.040*	4	= .187	4.5	.172	3	.160	3	.178
Family	5		5		4		3.5		4		4	
Source of income												
Working	4	5.749 (4) $p = .219$	5	1.723 (4) $p =$	4	0.549 (4) p	3.5	2.972 (4) $p =$	4	4.348 (4) $p =$	4	4.469 (4) $p =$
Pension	5		5	.787	4	= .969	3.5	.563	4	.361	4	.346
EPF/Retired fund	5		5		4		4		4		4	
Social welfare	4		4		4		3.5		3		3	
Family support	5		5		4		3.5		3		3	
Level of income group												
B40	5	0.634 (2) $p = .728$	5	1.049 (2) $p =$	4	2.457 (2) p	3.5	2.294 (2) $p =$	3	12.192 (2) p	3.5	1.372(2) $p =$
M40	5		5	.592	4	= .293	4	.318	4	= .002*	4	.504
T20	5		5		5		3.5		4		4	
Number of medications												
1–3	5	5.417 (3) $p = .144$	5	1.158 (3) $p =$	4	4.624 (3) p	3.5	0.883 (3) $p =$	3	2.261 (3) $p =$	4	3.975 (3) $p =$
4–7	4		5	.763	4	= .202	3.5	.830	4	.520	3	.264
7–10	5		5		4		3.5		3.5		4	
>10	4.5		4.5		4		3.5		4		3	

was run to determine the effect of demographic profiles on medication administration domains. Older adults staying alone had a statistically significant effect on the prediction of whether medication administration problems were in higher frequency, $\chi^2(2) = 6.608$, $p = .010$. The odds of older adults staying alone and having a higher frequency of medication administration problems was 0.447, 95% CI [0.242, 0.826] times that of older adults staying with family.

Subsequently, older adults without monthly healthcare expenses exhibited a higher likelihood of experiencing fewer polypharmacy issues [2.071 (95% CI, 1.306–3.286)] compared to their counterparts with such expenses, $\chi^2(1) = 9.567$, $p = .002$. To determine the effect of demographics on the frequency of accessibility problems among older adults, proportional odds were assessed by a full likelihood ratio test comparing the fitted model to a model with varying location parameters, $\chi^2(8) = 43.300$, $p = .132$. The odds of Chinese older adults having less accessibility problems were 2.439 (95% CI, 1.008, 5.904) compared to other ethnicities. Since the assumption of proportional odds was not met for satisfaction outcomes, multinomial regression was run, and findings predicted that an increase in scores of knowledge level was associated with an increase in the odds of satisfaction with medication use services in primary care, with an odds ratio of 0.348, 95% CI [0.210, 0.579], Wald $\chi^2(1) = 16.552$, $p < .001$.

3.2. Qualitative findings

A total of 15 older adults were interviewed. The demographics of participants are summarised in Table 3. Six themes were derived from thematic analysis. (1) Medication administration challenges among older adults; (2) Factors that affecting medication adherence; (3) Reasons of polypharmacy; (4) Accessible primary healthcare with needed refined improvement; (5) Limited awareness about adverse drug reactions and knowledge perception of older adults; (6) Factors affecting satisfaction with primary healthcare medication use services and facilities (Appendix 4).

3.2.1. Theme 1 medication administration challenges among older adults

This theme incorporates the challenges faced by participants while using medications. A few participants mentioned physical difficulties as a barrier to effective medication administration. The participants faced difficulties opening medication containers and pressing the canister due to their weak hands and vision problems. Also, administering half-strength medication, which requires cutting the tablet, has been challenging for some participants. Improper medication administration results in poor adherence.

So my hands are weak, and using the ventilator spray is difficult. (P8)

It is essential for them to obtain the right instructions on medication administration. Some participants commented that inadequate communication between them and healthcare providers led to improper medication administration techniques. Moreover, there is a lack of follow-up counselling, especially with many medications and devices.

