

Original Research Article

ASSESSMENT OF DRUG PRESCRIBING PATTERN IN GERIATRIC HYPERTENSIVE PATIENTS IN A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Background: With the rapid expansion of the geriatric population worldwide, hypertension has emerged as a major health concern among geriatric individuals. Prescription pattern analysis is an effective method for evaluating real-world antihypertensive prescribing practices, promoting evidence-based drug use, and assessing adherence to standard treatment guidelines. **Aim and Objectives:** To determine drug prescribing patterns in Geriatric Hypertensive patients. The primary objective is to analyse the class-wise distribution of prescribed antihypertensive drugs. Secondary objectives are to determine the average number of drugs prescribed per encounter, the percentage of drugs prescribed by generic name, the percentage of encounters with an antibiotic prescribed, and the percentage of drugs prescribed from the National List of Essential Medicines.

Materials and Methods: It was a hospital-based, cross-sectional, observational study on 600 geriatric patients diagnosed with Essential hypertension as per the ESH 2023 Guidelines.

Results: Mean age of study participants was 67.24 ± 5.64 years. Only 15.50% of patients received monotherapy, while 84.50% were prescribed combination therapy. 2-drug combination, 3-drug combination and polytherapy were prescribed in 219(36.50%), 150(25.00%), 138(23.00%) patients respectively. The average number of drugs prescribed per encounter was 6.72 ± 2.58 ; 6.23% of drugs were prescribed by generic name, Antibiotics were prescribed in 11.67% of encounters, and 36.42% of drugs were prescribed from the NLEM.

Conclusion: The present study highlights the importance of conducting regular prescription audits, promoting continuous medical education for healthcare professionals, and ensuring adherence to WHO prescribing indicators to improve long-term health outcomes among geriatric hypertensive patients.

Key Words: Geriatric hypertension, Antihypertensive drugs.

INTRODUCTION

With the rapid expansion of the geriatric population worldwide, hypertension has emerged as a major health concern among geriatric individuals.^[1] Non-communicable diseases (NCDs) collectively account for nearly 41 million deaths annually, representing approximately 74% of total deaths worldwide. Among all NCDs, cardiovascular diseases constitute the leading cause of death worldwide, and

hypertension is recognized as the most important modifiable risk factor contributing to cardiovascular morbidity and mortality, especially in the geriatric population.^[2]

Definition and Classification of Hypertension

According to the European Society of Hypertension (ESH) 2023 guidelines,^[3] the diagnosis of hypertension is confirmed when systolic blood pressure (SBP) is consistently ≥ 140 mmHg and/or diastolic blood pressure (DBP) is ≥ 90 mmHg,

documented on at least two separate measurements obtained under standardized clinical conditions.^[3]

Hypertension can be categorized into two major types:

- Primary (Essential) Hypertension – This form represents nearly 85–90% of all hypertensive cases and occurs without an identifiable underlying cause.
- Secondary Hypertension – Develops as a consequence of specific underlying pathological conditions, including renal disorders, endocrine abnormalities, vascular diseases, or drug-related mechanisms.^[4]

Hypertension in the Geriatric Population

The World Health Organization (WHO) classifies geriatric individuals as those who are 60 years of age or older. Geriatric hypertension differs from hypertension in younger adults due to age-related physiological changes such as arterial stiffness, reduced baroreceptor sensitivity, and altered renal function, leading to distinctive hypertensive patterns.^[5] The elderly have a unique physiological constitution, biomedical needs, and psychosocial challenges that require an individualized approach to their management.

Recent studies have consistently demonstrated that elderly hypertensive patients are frequently exposed to multiple medications due to coexisting chronic conditions such as diabetes, ischemic heart disease, and chronic kidney disease. Studies published between 2020 and 2024 have reported polypharmacy prevalence rates ranging from 30% to 60% among elderly hypertensive patients. Research articles have highlighted a strong association between polypharmacy and adverse drug reactions, drug–drug interactions, and poor medication adherence.^[6,7,8]

Relevance of the Present Study

Prescription pattern analysis is widely recognized as an effective method for evaluating real-world antihypertensive prescribing practices, promoting evidence-based drug use, guiding the selection of antihypertensive therapy, and assessing adherence to standard treatment guidelines to enhance the quality of healthcare services.^[9,10] In geriatric hypertension, such analyses are particularly important due to the vulnerability of the population and the complexity of treatment regimens, which often lead to polypharmacy. Findings from prescription pattern studies can contribute to policy formulation and guide targeted interventions at both institutional and national levels.^[11]

Aim and Objectives

Aim

To determine drug prescribing patterns in Geriatric Hypertensive patients attending the OPD of the Medicine Department in KGMU, Lucknow.

