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POLYPHARMACY CHALLENGES IN GERIATRIC SURGICAL PATIENTS WITH MEDICAL AND PSYCHIATRIC COMORBIDITIES: A HOSPITAL-BASED OBSERVATIONAL STUDY

Dr. Manjula Shetty[1*], Dr. Caroline Peter D'Souza[2], Dr. Sandesh K.S.[3] , Dr. Leeladhar D.V.[4] , Dr. Shyam Krishna Ashok[5]

[1*]Dr. Manjula Shetty Assistant Professor, KVG Medical College and Hospital, Sullia
[2]Dr. Caroline Peter D'Souza Assistant Professor, Kasturba Medical College, Mangalore
[3]Dr. Sandesh K.S. Assistant Professor, Department of Postgraduate Studies, Nehru Memorial College, Sullia
[4]Dr. Leeladhar D.V. Associate Professor of Ayurveda, KVG Medical College, Sullia
[5]Dr. Shyam Krishna Ashok Assistant Professor, KVG Medical College and Hospital, Sullia

***Corresponding Author:** Dr. Manjula Shetty
*Assistant Professor, KVG Medical College And Hospital, Sullia

Abstract
Polypharmacy is a major clinical issue in geriatric surgery, especially where the patient has both medical and psychiatric comorbidities. This has a high possibility of negative medication responses and drug-drug interactions (DDIs), postoperative complications, and lengthy hospital stays since there is concurrent use of multiple drugs among this population group. This research work also differed in that it was intended to evaluate the prevalence, prescription practice, and clinical consequences of polypharmacy among elderly surgical patients with multimorbidity. Over a year, a prospective observational study was conducted at a teaching hospital in India that provides tertiary care. The research involved 170 subjects with 65 years of age or older and had undergone elective or emergency surgery, where each of them had at least one chronic medical condition and one diagnosed psychiatric disorder. Data were collected on demographics, clinical history, medication profiles, potentially inappropriate medications (PIMs), DDIs, and postoperative outcomes, and analyzed using descriptive and inferential statistical methods. The prevalence of polypharmacy (five or more medicines) was noted in 66.5% of patients, whereas excessive polypharmacy (ten or more medicines) was reported in 19.4% of the patients. PIMs were identified in 41.8% of patients, and 15.2% experienced severe DDIs. Postoperative delirium was observed in 12.4% of the cohort and was significantly associated with polypharmacy and psychotropic drug combinations. Patients exposed to polypharmacy had longer hospital stays and a higher incidence of 30-day readmissions. Emergency surgical status and psychiatric comorbidity independently predicted adverse outcomes. These findings emphasize the urgent need to integrate multidisciplinary medication reviews and geriatric-psychiatric assessments into perioperative care pathways to minimize medication-related harm and improve patient outcomes in elderly surgical populations.

Keywords: Polypharmacy, Geriatric surgery, Psychiatric comorbidity, Drug–drug interactions, Potentially inappropriate medications

1. Introduction

The demographics in countries around the world are being restructured because there is a constant rise in the percentage of the older population. With current medical advancements in increasing life expectancy, the number of people living over the age of 65 years is still increasing at an alarming pace. With the associated increase in age-related chronic diseases, this demographic shift will be accompanied by an increasing prevalence of multimorbidity in older people, that is, the comorbidity of two or more chronic morbid conditions. The fact that various diseases can occur simultaneously in an elderly person has led to the emergence of a complicated treatment plan and taking a variety of medications, a process commonly termed as polypharmacy. Although polypharmacy is occasionally clinically justified, it has now emerged that polypharmacy is a two-edged sword in geriatric practice. Research has repeatedly shown that polypharmacy indicates poor clinical outcomes, such as functional deterioration, falls, cognitive disorders, adverse drug-to-drug interactions, and hospitalization rates (Baruth et al., 2020; Nobili et al., 2011).