No special care. The only time that I wanted when the doctor wrote the nasal spray, there was the pharmacist who did counselling to teach you how to use the nasal spray. So once after that, they do not teach already counselling, only the first time. (P6)

The language barrier is another interesting point being reflected by participants. One participant suggested placing the pharmacist at the front with the ability to converse in good command of English and Malay. Nevertheless, multi-lingual pharmacists will benefit older adults who can only speak their mother tongue. Support from family and friends was found to impact medication administration about the correct device technique positively and taking medications correctly. Furthermore, most participants pointed out that families or friends will often accompany them when getting their treatment and medication.

Table 3
Demographic profile of interviewed participants.

Demographic variable	Number (Percentage, %)
Sex	
Male	9 (60.0)
Female	6 (40.0)
Age	
60–64	3 (20.0)
65–70	7 (46.7)
71–75	4 (26.7)
76–80	1 (0.6)
Ethnicity	
Malay	4 (26.7)
Chinese	2 (13.3)
Indian	7 (46.7)
Others	2 (13.3)
Education level	
Primary	1 (0.6)
Secondary	11(73.3)
Tertiary	3 (20.0)
Living arrangement	
Alone	4 (12.5)
Family	11 (85.8)
Socio-economy	
Working	4(12.5)
Pension	2 (13.3)
EPF/Retired fund	3 (20.0)
Social welfare support	1 (0.6)
Family support	5(29.0)
Do you have health insurance?	
Yes	5 (33.3)
No	10 (66.7)
Do you spend on healthcare monthly?	
None	5 (33.3)
Yes (Mean ± SD)	6 (66.7)MYR350.5 ± 265.3
Number of medications	
1–3	6 (40.0)
4–6	5 (33.3)
7–10	3 (20.0)
More than 10	1 (0.6)
Primary care visitation	
Government health clinics	13 (48.1)
Private clinics	4 (14.8)
Community Pharmacies	10 (37.0)

SD: Standard deviation.

Last time my husband takes me, but now I depend on my daughter and brother-in-law. (P6)

However, a handful of participants claimed that they lack family support and manage their medications independently, leading to further difficulties managing medications.

3.2.2. Factors that affecting medication adherence

Within this theme, participants reported on factors affecting their medication adherence. A self-reported decline in cognitive abilities was the most common, resulting in forgetting to take medications on time.

Sometimes forget, but mostly I remember my medicines but now i reduce my medicine. I've lost lots of weight because no appetite. So i lessen medicine because my sugar is 5. (P12)

Long waiting times to be seen by doctors and for medication collection were viewed as barriers to medication adherence. The maximum waiting time was associated with public health clinics accommodating many patients. One participant mentioned that the waiting time often peaks when there are many patients, resulting in some of them buying their prescription medication from community pharmacies.

I think if less people, about one hour, more people, maybe one hour plus two. (P5)

Financial constraints were another factor that had an impact on medication adherence. Participants pointed out that medication sold at private facilities was expensive, and no subsidy or special privileges were given to older adults as senior citizens. Most older adults are unemployed and lack the financial ability to purchase medications, resulting in poor medication adherence. Some participants suggested that government and private healthcare centres should make medications available at affordable prices at community pharmacies, and private clinics, especially for older adults, to enable high medication adherence.

Physical difficulties in administrating medications, as mentioned in theme one, often reduce medication adherence among older adults. Helpful strategies to improve medication adherence were pointed out by participants who self-reported their high adherence to their counterparts who could not cope. Recommendations identified include placing their medication at a place easily identified by older adults to consume on time. Furthermore, splitting the timing of medications and writing a reminder on a board was a favourite suggestion among them.

The medicine is for me; I put it on the table within my eyesight when I want to have breakfast, see the medicine. That is the way I do it. (P11)

3.2.3. Reasons of polypharmacy

Multiple visits to primary healthcare settings occur, often resulting in many prescription medications without any review. This action has developed fragmented healthcare among participants.

I collect medicine at a government clinic and pharmacy. (P7)

Participants with active health-seeking behaviour pointed out that they are taking health supplements together with their prescription medications. Most participants noted their reasons for taking supplements besides prescription medications, i.e. improving the immune system and overall health and being active. However, they also felt that supplements were not considered prescription medication and had concerns about the active ingredients. This also links to theme 5, which explores participants' knowledge of medications.

