(RESEARCH ARTICLE)

Assessing the efficacy of home medication review in resolving drug-related problems in geriatric hypertensive patients: A community-based study

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Abstract

Home Medicines Review (HMR) is a health care service aimed to address various home medication management (HMM) issues which includes multiple services like maximizing knowledge regarding disease and its management, resolving drug-related problems and improving adherence to therapy. HMM issues are highly prevalent in geriatric patients owing to their chronic diseases like hypertension.

The main objective of the study was to assess the impact of HMR in hypertensive geriatric patients in Dakshina Kannada. The study included 50 subjects of either gender over the course of 6 months on resolving patient DRP. The PCNE V9.01 was utilised for the purpose of identifying and categorizing the DRP. 78% had atleast one DRPs in their daily medication list. Pre-intervention study included pharmacist's interventions by oral counselling. Intervention was given at patient level only including lifestyle modifications, better medication practices wherever applicable. Patients requiring dosage adjustments, dosing schedule changes or an alternative drug therapy were referred to the prescriber. During post-intervention analysis out of the total 58 DRPs, 30 were resolved and 28 were not resolved as the study subjects did not see the physicians. Out of 39 interventions given 16 were accepted by the physician and appropriate decisions were made. This indicates a positive attitude towards intervention given by pharmacists.

Conclusion: Home medication reviews proved to be an effective strategy in resolving DRPs among geriatric hypertensive patients in a community setting. This study highlights the importance of incorporating comprehensive medication management strategies into the care of older adults with chronic conditions, contributing to enhanced patient outcomes and overall healthcare quality. Further research is warranted to explore the long-term impact and cost-effectiveness of such interventions.

Keywords: Home medication review (HMR); Drug related problems (DRP); Hypertension; Geriatrics

1. Introduction

Hypertension is a significant contributor to cardiovascular disease and global mortality rates, particularly in low- and middle-income countries (LMICs). According to estimates from 2019, approximately 1.28 billion adults aged 30 to 79 years were affected by hypertension worldwide [1,2]. The management of hypertension in geriatric patients poses unique challenges due to age-related physiological changes, comorbidities, and polypharmacy. Polypharmacy, or the use of multiple medications, increases the risk of drug-related problems (DRPs) such as adverse drug reactions, drug interactions, and medication non-adherence. These DRPs can lead to suboptimal therapeutic outcomes, increased healthcare costs, and a decline in the overall quality of life for hypertensive geriatric patients [3].

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Home medication review (HMR) has emerged as a potential strategy to address DRPs in the geriatric population. HMR plays a crucial role in enhancing patient care through the optimization of prescription appropriateness and the improvement of patient adherence [4]. HMR involves a comprehensive assessment of a patient's medications by a qualified healthcare professional, typically a pharmacist, in the patient's home environment. Pharmacist-led medication review is a service provided by pharmacists to evaluate a patient's medication regimen and offer recommendations for addressing medication-related concerns. The concept of "medication review" encompasses a diverse range of cognitive services, varying in scope and depth, which can include activities such as prescription review and clinical medication review[5].Studies have found that HMR programs involving collaboration between general practitioners, pharmacists, and patients can improve medication adherence and reduce drug related problems (DRPs) [6,7].HMR aims to optimize medication use, identify and resolve DRPs, enhance medication adherence, and improve patient outcomes.

Despite the potential benefits of HMR, there is a lack of research examining its effectiveness specifically among hypertensive geriatric patients in community settings. Therefore, the purpose of this study is to assess the effectiveness of HMR in resolving DRPs among hypertensive geriatric patients in a community-based setting.

Objectives

- To assess the effectiveness and impact of HMR in Dakshina Kannada
- To identify and categorize various drug related problems among geriatric hypertensive patients
- To provide intervention at patient's home for resolution of DRP

2. Methodology

This study was a community-based, prospective design and involved hypertensive geriatric patients aged 65 years and above. Data was collected from 50 samples using convenient sampling method between January – September 2022.The study participants were visited at their residences, where a comprehensive medication review was performed. The review included an assessment of medication appropriateness, adherence, potential drug interactions, adverse drug reactions, and potential medication-related issues specific to hypertension management.

