

Mechanisms and Clinical Consequences of Drug–Drug Interactions in Polypharmacy Patients: A Systematic Review

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Abstract: Polypharmacy, commonly defined as the concurrent use of multiple medications, has become increasingly prevalent among elderly patients and individuals with chronic diseases. Although polypharmacy is often necessary for managing complex medical conditions, it significantly increases the risk of drug–drug interactions (DDIs), adverse drug reactions, therapeutic failure, hospitalisation, and mortality. This systematic review examines the mechanisms, risk factors, and clinical consequences of DDIs in polypharmacy patients. The review further explores pharmacokinetic and pharmacodynamic interactions, vulnerable patient populations, preventive strategies, and recent technological advancements for DDI detection and management. The findings indicate that effective medication review, clinical decision support systems, pharmacovigilance, and personalised medicine approaches are essential for minimising DDI-related complications and improving patient safety.

Keywords: Drug–Drug Interactions, Polypharmacy, Pharmacokinetic Interactions, Pharmacodynamic Interactions, Adverse Drug Reactions, Patient Safety, Clinical Pharmacology