These obstacles are increased in the context of surgery. The elderly have a higher risk of receiving surgical services because of age-related degenerative diseases like osteoarthritis, cataracts, or even cancer. Nevertheless, age-related physiological changes, a smaller organ reserve, and poor homeostatic disturbances make them extraordinarily susceptible to surgical stress. An evidence-based multidimensional instrument that has gained value is the "comprehensive geriatric assessment (CGA)", which has been used to identify frailty, optimize functional status, and also improve postoperative recovery (Pilotto et al., 2017). However, CGA is not widely practised in a majority of surgical contexts, especially in low- and middle-income nations. Besides, perioperative adverse events cannot be related to physiological weakness or systemic complexity only. One of the most common causes of pharmacokinetic and pharmacodynamic imbalances in surgical patients is the combined use of many drugs, which can lead to unexpected adverse drug incidents (Leendertse et al., 2008; Mohammed et al., 2022).

Another complexity in geriatric surgery care is derived from the large volume of psychiatric and neurocognitive illnesses in elderly patients. Depression, anxiety, dementia, and delirium are very common in old age and are poorly recognized in the surgical environment (Oh et al., 2015). Such conditions can not only affect cognitive and functional capabilities before surgery, but also affect the intraoperative climate and those after the surgery. The comorbidity of psychiatric illnesses may imply that psychotropic medications have to be used, and these medications can interact with anesthetic agents as well as postoperative drugs, further increasing the likelihood of delirium, sedation, or cardiovascular events. Moreover, compromised thinking can disrupt informed consent, pain measurement, medication compliance, and after-discharge follow-up plan (Sowmya & Pandey, 2025). Underdiagnosis and ineffective treatment of psychiatric syndromes during the perioperative period are also enhanced by the poorest system of diarrhea healthcare delivery, where there is little integration between the surgical, psychiatric, and geriatric healthcare services.

The concurrent use of five or more pharmaceuticals is sometimes referred to as polypharmacy, or polymedication, and is an underrecognized issue in the hospital care of the elderly. The cause of this proliferation of medications in surgical wards is the installation of prophylactic antibiotics, analgesics, anticoagulants, antiemetics, and the initiation of baseline treatment of chronic diseases. Even though a certain level of polypharmacy can be both unavoidable and therapeutically required, improper prescribing, which in turn is described as the use of medications with more significant risks than benefits, is a burning issue. Assessment instruments include Beers Criteria and STOPP/START tools, aimed at recognizing the potentially inappropriate medicines (PIMs), but are followed unevenly throughout various systems of providing care. Not only does polypharmacy increase the likelihood of adverse drug interactions, but also their severity rates, as age-related changes in renal clearance, hepatic metabolism, and blood-brain barrier permeability are more detrimental in polypharmacy (Ticinesi et al., 2017). As an example, the use of sedatives and anticholinergic medications or medications often applied in psychiatric treatment may be one of the inciting factors in the development of postoperative delirium, postoperative falls, and respiratory issues.

The latest results of observational studies provide evidence that polypharmacy is a directly and separately linked factor with an increase in hospitalization length, elevated healthcare expenditures, and postoperative complications among older patients (Jianghua Shen et al., 2023; Curtin et al., 2018). Moreover, population-based data show that there was a consistent increase in the complexity of geriatric patients hospitalized not only in the aspect of disease burden but also in pharmacologic profiles (Naik et al., 2024). Despite these threatening trends, the topic of polypharmacy related to the presence of medical and mental comorbidities in surgical patients older than age 65 is not well-established. The majority of literature is inclined to isolate geriatric care to either the medical or psychiatric segment, and few studies have been conducted discussing the complex relationship between these aspects in the surgery setting (Ribbink et al., 2024). Such a myopic manner of putting the pieces together is likely to result in poor opportunities to plan comprehensive care, risk stratification, and reconciliation of medications.