The identified DRPs was categorized and documented along with recommendations for resolution. Follow-up visits was conducted to assess the implementation of recommendations and measure the impact of HMR on resolving DRPs. Patient outcomes, including blood pressure control, medication adherence, and quality of life, was evaluated pre- and post-intervention.

2.1. Study criteria

2.1.1. Inclusion criteria

- The study population were hypertensive geriatrics from both genders. In addition, who are able to read and write English / Kannada language and agreed to participate in the study were included.
- All the patients taking medications for Hypertension during the period of study.
- Patients with age greater than 60 years.

2.1.2. Exclusion criteria

- Patients below the age of 60 years
- Mentally handicapped
- Who declined to participate in the study.

Data was collected using data collection form through direct interaction with the study subjects at their residences. The current study included geriatrics who were hypertensive.

3. Results

The results of the study revealed several important findings related to DRPs in this population. Data collected from patient by direct interview and medication chart were analysed to check DRPs. The DRPs collected were classified using PCNE (V.9.01). The study found a high prevalence of DRPs among hypertensive geriatric patients, with a significant number of participants experiencing one or more DRPs. Among the 50 patients' medication charts analyzed in this

study, a substantial proportion of participants, 78% (39 patients), experienced at least one drug-related problem (DRP) in their daily medication regimen. A total of 58 DRPs were identified, with an average of 1.16 DRPs per patient. The most prevalent type of DRP was treatment effectiveness (P1), accounting for 77.6% of the total DRPs identified, followed by treatment safety (P2) at 22.4%. Within the treatment effectiveness category, the dominant subcategory was "effect of drug treatment not optimal" (P1.2).

The causes of DRPs were categorized based on the Pharmaceutical Care Network Europe (PCNE) classification system. The most common cause of DRPs identified was drug selection (C1), followed by dose selection (C3). Within the drug selection category, the major subcategory was "inappropriate drug according to guidelines/formulary" (C1.1). The dominant category under dose selection was "drug dose too low" (C3.1). Additionally, four patient-related causes (C7) were identified as contributing factors to the occurrence of DRPs. Based on the identified DRPs and their causes interventions were provided at patient/carer level or prescriber level wherever applicable.

Amlodipine and Telmisartan were the drugs most frequently involved in DRPs among the study participants. Adverse drug reactions (ADRs) were the most common type of DRP, followed by drug-drug interactions. Thirteen ADRs were identified, with the most common ADR being dizziness caused by calcium channel blockers (CCBs), followed by tiredness associated with beta blockers. Twelve drug-drug interactions were found among the subjects, with telmisartan being the antihypertensive drug most frequently involved in these interactions.
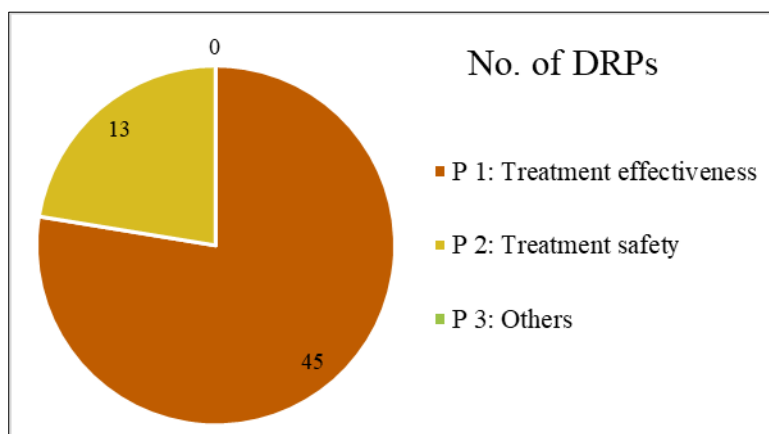

