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Research Paper

Evaluation of Drug Drug Interaction In Clinical Settings

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ABSTRACT

Drug–drug interactions (DDIs) are a significant concern in clinical practice due to their potential impact on patient safety and therapeutic outcomes. This study aimed to evaluate the prevalence, types, severity, and clinical significance of DDIs in hospitalized patients. A prospective observational study was conducted on 50 patients admitted to various wards of a tertiary care hospital who were receiving two or more medications. Patient data, including demographic details and medication profiles, were collected and analyzed using standard drug interaction databases such as Micromedex® and Lexicomp®.The results revealed that 32 out of 50 patients (64%) experienced at least one potential DDI, with a total of 78 interactions identified. Among these, moderate interactions were the most common (54%), followed by major (23%) and minor interactions (23%). Pharmacodynamic interactions (55%) were slightly more prevalent than pharmacokinetic interactions (45%). Cardiovascular drugs, antibiotics, and antidiabetic agents were the most frequently involved drug classes.The study highlights that polypharmacy, especially in hospitalized patients, significantly increases the risk of DDIs, potentially leading to adverse drug reactions, prolonged hospital stays, and increased healthcare costs. Early identification and appropriate management of DDIs are essential to minimize risks.In conclusion, DDIs are highly prevalent in clinical settings and require careful monitoring. The involvement of clinical pharmacists, use of computerized screening tools, and regular medication review can play a crucial role in preventing harmful interactions and improving patient safety.

INTRODUCTION

Drug–drug interactions (DDIs) are an important concern in clinical practice, as they can significantly affect patient safety and therapeutic outcomes. A DDI occurs when the pharmacological effect of one drug is altered by the presence of another drug, leading to either reduced efficacy or increased toxicity [1]. DDIs can result from changes in drug absorption, distribution, metabolism, or excretion

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(pharmacokinetic interactions) or from additive, synergistic, or antagonistic effects at the site of action (pharmacodynamics interactions) [2].

The prevalence of DDIs is increasing worldwide due to the rising use of multiple medications, particularly in elderly patients and those with chronic conditions such as hypertension, diabetes, cardiovascular disorders, and renal impairment [3]. Polypharmacy, defined as the concurrent use of five or more drugs, is a major risk factor for DDIs and is associated with a higher incidence of adverse drug reactions and hospitalizations [4]. Studies indicate that up to 30% of hospitalized patients experience at least one clinically significant DDI during their stay [5].

Certain drug classes are more frequently involved in DDIs. Cardiovascular drugs (e.g., antihypertensives, anticoagulants), antidiabetic agents, antibiotics, and psychotropic medications are often implicated due to their narrow therapeutic indices and complex metabolism [6]. DDIs can lead to serious clinical consequences, including hemorrhage, hypotension, hypoglycemia, or treatment failure, which emphasizes the need for careful monitoring and risk management [7].

Detection and management of DDIs are facilitated by clinical pharmacists and computerized drug interaction alert systems. The implementation of electronic prescribing tools and regular medication reviews has been shown to reduce the incidence of harmful interactions and improve patient safety [8]. Despite these interventions, the identification of DDIs remains a challenge in clinical settings due to factors such as alert fatigue, incomplete patient history, and variability in individual drug responses [9].

Evaluating the prevalence, type, and severity of DDIs in hospital settings is essential to develop targeted strategies for preventing adverse outcomes. Understanding which drug combinations pose the highest risks allows healthcare professionals to optimize therapy, enhance treatment efficacy, and reduce avoidable complications [10].

Drug-drug interactions (DDI) account for around 5% of all adverse medication reactions in hospitals, most of which are preventable [17-18]. After being released from the hospital, up to 10% of patients experience at least one adverse medication reaction [19].Among the most significant risk factors for drug-related issues include medication changes, the addition of new medications during a hospital stay, and the absence of therapeutic or nursing care following discharge. According to certain research, 40–70% of patients who are discharged may have a potentially harmful drug interaction [20].