In light of this context, it is evident that research addressing the trinity of surgical, medical, and mental concerns in elderly patients is desperately needed. Due to the defined prevalence, patterns, and outcomes of polypharmacy in this vulnerable group, a hospital-based real-time observational study can obtain precious information. The research would be important in instilling institutional policies, enhancing effective perioperative care, and ensuring a safe culture in the use of drugs in a multidisciplinary approach. In this study, the burden of polypharmacy is examined in older surgical patients with proven medical and psychological comorbidities. The main goals are to assess the level of polypharmacy, the most common types of drugs, possible interactions between them, and the correlation of these factors with adverse outcomes after surgery (delirium, longer stay, and readmission). With this study, we will aim to improve the state of medication management in geriatric surgery by generating a more holistic and evidence-based practice, to the eventual improvements of patient safety, the prevention of avoidable adverse effects, and the overall benefits of healthy aging and rational drug therapy.

2. Methodology

2.1 Study Design and Setting

The proposed study assumed a prospective, observational research style with a one-year follow-up in January, ending December 2024 at a tertiary teaching hospital in Northern India. The study was conducted through the departments of General Surgery, Orthopedics, and Psychiatry, which allowed a holistic clinical approach to the observation of the relationship between surgical treatment, chronic disease treatment, and psychiatric screening in geriatric patients. The multidisciplinary service model in the hospital was a proper environment to measure the real-time health burden and clinical implications of polypharmacy in multiple comorbid geriatric surgical patients.

2.2 Study Population and Sampling

Consecutive sampling was employed to recruit participants to allow demonstration of real-life applicability and reduce selection bias. In order to be eligible, the patient had to be 65 years of age or older, admitted under general, regional, or local anesthesia, and have a diagnosis of at least one chronic illness (such as diabetes, hypertension, or chronic kidney disease) in addition to a mental illness (such as schizophrenia, depression, anxiety, or dementia). A certified psychiatrist used ICD-10 classification to ensure psychiatric diagnosis. Terminally ill patients under palliative care, patients who died during surgery or within 24 h of surgery, patients with incomplete and inaccessible medication history, and patients who presented with a primary psychiatric diagnosis regarding substance use were also excluded. All participants signed written informed consent or their legal representative in case of impaired cognition.

2.3 Sample Size

The study's size and the hospital patient flow were taken into account when determining the sample size. Throughout the study period, 170 individuals were enrolled in total. This sample size was

considered to be sufficient because this study was not carried out on formal statistical power calculations, but rather to describe the pattern of medication use, as well as evaluate the drug-related issues, and also assess the perioperative outcome among geriatric surgical patients having complex clinical backgrounds etc.

2.4 Data Collection Tools and Procedure

A standardised, pretested case record form was used to acquire data and was formulated in collaboration with professionals working in geriatric medicine, psychiatry, surgery, clinical pharmacology, and clinical pharmacy. Such a form collected much information at the level of patients (demographic (age, sex, residence, education), clinical indicators (ASA classification, type of surgery, duration of hospital stay) and extensive lists of preoperative, intraoperative, and postoperative drugs. The WHO "Anatomical Therapeutic Chemical (ATC) classification" was utilized in the classification of drugs. Polypharmacy was defined as the taking of five or more drugs in sync, and excessive polypharmacy was defined as the consumption of ten or more. It was assessed on the presence of potentially inappropriate medications (PIMs) based on the "2019 American Geriatrics Society Beers Criteria" (American Geriatrics Society Beers Criteria® Update Expert Panel, 2019). All the drugs (over-the-counter (OTC) drugs, complementary drugs, etc.) were also noted. Lexicomp ® interaction checker was used to detect drug-drug interactions (DDIs) and also evaluate their clinical severity and recommend proper action. The data would be tabulated by the trained clinical pharmacists in the daily ward round, but confirmed by the principal investigator.

2.5 Outcome Measures

The high prevalence of polypharmacy and atypical polypharmacy in the perioperative setting among elderly patients with mental and medical comorbidities served as the end measure. The frequency and severity of drug interactions, utilization of PIMs, and the number and type of drug-related problems (DRPs) and their association with clinical outcomes, i.e., postoperative delirium, enhanced hospital stay, and unplanned readmission within 30 days, were considered as secondary outcomes. Consciousness status was measured by the Confusion Assessment Method (CAM), which was done daily by duly trained nursing personnel following the postoperative course. Other secondary outcomes were the duration of hospitalization (measured in days), rates of complications of common surgical complications (e.g., infections, bleeding, electrolyte imbalances), and the relation between drug burden and morbidity outcomes.