Figure 1 Drug Related Problem

Table 1 PCNE Classification for Drug Related Problems V.9.1

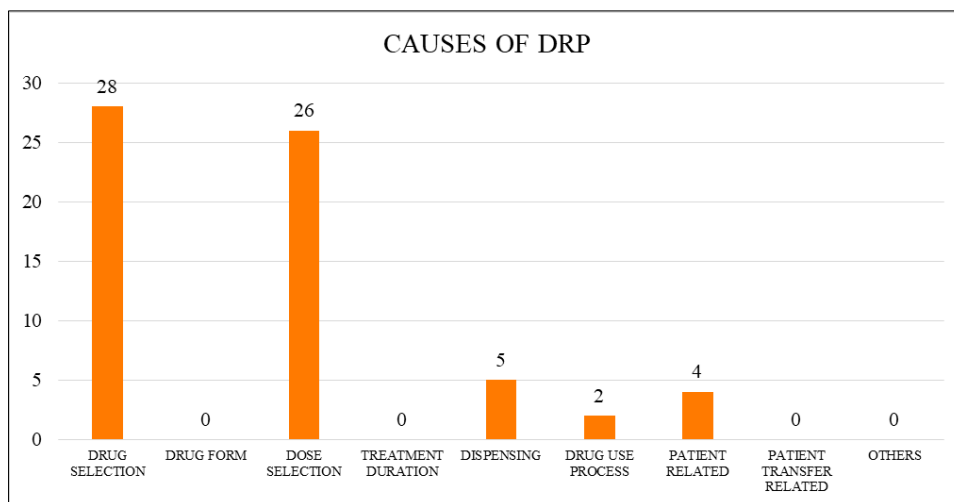| Primary Domain	Code V9.1	Problem	Frequency		
			n	%	Total
Treatment effectiveness	P 1.1	No effect of drug treatment/ therapy failure	0	77.6%	45(77.6%)
	P 1.2	Effect of drug treatment not optimal	45		
	P 1.3	Untreated symptoms or indication	0		
Treatment safety	P 2.1	Adverse drug event (Possibly) occurring	13	22.4%	13(22.4%)
Others	P 3.1	Unnecessary drug treatment	0	-	0
	P 3.2	Unclear problem/ complaint	0		
TOTAL			58		58(100%)

Figure 2 Causes of Drug related problems (DRPs)

(x-axis=causes of DRP's ,y-axis=no. of causes found in the study)

Table 2 Causes of DRP according to PCNE V.9.1

Primary Domain	Code V.9.1	Causes	Frequency		
			n	%	Total
Drug selection	C1.1	Inappropriate drug according to guidelines/ formulary	16	24.6%	28 (43%)
	C1.2	No indication for drug	-		
	C1.3	Inappropriate combination of drugs, or drugs and herbal medications, or drugs and dietary supplements	12		
	C1.4	Inappropriate duplication of therapeutic group or active ingredient	-	18.4%	
	C1.5	No or incomplete drug treatment in spite of existing indication	-		
	C1.6	Too many different drugs/active ingredients prescribed for indication	-		
Drug form	C2.1	Inappropriate drug form/formulation (for this patient)	-		0
Dose selection	C3.1	Drug dose too low	26	40%	26 (40%)
	C3.2	Drug dose of a single active ingredient too high	-		
	C3.3	Dosage regimen not frequent enough	-		
	C3.4	Dosage regimen too frequent	-		
	C3.5	Dose timing instructions wrong, unclear or missing	-		
Treatment duration	C4.1	Duration of treatment too short	-		0
	C4.2	Duration of treatment too long	-		
Dispensing	C5.1	Prescribed drug not available	-		5
	C5.2	Necessary information not provided or incorrect advice provided	3	4.61%	