Because it is not a drug. I am a pre-diabetic and pre-pressure person. So instead of taking drugs, I prefer taking supplement if it does the same work. (P8)

3.2.4. Accessibility to primary healthcare services

The current themes explore participants' perspectives on accessibility issues to primary healthcare facilities, including transportation and mobility. Most participants noted that their primary care facilities were quickly accessible, but there was a lack of proper lanes and walking paths designated for older adults. They summarised that most primary healthcare facilities did not cater to patients with mobility restrictions.

Senior citizens must have a special counter for seniors who use walking aids for all services. (P10)

While most participants agreed that their healthcare facilities are easily accessible, two participants mentioned the weakness of the transportation system they encountered, as they lack reliable public transportation. Several recommendations were suggested by participants to enhance accessibility. One of the participants suggested having a 24-h retail pharmacy to accommodate the needs of older adults at all times and make it easy to be referred in case of a health emergency. Additionally, she added that more blood treatment tests should be initiated at the retail and prioritizing medication delivery for older adults would be beneficial in improving access to medications and health screening which could help enhance essential medications and health screening.

They should initiate the pressure, blood test cholesterol, a minor type of blood test or blood, and some medical exam examination. So I need not go so far. (P8)

3.2.5. Limited awareness regarding adverse drug reactions and perception of older adults about medications

This theme provides insights into the lack of knowledge on adverse drug reactions and perception of medications. Participants reported that their primary healthcare providers mostly do not enquire or educate them on adverse drug events or medications. In addition, one participant pointed out that he hesitated to take medication because of adverse events. This could lead to poor medication adherence.

I have constipation, gas problems, and flatulence with current medications. This flatulence is the one that I am always afraid of. (P7)

Regarding their perceptions about medications, a few participants have the idea that original brand medication improves their health outcomes better than generic medications. One participant suggested providing original-brand medication to senior citizens in public primary health clinics. A few participants agreed they had confidence in improving their health outcomes by consuming their medications. This was reflected in their high adherence to medications. On the other hand, some participants mentioned that they do not consume medication daily to avoid being addicted. Although older adults mostly relied on recommendations from family and friends for their medications, a handful of them used social media, i.e. newspaper, the internet and television, as their source for health information. It was noted that social media influenced participants aged below 70.

3.2.6. Factors affecting satisfaction with primary healthcare medication use services and facilities

This theme examines factors affecting satisfaction levels and their relationship with medication use. From the interviews, most of the participants were satisfied with the medication use services and facilities from primary healthcare facilities. They pointed out that fast service, friendly pharmacists, good advice from doctors and convenient location are reasons for satisfaction.

Oh, I tell you, fantastic. They wish good morning and goodbye, have a nice day, work properly and care for yourselves. These little things make an older person like me happy with my day. (P15)

Moreover, recommendations and advice from doctors or pharmacists seem to alleviate their concerns regarding medication usage. Particularly, information on medication administration instructions and storage of medications were the most cited advice they received.

No, it is always simple; community pharmacists always point out the expiry date, its last three months, so buying this amount is worthwhile. (P15)

Participants expect personalized treatment and counselling from doctors and pharmacists to obtain complete information regarding their disease and medications, which could lead to better health information.

3.3. Triangulation findings

The triangulation of both quantitative and qualitative findings is shown in Fig. 1.

Overall, the triangulation framework provides a comprehensive understanding of the issues faced by older adults in utilizing primary healthcare medication services. It has been challenging for older adults, as an average of 50% have polypharmacy issues when assessing primary healthcare facilities. The qualitative findings further reveal those older adults with mobility challenges encounter difficulties due to a lack of walking paths and inadequate support in healthcare settings. In addition, transportation issues have been noted as a challenge to collect