The prevalence of possible DDI and their clinical significance in a patient's discharge medicine in the medical wards of a community teaching hospital were the objectives of this prospective investigation. Before the patient was discharged, pertinent clinical information was provided to the treating physicians in a written, standardized manner.

Adverse drug reactions are caused by drug-drug and drug-dietary supplement interactions, and they cost the US $5 to $7 billion a year [21]. Hospital admissions and ER visits are thought to be caused by interactions, which account for 3% to 5% of avoidable adverse medication reactions in hospitals [22]. In both hospital and outpatient settings, the emergence of adverse medication reactions as a result of drug interactions can significantly affect patient outcomes and lengthen hospital stays. At least 60% of adverse medication responses are avoidable, according to estimates from the World Health Organization [20]. DDIs account for 20% of all adverse medication events in the US alone [23], could result in approximately 770,000 fatalities and $30 billion [24] Healthcare costs have reached $180 billion [25] and four

hospital admissions for every 1,000 individuals per year [26].

This issue will only get worse due to an ageing population, polypharmacy treatment, supplement use, and drug misuse.By 2020, 18% of Americans will be over 65 [27], while the average patient over 65 now takes four drugs [28].Concurrent use of five or more drugs is known as polypharmacy, and it is linked to an 80% chance of having a DDI [29]. In the United States today, about 36% of adults are classified as polypharmacy patients [30]. According to a recent Swiss study, 41% of patients assigned to a community nursing service for medication management experienced medication errors, 13% needed at least one hospital stay or medical review as a result, and more than 60% were avoidable [31]. Therefore, it is crucial that discharge medicine has the lowest possible risk of DDI and that physicians are aware of potentially avoidable drug-related problems.

The field of pharmacy has developed continuously to assist other medical specialists and offer patients high-quality care, in part by reducing the risk of avoidable adverse medication events. The Joint Commission of Pharmacy Practitioners (JCPP) released a model of the patient care process for chemists in 2014 [32].

Online drug information databases' scope, accuracy, and comprehensiveness have all been assessed in earlier research. In one study, the highest ranking database based on scope, completeness, and simplicity of use was identified using fifteen types of pharmacological information enquiries, including drug-drug interactions [33]. Drug-drug interactions (DDIs) have been recognised as a significant subcategory of prescription errors, and pharmacists are crucial in safeguarding the public against these risks [34]. They have the chance to examine patient drug profiles in both inpatient and outpatient settings prior to dispensing, and they are specially trained to identify medication-related issues.

Computerized DDI screening is one of the methods chemists use to check drug profiles for DDIs. The majority of pharmacy computer systems used in community and hospital pharmacies offer computerized screening for DDIs and other possible medication-related issues. Pharmacy benefit managers also incorporate this screening into the prospective, online drug utilization assessment. Pharmacists can manually review medication regimens, but only about 70% of DDIs in a two-drug regimen can be identified without the use of an aid (such as a drug interaction reference or computer program), and the percentage drops significantly as the number of medications increases [35]. Therefore, compared to manual review alone, computerised DDI screening has the potential to greatly improve the identification of potentially dangerous DDIs [36].

Table no 1: Common Drug–Drug Interactions Observed in Hospitalized Patients

Drug 1	Drug 2	Type of Interaction	Mechanism	Severity
Warfarin	Amoxicillin	Increased bleeding risk	Pharmacodynamic	Major
Metformin	Cimetidine	Increased metformin levels	Pharmacokinetic	Moderate
Atenolol	Verapamil	Enhanced hypotensive effect	Pharmacodynamic	Moderate
Digoxin	Furosemide	Increased risk of toxicity	Pharmacokinetic	Major
Aspirin	Ibuprofen	Reduced antiplatelet effect	Pharmacodynamic	Moderate