Objectives

Primary Objective

- To analyse the class-wise distribution of Antihypertensive drugs prescribed to Geriatric patients with hypertension.

Secondary Objectives

- To determine the average number of drugs prescribed per encounter.
- To determine the percentage of drugs prescribed by generic name.
- To determine the percentage of encounters with an antibiotic prescribed.
- To determine the percentage of drugs prescribed from the National List of Essential Medicines (NLEM)
- To determine the percentage of drugs prescribed as fixed-dose combinations (FDCs).

Ethical Considerations

The study was conducted after obtaining ethical approval from the Institutional Ethics Committee of KGMU, Lucknow. Before participation, all participants were clearly informed about the objectives and purpose of the study in their local language, and written informed consent was obtained before their inclusion.

MATERIALS AND METHODS

The present study was a hospital-based, cross-sectional, observational study. In this study, 600 geriatric hypertensive patients were included. Data were collected using a pre-designed, semi-structured proforma that collected demographic details, clinical profile, comorbidities profile, antihypertensive drug prescription patterns, including the assessment of prescriptions involving monotherapy, two-drug or three-drug combination therapy, and polytherapy. In addition, the WHO core drug prescribing indicators,^[12] including the total number of drugs prescribed per patient encounter, the percentage of drugs prescribed by generic name, the percentage of encounters involving antibiotic prescriptions, the number of drugs prescribed from the National List of Essential Medicines (NLEM),^[13] and the proportion of medications prescribed as fixed-dose combinations (FDCs) was also evaluated.

Selection of Subjects

Patients diagnosed with Essential hypertension as per the European Society of Hypertension (ESH) 2023 Guidelines,^[3] were screened for eligibility. Selection was based on predefined inclusion and exclusion criteria to ensure homogeneity of the study population.

Inclusion Criteria

1. Patients aged 60 years and above of both sexes (Male & Female)
2. Patients diagnosed with Essential Hypertension as per ESH 2023 guidelines for the management of arterial hypertension (Systolic BP ≥ 140 mmHg and/or Diastolic BP ≥ 90 mmHg).
3. Patients willing to participate in the study and provide written informed consent.

Exclusion Criteria

1. Patients unwilling or unable to provide informed consent.
2. Prescriptions of hospitalized (indoor) patients.

3. Patients diagnosed with secondary hypertension.

Statistical Analysis

Data were analysed using descriptive statistical methods. Continuous variables were presented as

mean \pm standard deviation (SD), whereas categorical variables were reported in terms of frequencies and percentages. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Profile of Patients

		Number of Patients (N)	Percentage (%)
1	Gender Distribution		
	Male	321	53.50
	Female	279	46.50
2	Age Distribution (Years)		
	60-64	226	37.67
	65- 69	190	31.67
	70-74	114	19.00
	75-79	50	8.33
	>=80	20	3.33
	Mean \pm SD	67.24 \pm 5.64 Years	
3	Occupation Distribution		
	Housewife	262	43.67
	Self employed	127	21.16
	Retire Govt/private	102	17.00
	Farmer	81	13.50
	Daily wage worker	28	4.67
4	Education Status		
	Illiterate	129	21.50
	Primary School	139	23.17
	Secondary School	157	26.17
	Graduate	137	22.83
	Post Graduate	38	6.33
5	Residence Status		
	Urban	379	63.17
	Rural	221	36.83
6	Socio-economic Status		
	Lower	116	19.33
	Upper Lower	120	20.00
	Lower Middle	204	34.00
	Upper Middle	116	19.33
	Upper	44	7.34

Table 2: Clinical Profile of Patients

		Number of Patients (N)	Percentage (%)
1	Chief Presenting Complaints		
	Breathlessness	245	40.83
	Chest pain	235	39.17
	Follow up	187	31.17
	Pedal edema	188	31.33
	Fatigue	148	24.67
	Headache	123	20.50
	Palpitation	125	20.83
	Dizziness	92	15.33
	Cough	142	23.67
2	Associated Comorbidity Pattern		
	No Associated Comorbidity (only HTN)	176	29.33
	One or more associated comorbidities	424	70.67
	One Comorbidity	263	43.83
	Two Comorbidity	132	22.00
	Three or more comorbidities	29	4.84
3	Comorbidity Profile		
	Diabetes Mellitus	296	49.33
	Coronary Artery Disease	116	19.33
	Thyroid Disorder	57	9.50