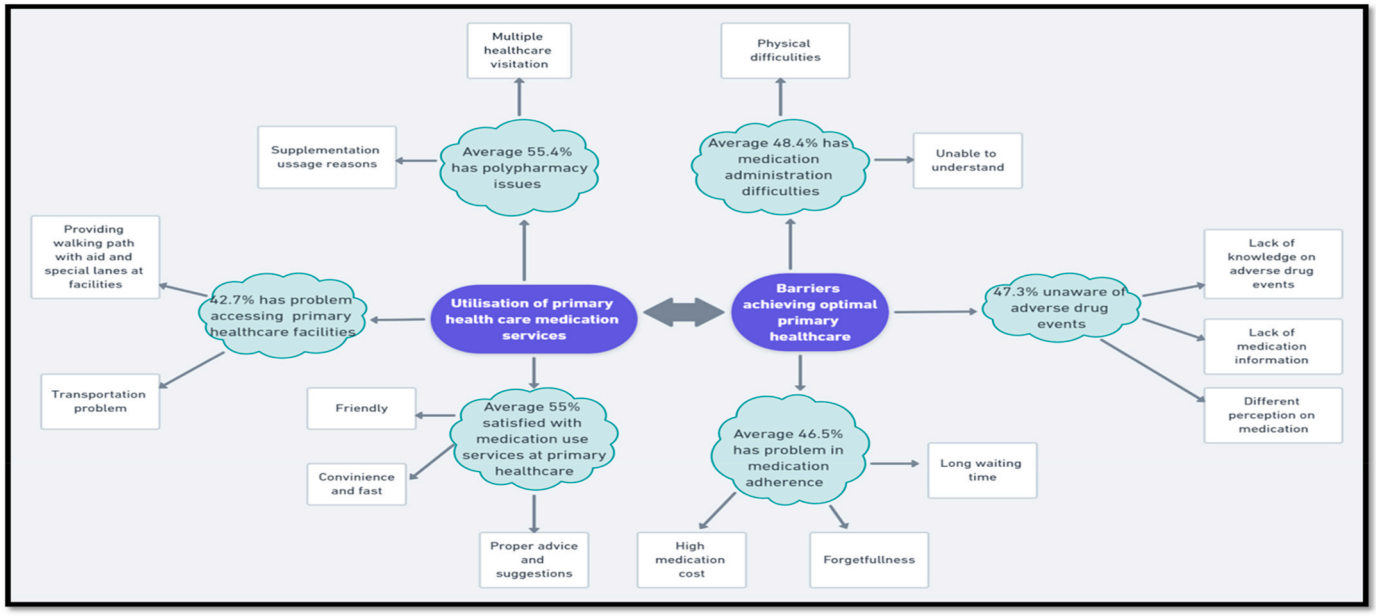

Fig. 1. Triangulation of quantitative and qualitative findings.

medications on time at the respective settings. As for the polypharmacy issue, the reasons were mainly supplementation usage and multiple healthcare visitations. The average satisfaction of 55% shows that most of the older adults were satisfied with the healthcare services, especially for medication use. Further exploration during the interview provided the reasons for the satisfaction, primarily because of the friendliness of the primary healthcare providers, fast services and proper advice and suggestions by the healthcare providers. However, notable barriers were achieving optimal primary health care among all the adults. The quantitative findings reported that almost 50% of medication administration difficulties are problems adhering to their medications and unaware of the adverse drug events. According to the qualitative exploration, physical challenges and difficulties in understanding instructions from healthcare providers were identified as the main reasons for medication administration. Factors such as high cost, forgetfulness, and long waiting hours at healthcare facilities also contribute to medication non-adherence. Participants also mentioned that the factors affecting their adverse drug events knowledge were mainly because of the unawareness of the knowledge on adverse events and different perceptions of knowledge on medications.