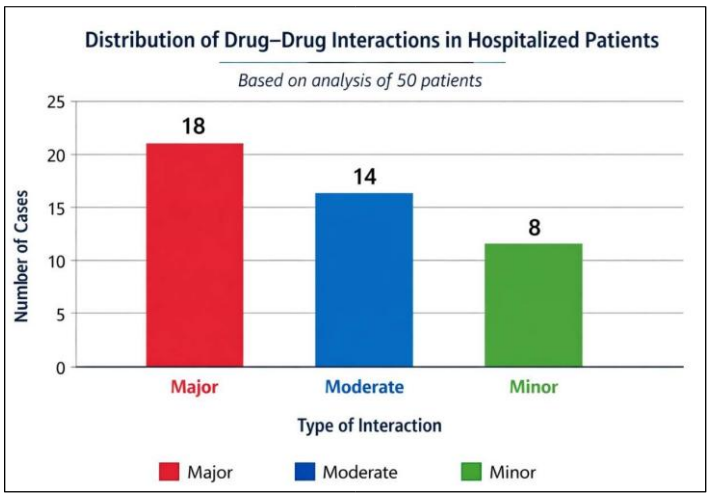

Fig no 1: Distribution of Drug Interactions in Patient

Life-threatening harm from drug–drug interactions:-

a) Bleeding and thrombosis

In addition to being dangerous on its own, warfarin and the direct-acting oral anticoagulants (dabigatran, rivaroxaban, and apixaban) are particularly dangerous in patients taking additional medications that alter the pharmacokinetics or pharmacodynamics of these anticoagulants.The risk is highest in patients with organ dysfunction (renal or hepatic) or when starting or quitting other medications. For instance, in patients on warfarin or direct-acting oral anticoagulants, starting or stopping macrolide antibiotics that inhibit CYP3A4, such as erythromycin or clarithromycin, increases the risk of bleeding or thrombosis. By blocking the metabolism of warfarin, the widely prescribed anti-arrhythmic amiodarone significantly increases the effect of warfarin on the risk of bleeding. The powerful impact of several supplementary medications on CYP450-catalyzed reactions is frequently disregarded [37]. These interactions are so significant that patients taking warfarin on a long-term basis must take into account the risk of an increased or decreased effect of warfarin whenever another medication is taken or stopped.

b) Bone marrow toxicity

Because allopurinol and its metabolite oxypurinol inhibit the enzyme xanthine oxidase, which is also crucial for the detoxification of azathioprine, the combination of allopurinol for gout and azathioprine for immunological conditions like systemic lupus erythematosus (SLE) or Crohn's disease (inflammatory bowel disease) can be fatal [38]. If the patient is continuously monitored for marrow toxicity and the dosage of azathioprine or its active metabolite 6mercaptopurine is lowered to around a quarter to a third, the combination may be administered. In fact, gastroenterologists who specialise in inflammatory bowel disorders employ the combination to increase azathioprine's efficacy, and frequent monitoring of blood azathioprine metabolite concentrations improves safety [39].

c) Viral diseases

There are many and potentially dangerous drug interactions when it comes to HIV treatment. The University of Liverpool, UK's Liverpool HIV Pharmacology Group maintains a great resource at http://www.hiv-druginteractionslite.org/. The primary risk is the loss of viral suppression. For instance, the use of carbamazepine, a CYP 3A4/5 inducer prescribed for neuropathic pain or epilepsy, is likely to result in a significant drop in indinavir concentrations. As was mentioned

above, there may be interactions when using direct-acting antiviral medications to treat hepatitis C.

d) Hypotension

Combinations of antihypertensive medications, such as ACE inhibitors or angiotensin II receptor inhibitors, which can also be administered for heart failure or renoprotection in type II diabetes, raise the risk of postural hypotension and the resulting fall-related damage. When taken with other antihypertensives, the CCB diltiazem, which is recommended for hypertension, might cause postural hypotension, worsen heart failure, and slow the heart rate. Unfortunately, patients are frequently taken this CCB together with a beta-blocker, which increases the risk of both hypotension and severe bradycardia [40]. Although this combination is frequently used in cardiology with favourable results when closely monitored, older patients seem to be more vulnerable to the negative consequences of this combination, particularly those who have some organ dysfunction and polypharmacy. Additionally, diltiazem is a CYP 3A4/5 inhibitor and a frequently chosen antihypertensive in patients receiving heart transplants who are administered calcium-nerin inhibitors, such as cyclosporin, the dosage of which is considerably reduced in the presence of diltiazem [41].