	Other Comorbidity	131	21.84
4	Addiction History		
	Addiction Present	191	31.83
	Smoking	191	31.83
	Alcohol	176	29.33
	No Addiction Present	409	68.17
5	Family History of Hypertension		
	Present	89	14.83
	Absent/ Not sure	511	85.17

Table 3: Analysis of Antihypertensive Drugs Prescription Pattern

		Number of Patients	Percentage (%)
1	Antihypertensive Prescription Pattern (N = 600)		
	Monotherapy	93	15.50
	2-drug combination therapy	219	36.50
	3-drug combination therapy	150	25.00
	Polytherapy	138	23.00
	Total	600	100 %
2	Class-wise Distribution of Antihypertensive Drugs in Monotherapy (N=93)		
	ARB	40	43.01
	CCB	37	39.78
	Beta blocker	9	9.68
	ACE inhibitor	5	5.38
	Diuretics	2	2.15
	Total	93	100%
3	Class-wise Distribution of Antihypertensive Drugs in 2 Drug Combination Therapy (N=219)		
	ARB + CCB	86	39.27
	ARB + Diuretics	42	19.18
	CCB+ B blocker	38	17.35
	ARB + B blocker	26	11.87
	Others	27	12.33
	Total	219	100%
4	Class-wise Distribution of Antihypertensive Drugs in 3 Drug Combination Therapy(N=150)		
	CCB + ARB + Diuretics	57	38.00
	CCB + ARB + B blocker	35	23.33
	ARB + B blocker + Diuretics	14	9.33
	CCB+ B blocker + Diuretics	12	8.00
	Other Combinations	32	21.33
	Total	150	100%
5	Class-wise Distribution of Antihypertensive Drugs in 4 Drug Combination Therapy(N=98)		
	ARB + CCB + B blocker + Diuretics	41	41.84
	ARB + CCB + Diuretics + Diuretics	16	16.33
	ARB + CCB + Diuretics + @ agonist	7	7.14
	Others	34	34.69
	Total	98	100
6	Class-wise Distribution of Antihypertensive Drugs in 5 Drug Combination Therapy(N=40)		
	ARB + CCB + B blocker + Diuretics + Diuretics	20	50.00
	ARB + CCB + ACEi + B blocker + Diuretics	7	17.50
	ARB + CCB + ACEi + B blocker + Diuretics	5	12.50
	Others	8	20.00
	Total	40	100 %

Table 4: WHO Drug Prescribing Indicators Analysis

	Indicator	Present Study	WHO Ideal Value
1	Drugs Per Encounter	6.72 ± 2.58	1.6-1.8
2	Generic Drug Prescription (%)	6.23%	100%
3	Encounters with Antibiotic (%)	11.67%	20-26.8%
4	Drugs Prescribed from NLEM (%)	36.42%	100%
5	Drug Prescription in FDC form	53.08 %	