4. Discussion

To the best of current knowledge, this study represents the first mixed-methods study in Malaysia to offer an overview of older adults' perspectives and challenges with medication use in primary healthcare settings. Overall, this study showed that almost 50% of older adults have challenges with medication administration, medication adherence, accessibility, polypharmacy, knowledge about medication use and factors affecting medication use, such as forgetfulness, long waiting times, difficulties in medication administration, and perspectives and knowledge about medication use at the primary care level. Furthermore, potential suggestions for improving medication use among older adults and services at facilities were also brought up by participants. Previous studies have reported on the practical problems of medication use, highlighted the drug-related problems and prevalence of potentially inappropriate medications.[6,35,36] Similar mixed-method designs were adopted in a study exploring medication-related beliefs in older patients with polypharmacy. This current study was different from the previous studies, which helped contextualize older adults' experiences and perspectives regarding medication use problems, identify their priorities and provide potential recommendations to improve the quality of medication use in primary healthcare. This study is unique in the utilization of triangulated quantitative and qualitative findings to achieve the ideal medication use needs among older adults.

Few studies have been conducted in the neighboring countries of Malaysia. For example, in Thailand, potentially inappropriate medication, medication non-adherence, and adverse drug events were significant among older adults in primary healthcare.[37,38] The study mentioned that the factors affecting such adherence problems were polypharmacy and having multiple comorbidities.[37] Furthermore, it has been emphasized that educating older adults about their medications is crucial for improving adherence.[39] Similarly, the authors highlighted that polypharmacy and inappropriate prescribing remain major concern in older adults' primary healthcare in Indonesia.[40] However, all these studies conducted in the Asian region were only focused on one or two domains, such as polypharmacy or medication adherence in primary or tertiary healthcare. In contrast, the current study comprehensively assessed all the medication use problem, which includes medication adherence, administration, accessibility, polypharmacy, knowledge and satisfaction faced by older adults in primary healthcare settings in Malaysia.

The older population in Malaysia has multiple and complex health needs that require comprehensive care at the primary healthcare level. However, the optimization of geriatric services in Malaysia is not on par with other countries such as Australia.[4] Investigating medication use problems among older adults is crucial to inform healthcare providers and policymakers. Previous studies have examined the perspectives of older adults on medication adherence and administration.[41–44] The current study has successfully retrieved the factors affecting adherence to medication among older adults through a qualitative approach which is similar to other studies[45,46] In the current study, forgetfulness, long waiting times for medication collection, and medication costs are the most common reasons for poor medication adherence among older adults were shown, as supported by the previous study.[47] Additionally, this study found that older adults who live with family members exhibit better medication adherence and administration, which another study supported.[47]

As observed in previous studies, most older adults acknowledged that although primary healthcare facilities are accessible, they still need

much improvement, especially in transportation.[48,49] The accessibility of primary healthcare, specifically for medication access, has been a significant barrier among older adults due to disability, cognitive impairment, and transportation limitations.[50] According to Kelling[51] community pharmacists are the most accessible primary care professionals among older patients in the United States, while in contrast, this current study findings show that older adults have the highest access to public health clinics. This is probably because government-provided funds for public health clinics are free medications and treatments for older adults compared to private primary healthcare settings in Malaysia. Following that, the findings from the current study on access to primary care settings are consistent with the National Health and Morbidity Survey (NHMS) and supported by another study conducted in Malaysia, which revealed that older Chinese adults have better accessibility than other ethnicities.[10,52] This could be attributed to the higher number of older Chinese adults residing in urban areas compared to the number of Malays in rural areas, where primary healthcare facilities are limited.

It is clearly defined in other studies that polypharmacy is linked to advancing age.[53,54] More than half of the participants from this current study expressed concern about having multiple medications, which contrasts with Ong et al.[55] who reported that only 20% of older adults experience it. This could be probably because of including the age range of 60 and above and a smaller sample size compared to the previous study. Additionally, polypharmacy resulted in more medication expenses. Therefore, it has contributed to getting treatment and medications from multiple healthcare facilities. The reason could be due to comorbidities and various treatments they are getting.[56]A systematic review conducted in 2021 strongly corroborated the findings.[57] Therefore, this highlights the need to reduce polypharmacy issues among older adults by effectively collaborating between public and private primary healthcare settings.

The current study has shown that almost 50% of older adults were not aware of the adverse effects of their medications. That could lead to deleterious effects on ageing populations' health outcomes.[58] Community pharmacists could play a vital role in mediating the side effects of medications on older adults. Future focus to provide older adult-focused primary healthcare should focus on community pharmacies to educate older adults on adverse drug events.