AIM & OBJECTIVE

Aim:

To evaluate the prevalence, types, and clinical significance of drug–drug interactions in hospitalized patients across multiple wards.

Objectives:

1. To determine the prevalence of drug–drug interactions (DDIs) in hospitalized patients receiving two or more medications.
2. To classify identified DDIs based on severity: major, moderate, and minor.
3. To categorize DDIs according to mechanism: pharmacokinetic or pharmacodynamic.
4. To identify the drug classes most commonly involved in clinically significant interactions.
5. To assess the potential clinical impact of identified DDIs on patient outcomes.
6. To suggest preventive strategies and interventions to minimize harmful DDIs in clinical settings.

❖ Types of drug–drug interactions (DDIs) in hospitalized patients

1. Pharmacokinetic interactions:- These change how the body handles a drug: absorption, distribution, metabolism, or excretion.

Table no 2: Types of drug–drug interactions (DDIs) in hospitalized patients (Pharmacokinetic interaction)

Sr.no.	Types	Mechanism	Common hospital examples	Why it matters on the ward
1.	Absorption	One drug binds another in the gut or changes gastric pH	Fluoroquinolones + calcium/iron/antacids; PPIs reducing ketoconazole absorption	Subtherapeutic antibiotic/antifungal levels → treatment failure, resistance

2.	Metabolism	Inhibition/induction of CYP450 enzymes	Clarithromycin + simvastatin → CYP3A4 inhibition; Rifampin + warfarin → CYP induction	Toxicity or loss of effect. Statin + macrolide can cause rhabdomyolysis. Rifampin makes warfarin ineffective → thrombosis risk
3.	Protein binding	Displacement from albumin	NSAIDs + warfarin; Sulfonamides + phenytoin	Transient rise in free drug → bleeding or CNS toxicity
4.	Excretion	Competition at renal transporters	Trimethoprim + metformin; NSAIDs + methotrexate	Metformin → lactic acidosis risk; methotrexate → marrow toxicity

2. Pharmacodynamics interactions:- Drugs act on the same pathway or opposite pathways.

Table no 3: Types of drug–drug interactions (DDIs) in hospitalized patients (Pharmacodynamic interaction)

Sr.no.	Types	Mechanism	Common hospital examples	Clinical significance
1.	Additive/synergistic	Same effect amplified	Opioids + benzodiazepines → CNS depression; Warfarin + SSRIs → bleeding l	Respiratory arrest, ICU transfer, major hemorrhage
2.	Antagonistic	Opposite effects	Beta-blocker + betaagonist in COPD; Levodopa + antipsychotics	Loss of disease control, worsening Parkinsonism or bronchospasm
3.	QT prolongation	Multiple drugs prolong cardiac repolarization	Amiodarone + azithromycin + haloperidol + ondansetron	Torsades de Pointes → sudden cardiac death
4.	Serotonin toxicity	Excess serotonin activity	Linezolid + SSRIs; Tramadol + duloxetine	Hyperthermia, rigidity, seizures, ICU admission

1. ICU/CCU: Highest risk. Polypharmacy, organ dysfunction, and IV meds. CYP interactions with azoles, amiodarone, and sedatives can cause hemodynamic instability. QT and CNS depression interactions are leading causes of adverse events here.
2. General medicine: Warfarin, insulin, opioids, and antibiotics drive most serious DDIs. Warfarin + antibiotics/NSAIDs is a classic cause of in-hospital major bleeding.
3. Surgery: Peri-opadds NSAIDs, anticoagulants, and anesthetics. NSAID + LMWH or SSRI increases post-op bleeding.

Linezolid in infected surgical patients can trigger serotonin syndrome with existing antidepressants.