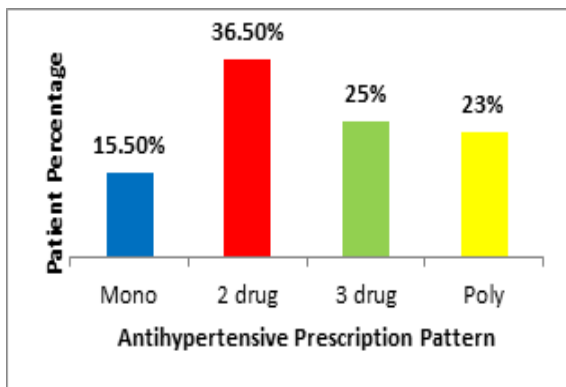


Figure 1.1: Antihypertensive Prescription Pattern

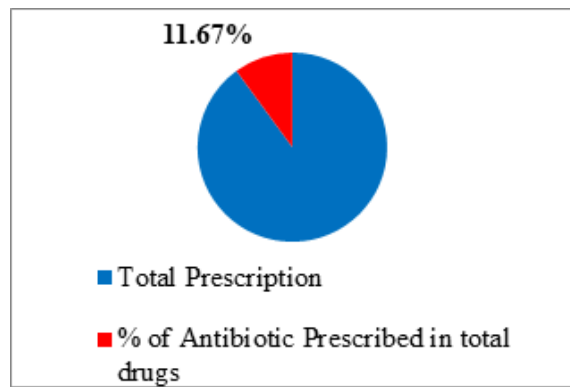


Figure 2.2: Encounters with Antibiotic

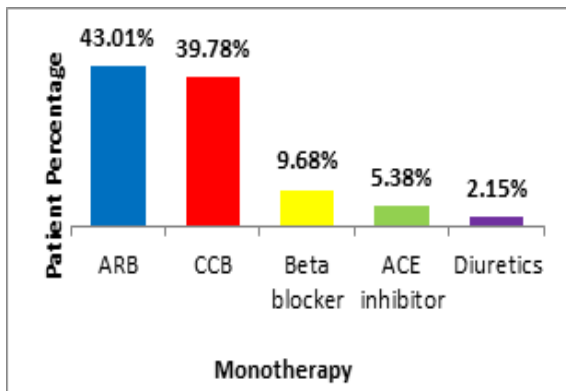


Figure 1.2: Distribution in Monotherapy

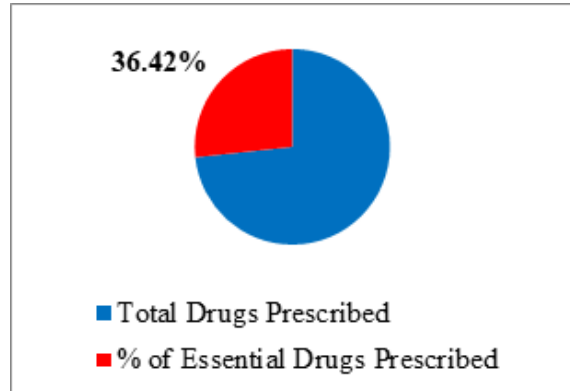


Figure 2.3: Drugs Prescribed from NLEM

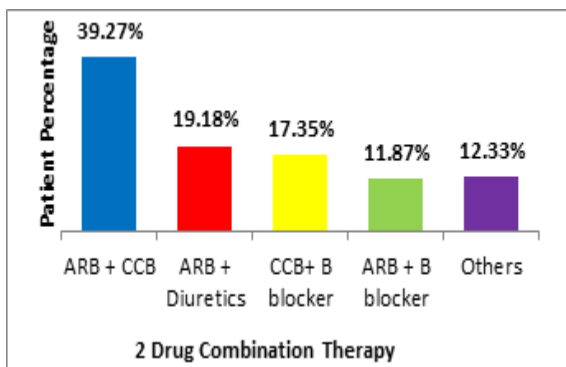


Figure 1.3: Distribution in 2 Drug Combination Therapy

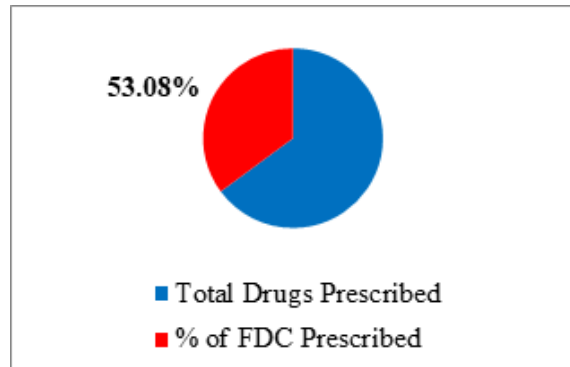


Figure 2.4: Drug Prescription in FDC form

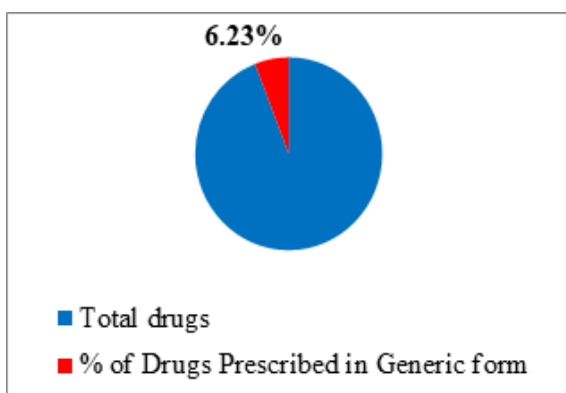


Figure 2.1: Generic Drug Prescription

DISCUSSION

Demographic Profile (Table 1)