Satisfaction with medication use services from primary care is vital in clinical research for assessing pharmaceutical care and improving interventions. Patient satisfaction is one of the essential factors in a healthcare facility's performance. Patient satisfaction has been found to be significantly associated with age, education, frequency of visits, self-perceived health status, and general health professional knowledge.[59] Higher satisfaction rates were reported towards public clinics particularly on medication use services in this study which is similar to other studies in developing countries.[60,61] This could lead to better medication management among the older adult population. Furthermore, current study findings show that having better knowledge and higher household income has contributed to high satisfaction among older adults with medication use services at primary care. From these current qualitative findings, participants reported getting health information from internet sources and primary healthcare providers, contributing to higher satisfaction levels. According to National Health and Morbidity Survey (NHMS) 2019, most of the higher household income group older adults visit private primary care facilities and thus, fast service and individualistic treatment could be a factor for the higher satisfaction level.[10]

Participants highlighted various perceptions of medication based on their knowledge, which affected their health-seeking behaviour. This could contribute to drug-supplement interactions, enhancing the disease's worsening progression Supplements were moderately consumed by older adults in Malaysia, consistent with other findings.[15] Most older adults take complementary medications because they believe they can promote their general well-being and independently live without depending on prescribed medications. Consistent with other studies, there was a misconception among older adults that original-brand medication works better than generic substitutes.[62,63] Such belief affects them psychologically and alters their pattern of medication use. There were suggestions by participants on the need for more pharmacists to cater to older adults' pharmaceutical care. Examples of recommended services included medication review services focusing on geriatrics and follow-up counselling. The findings were consistent with other studies.[64–67] Affordable medication at a subsidized cost should be given priority to older adults. Although most older adults get access to medication in public healthcare, where it is free, a significant proportion of older adults' purchase medications from private healthcare facilities to avoid long waiting times and fast individualized service. However, the out-of-pocket expense could result in poor adherence to medications.[68] Therefore, primary healthcare providers should be aware of the consequences of increasing medication costs and engage with public healthcare to subsidize the price for older adults. There should be a strategic formula from both public and private settings to solve the pressing high cost on the patient side.

4.1. Strengths and limitations

The current study has some strengths. Firstly, the study participants were from rural and urban areas, exploring perspectives from five districts within the primary care settings, i.e. public health clinics, private clinics and community pharmacies. Quota sampling used for recruiting participants from different ethnicities for the quantitative study was to be according to the population statistics in Penang state. The triangulation approach to determine the medication use problems has critically assessed the perspectives and challenges of older adults in primary care. However, there are a few limitations to this study. First, the study is limited to Penang state. Hence the findings of the study cannot be generalized to the older population in Malaysia. The quantitative survey questionnaire was only available in Malay and English form. Therefore, participants who were not proficient in both of these languages were not included in this study.

4.2. Study recommendations

Larger studies drawing on older participants from various states in Malaysia would be needed to affirm the conclusion and validate the findings of this study. Apart from highlighting various sociodemographic factors that affect medication use, the study has also provided an in-depth analysis of the different domains of medication use problems. These findings can serve as potential targets for the development of effective interventions for medication use problems among community-dwelling older adults.

4.3. Implications for research and practice

The current study has comprehensively explored the perspectives and challenges faced by older adults in primary healthcare settings regarding medication use. These outcomes could be assessed to conduct interventions such as medication review, medication delivery, patient education on adverse drug events and deprescribing to improve medication use among older adults in primary healthcare. Providing timely suggestions to local health authorities in primary care is essential to improve the services and prepare an age-friendly environment at primary health care facilities. Upliftment of the quality of life of the geriatric population by accommodating primary healthcare needs and promoting quality and preventive healthcare to maintain well-being would enable Malaysian healthcare reforms to be on par with the World Health Organisation's key policy issues and recommendations of the Sustainable Development Goals (SDG), as mentioned in the 2030 Agenda for Sustainable Development.

