

## A Review on the Pharmacological Challenges of Polypharmacy in Elderly Patients

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### ARTICLE INFO

#### Article History:

**Received:** 25.11.2025

**Revised:** 28.12.2025

**Accepted:** 26.01.2026

#### Keywords:

Geriatrics, Pharmacodynamics,  
Pharmacokinetics, Polypharmacy

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### ABSTRACT

The contemporaneous use of multiple medications is defined as Polypharmacy. Due to rising multimorbidity and life expectancy among elderly population, the prevalence of polypharmacy has increased. Despite the need for managing complex conditions, it significantly presents pharmacological challenges. By focusing on pharmacokinetic and pharmacodynamic changes, drug interactions, adverse drug reactions and strategies for optimizing medication use, this systematic review aims to evaluate the impact of polypharmacy in elderly individuals. Physiological changes related to age, complicates the drug metabolism and responses, further leads to toxicity from higher susceptibility. Due to fragmented care and insufficient geriatric-specific guidelines, the inappropriate prescribing remains increasing. In reducing medication related risks, strategies such as medication review, multidisciplinary care and deprescribing have showed a remarkable impact.

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### Introduction

Due to the global increase in elderly population, the risk of chronic diseases and multimorbidity has also rapidly increased, compelling the use of multiple medications. In Geriatric care, the wide spread phenomenon of consuming, five or more medications is generally defined as polypharmacy. Even though they are essential to manage complex health conditions, the risk of adverse drug reactions is high when they are not carefully managed. Due to the age-related physiological changes in elderly individuals, the scope of drug absorption, metabolism, distribution and excretion can be affected. When combined with the presence of multiple comorbidities and fragmented health care systems, these changes can increase the probability of adverse drug reactions and inappropriate prescription. For optimizing the therapeutic outcomes, understanding the pharmacological challenges associated with polypharmacy is mandatory.

Among elderly individuals, especially those who were with multiple chronic conditions polypharmacy has become more common. To manage multimorbidity such as diabetes, hypertension and cardiovascular disorders, patients often depend on multiple medications.

Lack of coordination in care, use of over-the counter medication and involvement of multiple health care providers are also some of the factors contributing to polypharmacy. Combining such factors, can increase the complexity and medication burden, there by highlighting the risk of adverse outcomes [1,2].

### Pharmacokinetic Changes in Elderly Patients

Drug therapy in elderly patients is influenced by significant alterations in pharmacokinetics associated with aging. In certain cases, bioavailability of drugs is influenced, due to the changes like slower gastric emptying and reduced gastric acidity. Decreased lean body mass and total body water and increased body fat causes the alterations in drug distribution and leads to higher plasma concentrations of hydrophilic drugs and prolonged half-life of lipophilic drugs. As hepatic metabolism declines with age, due to the low blood flow and reduced liver mass, the phase-I metabolic reactions are affected specifically. As the age increases, glomerular filtration rate decreases causing a significant reduction in renal excretion, resulting a great risk of toxicity and accumulation that decreases the drug clearance. These pharmacokinetic changes required careful dose adjustments and monitoring in elderly patients.

## Pharmacodynamic Changes in Elderly Patients

Along with pharmacokinetic alterations, the drug sensitivity in elderly individuals is a result caused by pharmacodynamic changes. Most often changes observed are, increased sensitivity to central nervous system depressants, anticholinergic drugs and anticoagulants. Such changes lead to sensitivity towards adverse drug effects like cognitive impairment, sedation, bleeding along with exaggerated drug responses. Inevitably, sometimes even standard dose of medications may cause unintended and harmful side effects in the elderly patients [3-5].

## Adverse Drug Reactions and Clinical Outcomes

In elderly patients, adverse drug reactions are the major cause of hospitalization and morbidity. Due to the high usage of psychotropic medications, antihypertensives and sedatives, the risk of falls and fractures have profoundly increased. In medications possessing anticholinergic properties cognitive impairment is often associated with long-term decline and delirium. Due to complex treatment regimens, polypharmacy can reduce medication adherence, raise in hospitalization and morbidity rates. Increase in the usage of multiple medication can lead to diminished quality of life, functional decline and frailty emphasizes the need for monitoring the medication management [6,7].

## Drug Interactions

In elderly patients, receiving multiple medications faces the major pharmacological challenge known as drug-drug interactions. The increase in drug intake can increase the scope of interactions especially, when narrow therapeutic indices are involved. Drug metabolism can be influenced due to the age-related changes. As certain medications may worsen existing conditions, drug-disease interactions also play a vital role. Hypertension and renal dysfunction can be aggregated by non-steroidal anti-inflammatory drugs, whereas, anticholinergic drugs in patients with dementia can worsen the cognitive impairment [8,9].

## Inappropriate Prescribing

The most crucial issue faced by polypharmacy is inappropriate prescribing, which includes over, under and mis-prescribing. Conflicting recommendations occurs as a result of negligence in addressing the complexities of multimorbidity and

one-sided focus on single diseases by the clinical guidelines. The under representation of elderly patients in clinical trials, limits the availability of evidence-based guidance for these populations. To identify potentially inappropriate medications and improve prescribing practices STOP/START criteria and beers criteria are widely used as screening tools [10].

## Clinical Challenges

Polypharmacy in clinical practice faces several complicated challenges. During transitions of care, inadequate medication review can cause medication errors. Lack of coordination among the health care providers and fragmented health care systems the risk of drug-interactions and duplication increases. Patient related factors like self-medication practices, cognitive impairment and poor health literacy plays a vital role. In addition to these, health care system constraints like insufficient access to geriatric specialists and limited consultation time also impede the optimal medication management [11].

## Management Strategies

To address polypharmacy, a comprehensive and multidisciplinary approach is essential. The systematic process of identifying and discontinuing unnecessary medications is known as de-prescribing. This process, worked successfully in reducing medication burden and improving outcomes. To ensure the efficacy and safety of prescribed medication, regular medication reviews by pharmacists and health care professionals is essential. The multidisciplinary approach from physicians, nurses, caregivers and pharmacists can enhance the coordination care and improves patient outcomes. For reducing the risk of adverse events and for improving medication adherence, patient education is crucial. In identifying potential drug interactions, providing patient counseling, conducting medication reconciliation and management of polypharmacy, along with implementing the process of de-prescribing initiatives and medication review processes, the involvement of pharmacists is vital and thus, proving the necessity of integrating pharmacists for optimizing the pharmacotherapy in elderly patients [12-14].

## Future Directions

For developing standardized definition of polypharmacy and including elderly patients in



clinical trials future research must be conducted and gather sufficient evidence to support the research. The need for the development of individualized treatment guidelines, which are accounted for multimorbidity and patient preferences always persist. To promote rational prescribing practices and ensure patient safety, the need for policy-level interventions is essential. The advancements in digital health technologies and clinical decision support systems have showed promising results in improving medication management.

## Conclusion

Based on the complexities of health care systems and aged-related physiological changes, polypharmacy in elderly causes pharmacological challenges. Even though the usage of multiple drugs is common in day-to-day management of multiple chronic conditions, the risk of adverse drug reactions, cognitive impairment and mortality can be increased when they are used inappropriately. For optimizing pharmacotherapy and improving quality of life in elderly patients, multidisciplinary collaboration, regular medication review and patient-centered approach plays vital role.

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