In the current study, 600 geriatric patients diagnosed with essential hypertension were included. The majority of the patients 530(88.34%) belonged to the early elderly age group of 60–74 years, with a mean age of 67.24 ± 5.64 years. Gender distribution shows that 321 (53.50%) patients were males, and 279 (46.50%) patients were females, showing a slight male predominance. Occupation-wise analysis showed that a significant proportion of elderly patients were either economically dependent or no longer part of the active workforce, which is characteristic of the geriatric age group, highlighting the need for accessible and affordable healthcare strategies for effective and long-term management of hypertension among geriatric patients.^[14]

Educational status varied widely, with a significant proportion of patients having low to moderate levels of formal education, which may influence disease awareness, treatment compliance, and healthcare-seeking behaviour.^[15,16,17] In the present study, 63.17% of patients came from urban areas, while 36.83% of patients came from rural areas. Results showed that a higher proportion of patients belonged to urban areas, reflecting better awareness, improved healthcare-seeking behaviour, and easier access to tertiary care facilities located in urban settings. Socioeconomic status analysis revealed that the majority of patients, 73.33%, belonged to lower, upper-lower, and lower-middle socioeconomic classes, which reflects the patient population typically attending public tertiary care hospitals. The predominance of patients from economically constrained backgrounds highlights the importance of cost-effective prescribing practices and the utilization of essential medicines to ensure optimal long-term management of hypertension in the elderly population.^[14,16,17]

Clinical Profile (Table 2)

Clinical assessment revealed that breathlessness, chest pain, pedal edema, and fatigue were the most common presenting complaints, suggesting underlying cardiovascular involvement and chronicity of the disease in geriatric hypertensive patients. In our study, Diabetes mellitus was the most common comorbidity in 49.33% of patients, followed by coronary artery disease in 19.33% and thyroid disorders in 9.50%. Jain PK et al,^[18] Singh H et al,^[8] found diabetes mellitus as the most common comorbidity associated with geriatric hypertensive patients. Shankpal PD et al,^[19] found 68.18% patients were diabetic, and Poornima B et al,^[20] found 65.77% patients were diabetic. Jan B et al,^[21] Malik C et al,^[22] highlighted in their study that the high prevalence of multiple comorbidities in geriatric hypertensive patients required the need for an integrated and multidisciplinary approach to their treatment, with careful selection of antihypertensive agents that provide both cardiovascular and metabolic benefits, to ensure safe and effective management of hypertension in geriatric patients.

Analysis of Antihypertensive Drug Prescription Pattern (Table 3)

Evaluation of antihypertensive drug prescription patterns showed that, out of 600 geriatric hypertensive patients, only 93 (15.50%) patients received monotherapy, while the majority of patients, 507(84.50%), were prescribed combination therapy. Among the combination therapies, the 2-drug combination was most commonly prescribed in 219(36.50%) patients, followed by the 3-drug combination in 150(25.00%) patients, and polytherapy in 138(23.00%) patients. Similar results were found by Poornima B et al. [20] 57.27% of patients received combination therapy, 42.72% received monotherapy, Jain PK et al. [18], 72.50% of patients received combination therapy, and 27.50% received monotherapy. This prescribing trend reflects

the predominance of combination therapy and the complex clinical profile of elderly hypertensive patients, who often present with long-standing disease, multiple comorbidities, and other age-related pharmacokinetic and pharmacodynamic changes that may limit the effectiveness of a single-drug antihypertensive regimen.