4. Oncology: CYP3A4/2D6 interactions with chemotherapy and antiemetics are common. Apixaban + strong CYP inhibitors can cause bleeding; ondansetron + QT drugs increases arrhythmia risk in already cardiac-compromised patients.
5. eriatrics: Age-related decline in renal/hepatic function amplifies both PK and PD interactions. Beers Criteria highlights warfarin + NSAIDs, benzodiazepine + opioid, and anticholinergic burden as major DDI risks for delirium, falls, and bleeding.

Why hospital patients are uniquely vulnerable?

- Polypharmacy: Average inpatient gets 8-12 meds. Each added drug increases DDI risk exponentially.
- Acute illness: Renal/hepatic injury, hypoalbuminemia, and altered GI function change drug handling day-to-day.
- Transitions of care: New meds started on admission often interact with home meds. Medication reconciliation misses ~30% of interactions.
- Ward-to-ward differences: ICU sees more CYP and QT interactions; med-surg sees more warfarin/antibiotic and opioid/sedative interactions.

Outcomes tied to DDIs:-

DDIs contribute to ~3-5% of hospital admissions and cause 2-3% of in-hospital adverse drug events. The most clinically significant ones lead to bleeding, arrhythmias, hypoglycemia, seizures, serotonin syndrome, and respiratory depression. Many are preventable with stewardship and pharmacy review.

If you're managing or reviewing meds for a specific patient, talk with a clinical pharmacist or the treating physician to check interaction severity, alternatives, and monitoring. They can interpret DDI alerts in the context of dose, timing, labs, and the patient's goals of care.

MATERIALS AND METHODS:

1. Materials:

The following materials and resources will be used for the study:

Patient Data Sources:

- Inpatient medical records from multiple wards of a tertiary care hospital.
- Medication charts and prescriptions of patients receiving two or more drugs.

Reference Tools for DDI Identification:

- Micromedex® – For detecting potential drug–drug interactions and their severity.
- Lexicomp® – For confirming pharmacokinetic and pharmacodynamics interactions.

1.1. Data Recording Tools:

- Pre-designed data collection forms to record demographic details, diagnosis, and drug prescriptions.
- Microsoft Excel or Google Sheets for tabulating and analyzing data.

1.2. Statistical Tools:

- Descriptive statistics for prevalence and frequency analysis.
- Graphical representation using Microsoft Excel or Google Sheets (bar charts, pie charts).

2. Methods:

The study will be conducted as a prospective observational study over multiple hospital wards with 50 patients receiving two or more

medications. The methodology will follow these steps:

2.1. Patient Selection:

- Patients aged >18 years receiving two or more medications will be included.
- Patients on short-term therapy (<48 hours) or with incomplete medical records will be excluded.

2.2. Data Collection:

- Patient demographic data such as age, gender, and diagnosis will be recorded.
- Complete medication charts will be obtained from hospital records, including drug name, dose, route, and frequency.

1. Identification of Drug–Drug Interactions:

- Each patient's medication chart will be analyzed using Micromedex® and Lexicomp® to identify potential DDIs.
- Interactions will be noted along with their severity (major, moderate, minor) and mechanism (pharmacokinetic or pharmacodynamic).

2. Classification of DDIs:

Major: Life-threatening or requiring medical intervention.
Moderate: May require dose adjustment or additional monitoring.
Minor: Usually mild, no significant clinical effect.
Mechanism:
Pharmacokinetic (PK): Interactions affecting absorption, distribution, metabolism, or excretion.
Pharmacodynamics (PD): Interactions affecting the drug's effect without altering its concentration.

3. Data Analysis:

- The prevalence of DDIs in the 50 patients will be calculated.
- Frequency of major, moderate, and minor interactions will be tabulated.
- High-risk drug combinations and most commonly implicated drug classes will be identified.

RESULT AND DISCUSSION

Results

A total of 50 hospitalized patients receiving two or more medications were evaluated for potential drug–drug interactions (DDIs).

1. Prevalence of DDIs Out of 50 patients, 32 patients (64%) were found to have at least one potential DDI. A total of 78 drug–drug interactions were identified.