	C5.3	Wrong drug, strength or dosage advised (OTC)	2		(7.7%)
	C5.4	Wrong drug or strength dispensed	-	3.07%	
Drug use process	C6.1	Inappropriate timing of administration or dosing intervals by a health professional	2	3.07%	2 (3.1%)
	C6.2	Drug under-administered by a health professional	-		
	C6.3	Drug over-administered by a health professional	-		
	C6.4	Drug not administered at all by a health professional	-		
	C6.5	Wrong drug administered by a health professional	-		
	C6.6	Drug administered via wrong route by a health professional	-		
Patient related	C7.1	Patient intentionally uses/takes less drug than prescribed or does not take the drug at all for whatever reason	2	3.07%	
	C7.2	Patient uses/takes more drug than prescribed	1	1.53%	
	C7.3	Patient abuses drug (unregulated overuse)	-		
	C7.4	Patient decides to use unnecessary drug	-		
	C7.5	Patient takes food that interacts	-		
	C7.6	Patient stores drug inappropriately	-		
	C7.7	Inappropriate timing or dosing intervals	1		
	C7.8	Patient unintentionally administers/uses the drug in a wrong way	-	1.53%	
	C7.9	Patient physically unable to use drug/form as directed	-		4 (6.2%)
	C7.10	Patient unable to understand instructions properly	-		
Patient transfer related	C8.1	Medication reconciliation problem	-		0
Other	C9.1	No or inappropriate outcome monitoring (incl. TDM)	-		0`
	C9.2	Other cause; specify			
	C9.3	No obvious cause			
TOTAL			65		65 (100%)

The intervention in this study was administered at the patient level, encompassing lifestyle modifications and improved medication practices as deemed necessary. Patients who required dosage adjustments, changes in dosing schedules, or alternative drug therapies were referred to their respective prescribers. The outcomes of the intervention were assessed during the post-test phase.

Out of the total 58 identified drug-related problems (DRPs), 30 DRPs were successfully resolved, indicating that appropriate actions were taken to address these issues. However, 28 DRPs remained unresolved, primarily due to the study subjects not seeking consultations with physicians. This highlights a potential limitation in the study, as the lack of engagement with healthcare providers may have hindered the resolution of DRPs.

Among the 39 interventions provided by the pharmacists, 16 interventions were accepted by the physicians, indicating that the healthcare providers acknowledged and acted upon the recommendations put forth by the pharmacists. This positive response from physicians reflects a favorable attitude towards the interventions proposed by the pharmacists involved in the study.

Overall, the findings suggest that the interventions implemented at the patient level, including lifestyle modifications and improved medication practices, were effective in resolving a significant proportion of the identified DRPs. However, the unresolved DRPs due to the study subjects not seeking medical consultations indicate a potential barrier to the resolution of these issues.

Moreover, the acceptance of interventions by physicians highlights the collaborative approach between pharmacists and prescribers, underscoring the importance of interdisciplinary teamwork in optimizing patient care and medication management.

Table 2 Patient level Intervention Provided and its Outcome

DRP	Intervention	N	Outcome	
			Resolved	Not Resolved
Treatment Effectiveness (n=45)	Patient (drug) counselling	13	10	3
	Written information provided (only)	0	0	0
	Patient referred to prescriber	35	16	19
	Spoken to family member/caregiver	2	1	1
Treatment Safety (n=13)	Patient (drug) counselling	9	4	5
	Written information provided (only)	9	4	5
	Patient referred to prescriber	4	0	4
	Spoken to family member/caregiver	0	0	0
Others (n=0)	Patient (drug) counselling Written information provided (only) Patient referred to prescriber Spoken to family member/caregiver	0	0	0

4. Discussion

Home Medicines Review (HMR) service aims to support patients who reside in their homes to optimize the advantages of their medication regimen and prevent medication-related issues, particularly among the elderly population with chronic conditions like hypertension.The article presents valuable insights into the effectiveness of home medication review in addressing drug-related problems in elderly patients with hypertension. This discussion aims to compare the findings of this study with previous research and highlight the implications for clinical practice.

Direct involvement of pharmacists with hypertensive patients may provide a solution in early detection of DRPs. A study conducted Netherlands highlighted that DRPs identified through direct patient interviews had higher clinical relevance than those identified through medical records[8]. In the present study, the evaluation of Drug-Related Problems (DRPs) was performed utilizing the PCNE V9.01 classification system. The results of the analysis unveiled a significant prevalence of DRPs, with a total of 58 instances identified, leading to an average of 1.16 DRPs per patient. Notably, this surpasses the average of 0.88 DRPs per subject reported in a prior study conducted in China[9].