2.6 Data Quality Assurance

In order to make the data collected reliable and consistent, a number of quality assurance procedures were introduced. Two research associates independently reviewed all case records in terms of completeness and accuracy. The disagreements were addressed by consensus meetings with the clinical pharmacist, surgical unit registrar, and psychiatrist. The inter-rater reliability of mental diagnoses and delirium assessments was measured using Cohen's kappa statistic, which has a threshold of 0.80, meaning that $0 > \text{kappa} > 0.80$. Data collectors were also regularly trained to ensure consistency of the assessment methods, reduce the effects of observer bias. A sample of one in ten records of the patients was randomly audited monthly in order to assess internal consistency. All the data were anonymized and safely stored in encrypted and controlled access files, which ensured the confidentiality of patients and ensured ethical norms.

2.7 Ethical Considerations

The study received ethical clearance from the Institutional Ethics Committee of the hospital (Approval No. IEC/2023/76/Med). None enrolled without providing a written informed consent. Within patients who had cognitive dysfunction or neuropsychiatric disorders that caused intellectual disability, the opposite kin or state-appointed representative was asked to give consent based on the national ethical

records. Data privacy and confidentiality of the patients were observed to the letter in the research. The data analysis and dissemination did not employ patients' identifiers.

2.8 Statistical Analysis

The analysis of data was done in IBM SPSS Statistics Version 22. Descriptive statistics techniques included summation of demographic and clinical data, such as frequencies, percentages, means, and standard deviations. The Fisher exact test or chi-square was used to compare categorical variables, while the independent t-test or Mann-Whitney U test, depending on the data distribution, was used to compare continuous variables. Logistic regression models have been constructed that aimed at finding predictors of PIM, polypharmacy, and postoperative complications. Multivariate models were used for variables with $p < 0.10$ in univariate analysis. The statistical significance level of $p < 0.05$ was applied to all analyses.

3. Results

3.1 Demographic and Clinical Profile

The study included 170 elderly patients who were 65 years of age or older. The participants' ages ranged from 65 to 91 years old, with a mean age of 72.6 ± 6.1. Males made up 45.9% (n = 78) of the sample, while females made up 54.1% (n = 92). The majority of patients (61.8%) underwent elective surgeries, while the remaining 38.2% were admitted for emergency surgical interventions. The most common types of surgery included abdominal (36.5%), orthopedic (29.4%), and genitourinary procedures (17.1%). Regarding comorbid medical conditions, hypertension (63.5%), type 2 diabetes mellitus (51.2%), and chronic kidney disease (21.8%) were most frequently observed. Psychiatric diagnoses included depression in 42.9% of patients, anxiety disorders in 25.9%, dementia in 18.8%, and schizophrenia or other psychoses in 12.4%.

Table 1 provides a detailed summary of the demographic and clinical features of 170 elderly surgical patients. Most participants were aged above 70, with a slight female predominance. Hypertension, diabetes, and depression were the most prevalent comorbidities, reflecting the dual burden of chronic medical and psychiatric conditions in this cohort.

Table 1: Demographic and Clinical Characteristics of the Study Population (n = 170)

Variable	Frequency (%) or Mean ± SD
Age (years)	72.6 ± 6.1
Gender (Male/Female)	78 (45.9%) / 92 (54.1%)
Elective Surgery	105 (61.8%)
Emergency Surgery	65 (38.2%)
Hypertension	108 (63.5%)
Diabetes Mellitus (Type 2)	87 (51.2%)
Chronic Kidney Disease	37 (21.8%)
Depression	73 (42.9%)
Anxiety Disorders	44 (25.9%)
Dementia	32 (18.8%)
Schizophrenia/Other Psychoses	21 (12.4%)