5. Conclusion

This study showed that older adults face multiple challenges with medication use, encompassing adherence, administration, polypharmacy, and limited knowledge. Qualitative exploration identified contributing factors, such as forgetfulness, language barriers, lack of information and awareness about adverse drug events, transportation problems, long waiting times, and multiple visits to healthcare facilities.

Nevertheless, despite these challenges, older adults generally expressed satisfaction with medication services in primary healthcare settings. These findings not only enhanced our understanding of how the older population utilizes medication but also hold the potential to guide the development of pharmacist-led strategies in primary healthcare settings. Additionally, the study's implications can be extrapolated to policymakers to prioritize health and medication use care among older adults in Malaysia.

Funding/support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

None.

Declaration of sources of funding

None.

Author statement

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Ethics approval

This study involves human participation and was approved by Malaysian Research Ethical Study (MREC), NMRR-20-3136-56763. Participants gave informed consent to participate in the study before taking part.

Acknowledgements

We would like to thank all the participants who have contributed to this study.

Appendix 1. Problems with medication use

Domains	No	Questions	Always (%)	Often (%)	Sometimes (%)	Seldom (%)	Never (%)
Medication administration	1	How often have you had problems taking medication as instructed because of changes in its colour, size, or shape?	3.1	4.3	17.6	27.0	48.1
	2	How often have you had problems taking medication as directed (by doctor/pharmacist) because the instructions were difficult?	0.5	3.6	14.5	27.2	54.2
	3	How often have you had problems getting your medication supplies on time because of hassles? (Examples: long waits at the pharmacy, problems with postal medication, difficulty seeing a doctor get a refill, bad weather or no transportation)	1.8	6.4	20.1	30.3	41.5
	4	How often have you had problems taking medication as instructed because you couldn't read or hear the instructions?	1.0	2.5	12.7	29.0	54.7
	5	How often have you had problems taking medication as instructed because physical difficulties made it hard for you to take it? (Examples: swallowing a pill, opening a container, measuring a dose, or using eye drops)	0.5	3.3	10.22	26.7	59.3
Medication adherence	6	How often do you skip your medication or take less than instructed because of the side effects of medication disturbing your daily activities? (Examples: needing to go to the bathroom too often, feeling tired, or not being able to think clearly)	0.8	2.8	14.5	28.0	53.9
	7	How often did you skip your medication or take less than instructed because you were trying to save money?	0.5	3.3	8.7	23.4	64.1
	8	How often did you skip medication or take less than instructed or because you didn't like the way you had to take it? (Examples: injections or eye drops)	0.8	3.1	9.7	21.9	64.6
	9	How often did you skip medication or take less than instructed because you didn't think you needed it?	0.5	1.8	20.1	25.2	52.4
	10	How often did you skip medication or take less than instructed because you thought the medication was not working?	0.3	1.8	13.5	28.8	55.7
	11	How often did you skip medication or take less than instructed because you were afraid of becoming addicted?	0.5	3.11	2.0	27.0	57.5
	12	How often have you forgotten to take medication?	0.0	4.3	29.3	40.5	26.0
Polypharmacy	13	How often have you taken an over-the-counter medication, supplement, or alternative product?	5.6	8.9	28.5	23.7	33.3
	14	How often have you taken more of a medication than instructed to get more relief from your symptoms?	0.8	2.0	11.7	24.4	61.1
	15	How often have you taken pain relievers, tranquilizers, anxiety medications, and sleep aid when you didn't need them?	0.3	1.8	9.4	23.9	64.6
	16	How often do you have to take several medications together at the same time?	9.9	15.5	19.3	28.8	26.5
	17	How often do you feel you have many medications to take?	4.1	8.1	23.9	26.2	37.7
Accessibility	18	How often do you find it is easy to get your medication information from your primary health care providers?	15.8	27.7	23.41	17.61	15.5
	19	How often have you gone to more than one clinic or community pharmacy (pharmacy shop) because you need more medication than prescribed?	0.5	2.3	15.8	33.1	48.3