Table no. 3:- Prevalence of Drug Interaction (DDIs)

Sr. No	Category	Number of Patients	Percentage (%)
1.	Patients with DDIs	32	64%
2.	Patient without DDIs	18	36%
3.	Total	50	100%

2. Severity of DDIs o Major interactions: 18 (23%) o Moderate interactions: 42 (54%) o Minor interactions: 18 (23%) o Moderate interactions were the most frequently observed category.

Table no. 4:- Severity on Identified DDIs

Sr.no.	Severity	Number of interaction	Percentage %
1.	Major	18	23%
2.	Moderate	42	54%
3.	Minor	18	23%
4.	Total	78	100%

3. Mechanism of DDIs o Pharmacokinetic interactions: 35 (45%) o Pharmacodynamic interactions: 43 (55%) o Pharmacodynamic interactions were slightly more common than pharmacokinetic interactions.

Table no. 5:- Mechanism of DDIs

Sr.no.	Mechanism	Number	Percentage %
1.	Pharmacokinetic	35	45%
2.	Pharmacodynamics	43	55%
	Total	78	100%

4. Drug Classes Involved
The most commonly involved drug classes were:
o Cardiovascular drugs (e.g., anticoagulants, antihypertensives) – 30% o Antibiotics – 22% o Antidiabetic agents – 18% o CNS drugs (psychotropics, opioids) – 15% o Others – 15%

Table no. 6:-Drug Classes Most Common Involved

Sr. no.	Drug class	Percentage %
1.	Cardiovascular drugs	30%
2.	Antibiotic	22%
3.	Antidiabetics	18%
4.	CNS drugs	15%
5	Other	15%
6.	Total	100%

5. Common Drug Combinations Identified
Frequently observed interactions included:
o Warfarin + antibiotics → increased bleeding risk o Metformin + cimetidine → increased drug levels o Aspirin + ibuprofen → reduced therapeutic effect o Digoxin + diuretics → toxicity risk

6. Ward-wise Distribution o ICU/CCU: Highest number of DDIs (35%) o General Medicine: 30% o Surgery: 20% o Others: 15%

Table no. 7:- Ward-wise Distribution of DDIs

Sr. no.	Ward	Percentage %
1.	ICU/CCU	35%
2.	General medicine	30%
3.	Surgery	20%
4.	Other	15%
	Total	100%

7. Clinical Impact o Approximately 25% of DDIs required monitoring or dose adjustment o Around 10% were potentially life-threatening if not identified o Most interactions were preventable with proper review and monitoring

Table no. 8:- Clinical Impact of DDIs

Sr. no.	Clinical impact	Percentage
1.	Monitoring/Dose Adjustment	25%
2.	Life-threatening	10%
3.	Preventable	65%
4.	Total	100%

DISCUSSION

The provided study on the "Evaluation of drug drug interactions in clinical settings" highlights several critical insights regarding patient safety and therapeutic outcomes. Below is a discussion of the key findings based on the analysis of 50 hospitalized patients.

Prevalence and Impact of DDIs

The study found that a significant majority of hospitalized patients (64%) experienced at least one potential drug-drug interaction (DDI). This aligns with broader research suggesting that up to 30% of hospitalized patients face clinically relevant interactions. Such a high prevalence is largely attributed to polypharmacy—defined as the concurrent use of five or more drugs— which is an exponential risk factor for adverse reactions.

Severity and Mechanisms

Moderate interactions were the most frequent, accounting for 54% of cases, while major and minor interactions each represented 23%.

Major Interactions: These are life-threatening and require immediate medical intervention. High-risk combinations identified include Warfarin and Amoxicillin, which significantly increases bleeding risk, and Digoxin and Furosemide, which can lead to fatal toxicity due to electrolyte imbalances.

Mechanisms: Interactions were classified as either pharmacokinetic (affecting how the body handles the drug) or pharmacodynamics (affecting the drug's actual effect). For instance, the interaction between Metformin and Cimetidine is pharmacokinetic, as cimetidine interferes with renal clearance, potentially increasing metformin exposure by 40-60% and risking lactic acidosis.