In the class-wise distribution of antihypertensive drugs, among the total 93 patients receiving monotherapy, ARBs were the most commonly prescribed class in 40 (43.01%) patients, followed by CCBs in 37 (39.78%) and Beta-blockers in 9 (9.68%). Among the total 219 patients receiving 2 drug combination therapy, the most commonly prescribed combination was ARB + CCB in 86 (39.27%) patients, followed by ARB + Diuretics in 42(19.18%) patients, and CCB + B blocker in 38(17.35%) patients. Among the total 150 patients receiving 3-drug combination therapy, the most commonly prescribed regimen was CCB + ARB + Diuretics in 57 (38.00%) patients, followed by CCB + ARB + Beta-blocker in 35 (23.33%) patients, and ARB + Beta-blocker + Diuretics in 14 (9.33%) patients. Four drug combinations were prescribed in 98 patients, and five drug combinations were prescribed in 40 patients, likely representing resistant hypertension or the presence of multiple comorbidities. The predominance of the ARB, CCB, and diuretics in combination suggests an evidence-based prescribing approach in the geriatric population, and adherence to current treatment guidelines, as these drug classes are known for their complementary mechanisms of action for effective blood pressure control, favourable safety profile, good tolerability, and proven cardiovascular and renal protective effects in elderly patients. Overall, the preference for combination therapy reflects the complexity of managing hypertension in the elderly and the need for more intensive treatment strategies in geriatric hypertension, where multiple pathophysiological factors often necessitate the use of more than one antihypertensive agent to achieve optimal therapeutic outcomes, and underscores the importance of careful monitoring to minimize adverse drug reactions, drug interactions, and issues related to medication adherence.

(Table 4) In the present study, a total of 4031 drugs were prescribed across 600 prescriptions, with an average of 6.72 ± 2.58 drugs per prescription, which was higher when compared with the standard value of 1.6-1.8 given by WHO. The results indicate a substantial prevalence of polypharmacy, due to the coexistence of multiple chronic conditions requiring long-term pharmacological management, and highlight the importance of optimal drug prescribing, periodic medication review, and individualized therapy in geriatric patients. Assessment of WHO drug prescribing indicators revealed that only 6.23% of drugs were prescribed by generic name, and only 36.42% of drugs were prescribed from the National List of Essential Medicines (NLEM), which was very

low when compared with the ideal value of 100% given by the WHO. These findings highlight the need to encourage generic and essential drug prescription to enhance affordability and support evidence-based drug use in geriatric hypertensive patients, as it promotes cost-effective treatment, improves medication accessibility, and reduces the financial burden in geriatric patients who often require multiple medications for long-term disease management. Antibiotics were prescribed in 11.17% of encounters, which was within the optimal value of 20.0-26.8 % given by WHO, suggesting cautious and rational use of antibiotics. The findings indicate reasonable antibiotic stewardship, which is essential to prevent antimicrobial resistance and unnecessary drug exposure in elderly patients. In the present study, out of the total 4031 drugs prescribed, 2140 drugs were prescribed in fixed-dose combination form, accounting for 53.08 % of total drug prescriptions. The high utilization of FDCs reflects an effort to simplify treatment regimens, improve medication adherence, and achieve better therapeutic outcomes; however, their use should be carefully evaluated to ensure evidence-based drug selection and appropriate dosing essential for optimizing treatment and ensuring safe pharmacotherapy in elderly hypertensive patients.

Strengths and Limitations

By analysing real-world prescriptions from a tertiary care hospital, the study provides practical insights into current prescribing practices. The study also employed a structured evaluation using WHO prescribing indicators, which allowed for a comprehensive assessment of both quantitative and qualitative aspects of prescribing. Being a cross-sectional study, it could not establish causal relationships between prescribing patterns and clinical outcomes or adherence. The study was limited to a single tertiary care hospital, which may affect generalizability to primary or secondary healthcare settings.

CONCLUSION

The present study provides a comprehensive overview of real-world antihypertensive prescribing practices in geriatric hypertensive patients. It highlights the complexity of managing hypertension in the geriatric population due to age-related physiological changes, multimorbidity, and long-standing disease duration. The findings demonstrate that antihypertensive prescribing practices are broadly aligned with standard treatment guidelines and reflect evolving trends in geriatric hypertension management, including increased reliance on combination therapy, consideration of associated comorbidities, and a shift toward a patient-centric, personalized treatment approach. However, the study also highlights important areas for improvement, such as a high prevalence of polypharmacy and a low rate of generic and essential drug prescriptions,

which increase the economic burden on geriatric patients. The findings of this study highlight the importance of conducting regular prescription audits, promoting continuous medical education for healthcare professionals, and ensuring adherence to WHO prescribing indicators. Furthermore, adopting a patient-centred approach in therapeutic decision-making is essential for improving the quality of hypertension management in geriatric patients. These measures can help optimize treatment strategies, enhance patient safety, and ultimately lead to improved long-term health outcomes among geriatric hypertensive patients.

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