Appendix 2. Knowledge on medication use among older adults

No	Question	Yes (%)	No (%)	Maybe (%)
20	Do you know the proper use each of your medication in terms of: i) Right timing	94.1	3.8	2.0
21	Do you know the proper use each of your medication in terms of: ii) Right dose	96.2	1.8	2.0
22	Do you know the proper use each of your medication in terms of: iii) Indication of medicine	90.6	5.3	4.1
23	Do you know the proper use each of your medication in terms of: iv) Side effects	52.7	33.6	13.7

Appendix 3. Satisfaction levels of older adults regarding medication use services

No	Question	Very dissatisfied (%)	Dissatisfied (%)	Neutral (%)	Satisfied (%)	Very Satisfied (%)
24	How satisfied are you with medication use services provided by: Government Health Clinic	2.0	3.8	24.7	45.3	24.2
25	How satisfied are you with medication use services provided by: Private Health Clinic	0.5	3.3	51.9	35.4	8.9
26	How satisfied are you with medication use services provided by: Community Pharmacy (Pharmacy Shop)	0.8	2.5	45.3	40.7	10.7

Appendix 4. Themes,Sub-themes and Quotes

No	Themes	Sub-themes	Quotes
1	Medication administration challenges among older adults	➢ Physical difficulties affecting medication use (to open containers, cut tablets into half and pressing canister) ➢ Obtaining support from family and friends on managing medications and disease	➢ *Oh yeah this type of things I think is a bit difficult to open for me because we are getting old. (P8)* ➢ *I took its not like when i want to cut into two, it went to powder.(P2)*
2	Factors that affecting medication adherence	➢ Forgetfulness ➢ Waiting time ➢ High medication cost and no subsidy for older adults ➢ Providing tips to older adults for achieving high level medication adherence ➢ Affordable medication cost at primary care settings ➢ Lack of folllow-up counselling	➢ *By splitting medications, i wont take all at one go, i split sometimes within the morning 3 or 4 important ones to remember (P7)* ➢ *I feel they should be able to converse in all the major dialects or languages in our in our pharmacy..lah. (P8)*
3	Reasons of polypharmacy	➢ Sharing thoughts on supplementation reasons for health ➢ Types of primary health care visitation	➢ *Another one more thing I don't get caught cold.(when taking supplements) I never see going to see a doctor for fever or runny nose because of this two main things. (P2)* ➢ *This supplement is for us to be active, for our body. (P10)*
4	Accessibility to primary healthcare services	➢ Accessible for older adults but need improvement in mobility issues (providing walking path with aid and special lanes at facilities). ➢ Transportation problems which affecting the accessibility ➢ Providing 24 h community pharmacy with sufficient facilities i.e., parking, treatments test, medication postag	➢ *I think I will need at least a 24 h pharmacies open.(P8)* ➢ *they should have more pharmacist, sometimes.(P2)*
5	Limited awareness regarding adverse drug reactions and perception of older adults about medications	➢ Having perception on original brands medication works better ➢ Having confidence on taking medications ➢ Essential of communication and interaction with primary health care providers regarding medication use ➢ Factor affecting on decision to obtain medications ➢ Health care providers to provide health information pertaining to the medications and disease condition (Individualistic treatment)	➢ *..most of that medication so that is found in a pharmacy..so i just go in and nowadays I used to perform and now its google the and I get most of the information from the .. Better than the pharmacist. (P7)* ➢ *I dont know but i think I'm still healthy and also maybe the medication make me controlled and i am healthy. So good is good. (P6)* ➢ *Example of how we want to buy medicine, example of fever medicine, he will issue three types of medicine and tell us one by one, example of this one is the best and this is not good, that's how. (P11)*
6	Factors affecting satisfaction with primary healthcare medication use services and facilities	➢ Reasons for satisfaction level among older adults at primary health care ➢ Allocating more pharmacists for older adults to provide pharmaceutical care need	➢ *Yeah they when they give me they will tell me these medicines for what purpose and all, ussual lah.(P13)* ➢ *The pharmacist explains to me so I just follow the regular rules.(P8)* ➢ *Convenient, very convenient and these girls (pharmacists) are very nice when you need to get things for yourself.(P13)*

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