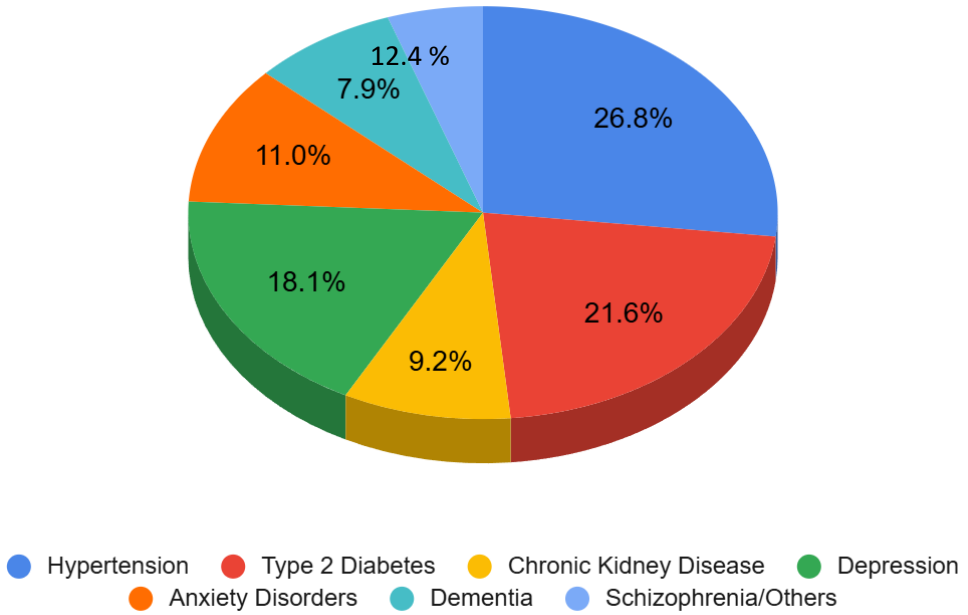

Figure 1: Distribution of Medical and Psychiatric Comorbidities in the Study Population

Figure 1 illustrates the distribution of major medical and psychiatric comorbidities among the geriatric surgical patients. Hypertension and diabetes were the most prevalent medical conditions, while depression and anxiety dominated the psychiatric profile. The chart emphasizes the complex multimorbidity burden in this vulnerable population, underscoring the need for integrated care.

3.2 Prevalence and Patterns of Polypharmacy

At the time of surgical admission, 66.5% (n = 113) of patients were taking five or more medications, fulfilling the criteria for polypharmacy, while 19.4% (n = 33) were on ten or more medications, classified as excessive polypharmacy. The mean number of medications per patient was 6.7 ± 2.9. The most commonly prescribed drug classes included antihypertensives (72.4%), oral hypoglycemics or insulin (48.8%), analgesics (71.2%), sedative-hypnotics (36.5%), and psychotropic agents (34.1%). Notably, polypharmacy was significantly more prevalent among patients undergoing emergency surgery ($p = 0.038$) and those with three or more chronic conditions ($p = 0.012$). **Table 2 highlights** the extent of polypharmacy and distribution of frequently prescribed drug classes. Over two-thirds of patients were on five or more medications, with antihypertensives and analgesics being most common. The findings emphasize the therapeutic complexity and high pharmacological load faced by geriatric patients undergoing surgical treatment.

Table 2: Polypharmacy Profile and Common Drug Classes Used

Polypharmacy Variable	Frequency (%)
Patients on ≥5 drugs (polypharmacy)	113 (66.5%)
Patients on ≥10 drugs (excessive)	33 (19.4%)
Mean number of drugs/patient	6.7 ± 2.9
Antihypertensives	123 (72.4%)
Analgesics	121 (71.2%)
Antidiabetics/Insulin	83 (48.8%)
Sedative-Hypnotics	62 (36.5%)
Psychotropic Medications	58 (34.1%)