Vulnerable Populations and Clinical Settings

Certain patient groups and hospital wards were identified as being at higher risk:

Geriatrics: Elderly patients are particularly vulnerable due to age-related declines in renal and hepatic function, which amplify both pharmacokinetic and pharmacodynamics interactions.

ICU/CCU: These wards see the highest risk due to complex medication regimens, organ dysfunction, and the use of intravenous medications.

High-Risk Drug Classes: Cardiovascular drugs (anticoagulants, antihypertensives), antibiotics, and antidiabetic agents are most frequently implicated due to their narrow therapeutic indices.

Preventative Strategies and the Role of Pharmacists

The study emphasizes that at least 60% of adverse medication responses are avoidable. Clinical pharmacists play a vital role in identifying these risks through manual regimen reviews and the use of computerized screening tools like Micromedex® and Lexicomp®. While automated systems significantly improve detection, healthcare professionals must remain vigilant against "alert fatigue" and rely on clinical judgment to interpret these alerts in the context of individual patient needs.

In conclusion, reducing the incidence of DDIs requires a multi-faceted approach involving rational prescribing, regular medication reviews, and the active involvement of clinical pharmacists to enhance overall patient safety

CONCLUSION

Drug-drug interactions (DDIs) are a major concern in clinical practice and can have a considerable impact on patient safety and therapeutic results, as the current study on the evaluation of DDIs in hospitalised patients showed. 64% of the 50 patients in the study had at least one possible drug interaction, suggesting that DDIs are common among hospitalised patients who are taking several drugs. A total of 78 interactions were found, with major and minor interactions coming in second and third, respectively. Additionally, the study showed that pharmacodynamics interactions were marginally more common than pharmacokinetic interactions. Clinically relevant interactions were most frequently associated with cardiovascular medications, antibiotics, antidiabetic medicines, and CNS drugs. Antibiotics, CNS medications, cardiovascular medications, and antidiabetic medications were the pharmacological classes most frequently implicated in clinically meaningful interactions. Digoxin and diuretics, metformin and cimetidine, and warfarin and antibiotics are common combos that have been linked to higher risks of bleeding, toxicity, and changed therapeutic effects. Because of polypharmacy, severe illness, and complicated treatment regimes, ICU/CCU patients had the greatest incidence of DDIs. The results highlight the importance of various comorbidities, organ failure, polypharmacy, and advanced age as risk factors for DDIs. With diligent drug reviews, prompt intervention, therapeutic monitoring, and sensible dosing, many of these interactions can be avoided.

Drug-drug interactions (DDIs) in hospitalised patients were evaluated in the current study, which demonstrated Clinical chemists' active involvement and the use of computerised screening programs like Micromedex® and Lexicomp® can significantly lower the prevalence of dangerous DDIs. In conclusion, minimising drug-drug interactions and enhancing overall patient care and treatment results in hospital settings require ongoing prescription monitoring, raising awareness among medical professionals, and putting preventive measures into practice.

This study's assessment of drug-drug interactions (DDIs) in clinical settings leads to the conclusion that DDIs pose a serious risk to patient safety, especially for hospitalised or polypharmacy patients. 50 patients were analysed, and 78 interactions were found, with 64% of them experiencing at least one possible DDI. Of these, 54% were moderate, frequently necessitating dose modifications, and 23% were serious, offering potentially fatal hazards. Cardiovascular drugs, anticoagulants like warfarin, and antidiabetic

drugs like metformin are high-risk medicine classes that are often involved. Major bleeding, lactic acidosis, and sudden cardiac death from QT prolongation are typical serious consequences. The study emphasises that although polypharmacy, which is defined as taking five or more medications, is a major risk factor, many of these negative outcomes are avoidable. Clinical chemists' active participation in medication reviews and the use of computerised DDI screening instruments, such as Micromedex® and Lexicomp®, are essential components of effective mitigation strategies. In the end, optimising therapy efficacy and improving overall patient outcomes requires a multidisciplinary approach to rational prescribing and ongoing monitoring.

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