The identification and prevention of DRPs are crucial in the geriatric population, as the risks associated with these problems are amplified in this group. Notably, 78% of the geriatric patients included in our study exhibited DRPs, which aligns with earlier research conducted by Hailu BY et al., where a prevalence rate of 81.5% was observed in the surgical and medical wards of a hospital[10].

Study's average of 1.16 DRPs per participant is slightly lower than the 1.45 DRPs per participant reported in a study conducted by Sharon T et al.[11].Additionally, the study by Sharon T et al. highlighted that approximately half (49.31%) of the DRPs identified were attributed to treatment effectiveness (P1). These findings are consistent with our study, as our primary DRP category was also treatment effectiveness (P1).

Improper dose selection may lead to uncontrolled hypertension which can exacerbate into cardiovascular complications. A major proportion of the DRPs identified were attributed to inappropriate dose selection accounting for 40% of DRPs. This is significantly lower than 70.3% DRPs caused of improper dose selection in a study conducted by RosliMR et,al. [12]. The present study implemented interventions at the individual patient level, involving modifications in medication administration practices as well as specific lifestyle adjustments. Previous investigations focusing on pharmacist-directed Home Medication Reviews (HMR) have consistently demonstrated that medication reviews conducted by pharmacists at patients' residences, involving active pharmacist intervention, constitute an efficacious approach for addressing pharmacotherapy-related concerns in patients[13,14]. Furthermore, such interventions have the potential to mitigate Drug-Related Problems (DRPs) and optimize healthcare cost savings.

The study findings reaffirm the above results, highlighting that home medication review exerts a positive impact on the resolution of drug-related problems in elderly hypertensive patients. The intervention implemented in this study resulted in a noteworthy reduction in the number of identified drug-related problems.

The majority of the pharmacist intervention for DRPs resolutions were conducted at patient/carer level, such as providing counselling and education to the family. Additionally, some DRPs were referred to the prescriber for consideration of increased dosage, medication changes, or alternate dosing schedules. According to a study conducted by Dhillon et al.,[15] general practitioners expressed positive perceptions of Home Medication Review (HMR) programs, highlighting that HMR improved their knowledge of their patients' medication regimens.

Out of the 58 identified DRPs, 30 were successfully resolved, indicating a positive response to the interventions provided during the Home Medicines Review (HMR) process. However, it is important to note that the prescriber acceptance rate in our study was 41%, which is comparatively lower than the acceptance rates reported in the previous studies conducted by Selviera ED et al. (69.9%) andAmankwa HM et al. (71.6%)[16,17].

In summary, the study utilizing the PCNE V9.01 classification revealed a significant number of DRPs among geriatric patients, with a prevalence rate of 78%. Treatment effectiveness (P1) was identified as the primary category of DRPs. Interventions implemented during the HMR process demonstrated a favorable outcome, with 30 out of 58 DRPs being resolved. However, the prescriber acceptance rate for interventions was lower in our study compared to previous research.

5. Conclusion

In conclusion, this community-based study on the efficacy of home medication review in resolving drug-related problems in geriatric hypertensive patients highlights the potential benefits of this intervention. The findings suggest that home medication review can be effective in identifying and resolving drug-related problems in this vulnerable population.

The findings of this study revealed a high prevalence of DRPs among hypertensive geriatric patients, with treatment effectiveness being the most common type of DRP. The causes of DRPs were primarily related to drug selection and dose selection, with a significant number of ADRs and drug-drug interactions identified.

The study demonstrated that home medication review led to a significant reduction in the number of drug-related problems, including medication errors, drug interactions, and inappropriate medication use. This intervention focused on optimizing medication regimens, ensuring adherence, and promoting patient safety.

Overall, the results indicate that home medication review holds promise as an effective strategy for resolving drug-related problems in geriatric hypertensive patients. Implementing this intervention in community settings has the potential to improve medication safety, optimize treatment outcomes, and enhance the overall quality of care for this vulnerable population. Further research and larger-scale studies are warranted to validate these findings and explore the long-term impact of home medication review in this context.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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