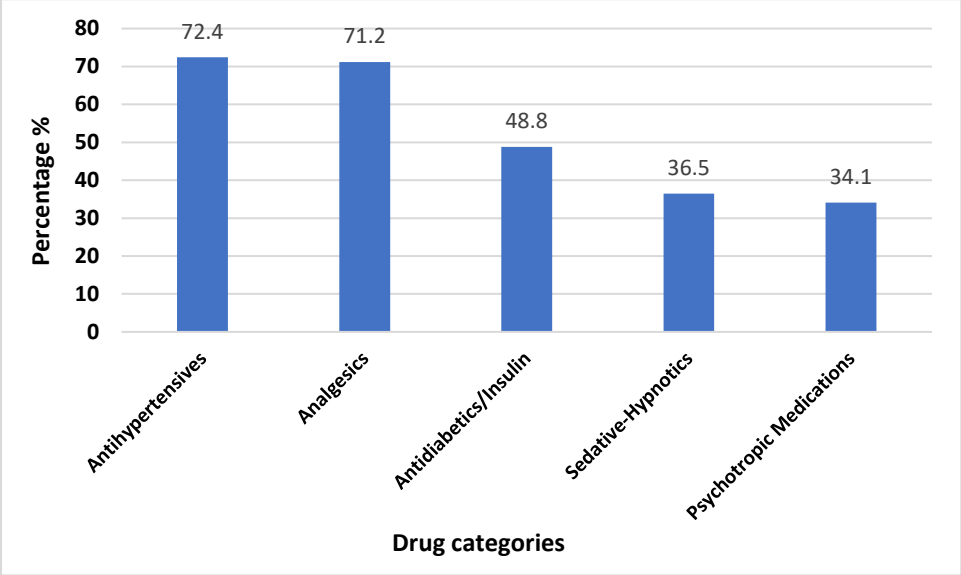

Figure 2: Distribution of Polypharmacy and Drug Categories in the Study Group

Figure 2 illustrates the prevalence of major drug categories prescribed among the study population with polypharmacy. Antihypertensives and analgesics were the most frequently used, followed by antidiabetics, sedative-hypnotics, and psychotropics. This distribution highlights the complex therapeutic burden in elderly surgical patients with medical and psychiatric comorbidities requiring multidrug regimens.

3.3 Potentially Inappropriate Medications and Drug–Drug Interactions

According to the 2019 Beers Criteria, 41.8% (n = 71) of patients had at least one potentially inappropriate medication (PIM) administered to them, and 11.8% (n = 20) had two or more PIMs found in their regimen. Common PIMs included long-acting benzodiazepines, first-generation antihistamines, and anticholinergic antidepressants. Use of PIMs was notably higher in patients with cognitive impairment or dementia ($p = 0.004$).

According to Lexicomp® interaction grading, 39.6% of the 197 drug–drug interactions (DDIs) that were found were classified as moderate, and 15.2% as severe. Common interaction pairs included NSAIDs with ACE inhibitors, SSRIs with anticoagulants, and benzodiazepines with opioids. Of the patients exposed to severe interactions, 85% (n = 22) had either a psychiatric disorder or were on psychotropic medications, suggesting a significant overlap between psychiatric polypharmacy and adverse interaction risk ($p = 0.002$).

Table 3 outlines the prevalence of potentially inappropriate medications (PIMs) and the severity of drug–drug interactions (DDIs) among the participants. A substantial number of patients received high-risk drug combinations. Notably, severe DDIs and multiple PIMs were more common in those with psychiatric diagnoses, indicating a need for careful prescribing.

