

Adverse Drug Reactions in Polypharmacy Among Elderly Patients: A Clinical Pharmacology Perspective

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Annotation: Elderly patients are particularly vulnerable to adverse drug reactions (ADRs) due to age-related physiological changes and the common practice of polypharmacy in managing multiple chronic conditions. This study aims to identify the prevalence, risk factors, and clinical patterns of ADRs among elderly patients exposed to polypharmacy, as well as evaluate the clinical pharmacology principles behind safer prescribing practices. A prospective observational study involving 300 hospitalized elderly patients aged 65 years and older was conducted. Results showed that 39% of patients experienced at least one ADR, with central nervous system agents and cardiovascular drugs being the most implicated. Polypharmacy (≥ 5 medications), renal impairment, and history of prior ADRs were significant predictors. Rational pharmacological approaches, including medication review, deprescribing, and individualized dosing based on renal and hepatic function, are essential in minimizing ADRs in this population.

Keywords: Adverse drug reactions, Polypharmacy, Elderly, Clinical pharmacology, Rational prescribing, Drug safety.

Introduction:

Adverse drug reactions (ADRs) are a significant cause of morbidity, hospitalization, and mortality among the elderly population. With advancing age, patients often present with multiple

comorbidities, necessitating complex drug regimens—a phenomenon known as polypharmacy. Defined commonly as the use of five or more medications, polypharmacy significantly increases the risk of pharmacokinetic and pharmacodynamic drug interactions, inappropriate prescribing, and poor adherence. Furthermore, age-related physiological alterations such as reduced hepatic metabolism, decreased renal clearance, altered receptor sensitivity, and compromised homeostatic mechanisms amplify the susceptibility to ADRs. The clinical pharmacology of aging emphasizes the importance of dose adjustment, therapeutic drug monitoring, and careful benefit-risk evaluation. Despite existing guidelines, ADRs remain underreported and inadequately managed in elderly care. This study seeks to provide a comprehensive clinical pharmacological assessment of ADRs in elderly patients experiencing polypharmacy in a tertiary care setting.

Materials and Methods:

This prospective observational study was conducted over 12 months at the Internal Medicine and Geriatric Units of Samarkand State Medical University Hospital. Inclusion criteria included patients aged 65 years and older, taking five or more medications at the time of hospital admission. Patients with severe cognitive impairment or terminal illness were excluded. Detailed medication histories were collected, and ADRs were identified using Naranjo's algorithm for causality assessment. Renal and hepatic function, comorbidity index, and previous ADR history were documented. Each patient was monitored throughout hospitalization for newly emerging ADRs. Drug categories most commonly involved were recorded, and severity was assessed using the Hartwig scale. Multivariate logistic regression analysis was performed to identify independent risk factors.

Results:

Of the 300 elderly patients studied, the mean age was 72.8 years, and 56% were female. The average number of medications per patient was 7.2. A total of 117 patients (39%) experienced at least one ADR during hospitalization. Of these, 64% were classified as mild, 28% as moderate, and 8% as severe. The most commonly implicated drug classes included CNS agents (especially benzodiazepines and antidepressants), cardiovascular drugs (beta-blockers, ACE inhibitors, anticoagulants), and antidiabetic agents (sulfonylureas and insulin). The most frequent ADRs were dizziness, hypotension, hypoglycemia, gastrointestinal disturbances, and confusion. Logistic regression revealed that the number of medications (OR 2.1, $p < 0.001$), impaired renal function (OR 1.8, $p = 0.003$), and previous ADR history (OR 2.4, $p < 0.001$) were statistically significant predictors of ADR occurrence. Patients on more than eight medications had a 53% risk of ADRs, compared to 22% in those with fewer than five.

Discussion:

The findings highlight the significant burden of ADRs in elderly patients subjected to polypharmacy. Central to this problem is the often inadequate application of geriatric pharmacology principles in clinical practice. Polypharmacy increases the probability of drug–drug and drug–disease interactions, while age-related decline in renal and hepatic function alters drug clearance, necessitating dosage adjustments that are frequently overlooked. The predominance of CNS-related ADRs correlates with increased sensitivity to psychoactive drugs in older adults, often exacerbated by inappropriate prescribing practices. Cardiovascular ADRs reflect common prescribing patterns for hypertension, heart failure, and arrhythmias, with agents like diuretics and anticoagulants carrying high risk. This study emphasizes the need for structured medication reviews, including the use of tools such as STOPP/START criteria and the Beers list, to evaluate medication appropriateness. Clinical pharmacists and interdisciplinary geriatric teams play a vital role in conducting medication reconciliation, deprescribing unnecessary drugs, and implementing monitoring protocols. Education on age-specific pharmacokinetics and dynamics among healthcare providers is essential to reduce ADR prevalence.

Conclusion:

Adverse drug reactions are prevalent among elderly patients exposed to polypharmacy, contributing to increased morbidity and healthcare utilization. Risk factors such as excessive medication use, impaired organ function, and previous ADRs necessitate individualized pharmacotherapy based on clinical pharmacology principles. A multidisciplinary approach involving geriatricians, clinical pharmacists, and primary care providers is crucial to optimizing drug safety and improving outcomes. Future research should focus on developing predictive models and decision support systems to facilitate safer prescribing in older adults.

References:

1. Mangoni AA, Jackson SHD. Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. *Br J Clin Pharmacol*. 2004;57(1):6–14.
2. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf*. 2014;13(1):57–65.
3. Naranjo CA, Busto U, Sellers EM, et al. A method for estimating the probability of adverse drug reactions. *Clin Pharmacol Ther*. 1981;30(2):239–245.
4. O'Mahony D, O'Sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people. *Age Ageing*. 2015;44(2):213–218.
5. Budnitz DS, Lovegrove MC, Shehab N, Richards CL. Emergency hospitalizations for adverse drug events in older Americans. *N Engl J Med*. 2011;365(21):2002–2012.
6. Corsonello A, Pedone C, Corica F, et al. Concealed renal insufficiency and adverse drug reactions in elderly hospitalized patients. *Arch Intern Med*. 2005;165(7):790–795.
7. Spinewine A, Schmader KE, Barber N, et al. Appropriate prescribing in elderly people: how well can it be measured and optimized? *Lancet*. 2007;370(9582):173–184.
8. Steinman MA, Hanlon JT. Managing medications in clinically complex elders: "There's got to be a happy medium". *JAMA*. 2010;304(14):1592–1601.