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Clinical Evaluation of Drug–Drug Interactions in Hospitalized Patients with Cardiovascular Disorders

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Abstract: Drug–drug interactions (DDIs) represent a significant clinical challenge in the management of patients with cardiovascular disorders, especially during hospitalization when multiple medications are administered concurrently. This study aims to evaluate the prevalence, types, and clinical significance of DDIs among hospitalized cardiovascular patients, identifying risk factors and proposing strategies for prevention and management. A prospective observational study was conducted on 250 patients admitted for cardiovascular conditions including hypertension, ischemic heart disease, and heart failure. Using drug interaction databases and clinical assessment tools, potential and actual DDIs were identified and classified. Results revealed that 68% of patients experienced at least one potential DDI, with 21% experiencing clinically significant interactions leading to adverse events or therapy modification. Polypharmacy, older age, and renal impairment were major risk factors. Implementation of clinical pharmacology services and computerized alert systems are recommended to minimize DDI-related complications and improve patient outcomes.

Keywords: Drug–drug interactions, Cardiovascular disorders, Polypharmacy, Hospitalized patients, Clinical pharmacology, Adverse drug events.

Introduction:

Cardiovascular diseases (CVD) remain the leading cause of morbidity and mortality worldwide, necessitating complex pharmacotherapy regimens involving antihypertensives, antiplatelets, anticoagulants, lipid-lowering agents, and others. Hospitalized patients with CVD often receive multiple drugs simultaneously, increasing the risk of drug–drug interactions (DDIs). DDIs can lead to reduced therapeutic efficacy, increased toxicity, and adverse drug reactions, complicating clinical management and prolonging hospital stays. Despite advances in pharmacotherapy, the clinical evaluation and monitoring of DDIs remain suboptimal, particularly in resource-limited settings. Understanding the prevalence and patterns of DDIs in hospitalized cardiovascular patients is essential for implementing effective preventive strategies. This study investigates the nature and impact of DDIs in this vulnerable population, focusing on clinical relevance and actionable interventions.

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Materials and Methods:

A prospective observational study was conducted over 10 months in the cardiology and internal medicine wards of Samarkand State Medical University Hospital. Inclusion criteria were adult patients (≥18 years) hospitalized with a primary diagnosis of cardiovascular disease and receiving at least two concomitant medications. Data collection included detailed medication histories, laboratory values, and clinical status. Potential DDIs were identified using Micromedex and Lexicomp interaction databases. Each interaction was classified by severity (major, moderate, minor) and documentation level (established, probable, suspected). Clinical pharmacists reviewed patient records daily to detect actual DDIs manifesting as adverse events or requiring therapy modification. Demographic variables and clinical parameters, including renal function and comorbidities, were recorded. Statistical analysis involved descriptive statistics and logistic regression to determine risk factors for clinically significant DDIs.

Results:

Among 250 patients enrolled, the mean age was 66.4 years; 58% were male. The average number of drugs prescribed per patient was 6.4. Potential DDIs were identified in 170 patients (68%), with a total of 412 interactions documented. Major interactions accounted for 24%, moderate for 54%, and minor for 22%. Clinically significant DDIs resulting in adverse effects or necessitating treatment changes occurred in 53 patients (21%). The most frequent interacting drug pairs included warfarin-aspirin, amiodarone-simvastatin, digoxin-verapamil, and ACE inhibitors-potassium-sparing diuretics. Adverse events linked to DDIs included bleeding, hyperkalemia, bradycardia, and hypotension. Logistic regression identified polypharmacy (≥7 drugs) (OR 2.8, $p<0.001$), age over 70 years (OR 1.9, $p=0.01$), and impaired renal function (OR 2.3, $p=0.003$) as significant predictors of clinically relevant DDIs.

Discussion:

The high prevalence of potential and clinically significant DDIs among hospitalized cardiovascular patients underscores the critical need for vigilant medication management. Polypharmacy remains the most important risk factor, reflecting the complex therapeutic requirements in CVD management. Drug pairs such as warfarin and aspirin exemplify the delicate balance between benefit and risk, where DDIs can lead to severe bleeding complications if not closely monitored. Similarly, interactions involving amiodarone and statins heighten the risk of myopathy and require dose adjustments or alternative therapies. The observed association between older age and DDIs aligns with age-related changes in pharmacokinetics and pharmacodynamics, as well as the increased likelihood of comorbidities. Renal impairment further complicates drug clearance, enhancing the risk of toxicity. Implementation of clinical pharmacology services, including medication reconciliation, routine interaction screening, and interdisciplinary collaboration, is essential. Moreover, integration of computerized DDI alert systems can aid prescribers in real-time decision-making. Educational programs aimed at healthcare professionals will enhance awareness and management of DDIs, improving patient safety and treatment efficacy.

Conclusion:

Drug–drug interactions are highly prevalent and clinically impactful in hospitalized patients with cardiovascular disorders. Risk factors such as polypharmacy, advanced age, and renal dysfunction contribute significantly to DDI occurrence and severity. Early identification and proactive management strategies including clinical pharmacology interventions and computerized alert tools are paramount to mitigate adverse outcomes. This study highlights the necessity of incorporating structured DDI evaluation protocols within cardiovascular inpatient care to optimize therapeutic safety and effectiveness.

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