Table 3: Frequency and Severity of Drug–Drug Interactions and PIMs

Interaction/PIM Measure	Frequency (%)
At least 1 PIM	71 (41.8%)
≥2 PIMs	20 (11.8%)
Total DDIs Identified	197
Moderate Interactions	78 (39.6%)
Severe Interactions	30 (15.2%)
Most Common Severe Interaction Pairs	Benzodiazepines + Opioids
	SSRIs + Anticoagulants

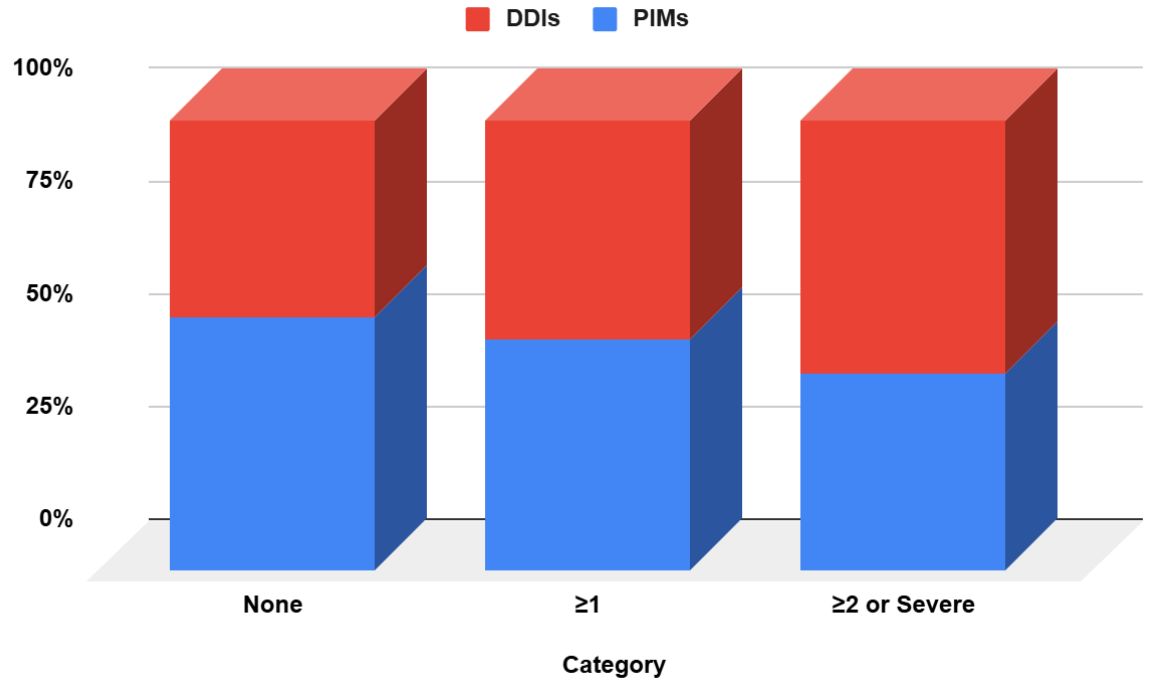

Figure 3: Prevalence of PIMs and DDI Severity Levels Across Study Participants

Figure 3 illustrates the prevalence of potentially inappropriate medications (PIMs) and the severity levels of drug–drug interactions (DDIs) among the study participants. While 41.8% had at least one PIM, 15.2% experienced severe DDIs. The visualization emphasizes the overlapping risks of unsafe prescribing and interaction-related complications in geriatric patients.

3.4 Drug-Related Problems and Adverse Events

During the perioperative period, 31.8% (n = 54) of patients experienced at least one drug-related problem (DRP). These included inappropriate dosing (18.8%), therapeutic duplication (11.2%), omission of indicated medications (9.4%), and adverse drug reactions (7.6%) as shown in Table 4. Adverse events commonly observed included postoperative confusion (14.1%), acute kidney injury (5.9%), and excessive sedation (4.7%). PIM usage and concurrent administration of three or more CNS-acting drugs were substantially linked with postoperative delirium, which was identified using the Confusion Assessment Method (CAM) and occurred in 12.4% (n = 21) of the sample ($p < 0.001$).

Table 4: Drug-Related Problems and Associated Clinical Outcomes

Clinical Outcome	Frequency (%)
Any Drug-Related Problem (DRP)	54 (31.8%)
Inappropriate Dosing	32 (18.8%)
Therapeutic Duplication	19 (11.2%)
Delirium (CAM-positive)	21 (12.4%)
Excessive Sedation	13 (7.6%)
Acute Kidney Injury	10 (5.9%)
In-Hospital Falls	6 (3.5%)

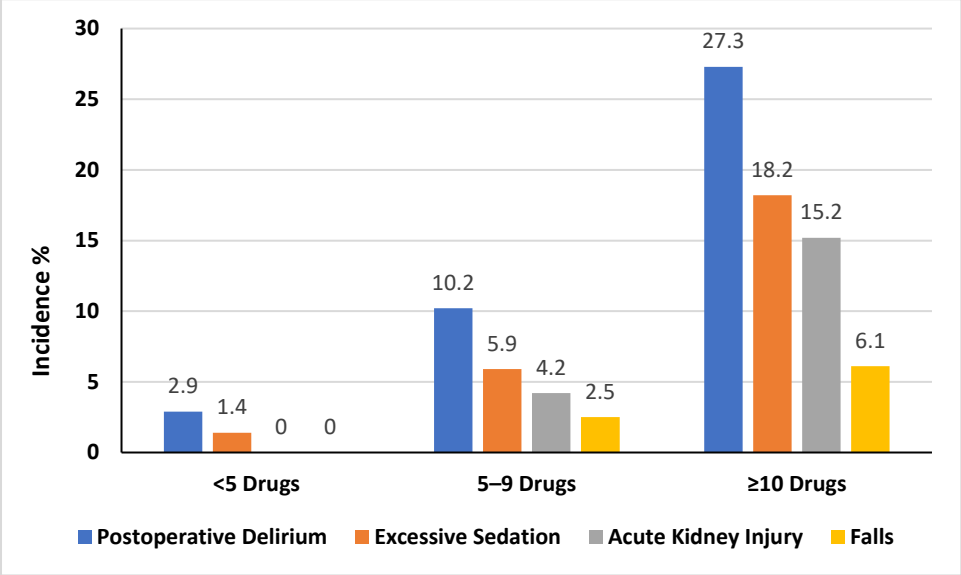

Figure 4: Incidence of Postoperative Delirium and Drug-Related Adverse Events

Figure 4 illustrates the incidence of postoperative delirium and drug-related adverse events stratified by medication burden. Patients taking ≥10 drugs experienced significantly higher rates of delirium, sedation, acute kidney injury, and falls. The trend underscores the escalating clinical risks associated with excessive polypharmacy in elderly surgical patients with complex comorbidities.

3.5 Length of Hospital Stay and Readmissions

The mean length of hospital stay among all participants was 8.9 ± 3.4 days. Patients exposed to polypharmacy had a significantly longer duration of stay compared to those with fewer than five medications (10.1 ± 3.7 vs. 7.4 ± 2.8 days; $p = 0.017$). Similarly, patients who received at least one PIM or had a moderate-to-severe DDI had prolonged hospitalization durations. Within 30 days of discharge, 17 patients (10.0%) were readmitted, most commonly due to drug-related adverse events such as electrolyte imbalance, hypotension, or exacerbation of underlying psychiatric illness. Multivariate logistic regression analysis identified polypharmacy (OR = 2.6, 95% CI: 1.3–5.2), presence of PIMs (OR = 2.2, 95% CI: 1.1–4.4), and emergency surgery (OR = 1.9, 95% CI: 1.0–3.8) as independent predictors of extended hospital stay or readmission.

4. Discussion

The results of the present study revealed the serious and multifactorial nature of the issue of polypharmacy in geriatric surgical patients who have multiple medical and psychiatric comorbidities. The rate of polypharmacy (66.5%) and potentially inappropriate medications (41.8%) in this cohort demonstrates an aspect of a clinical case that has recently come under the spotlight but remains underdiagnosed and undertreated in transitional and perioperative care processes. These results align with previous prospective studies in which large proportions of older patients undergoing acute care transitions have been documented to use extensive amounts of medications, in which polypharmacy is a well-known but unintended side-effect of the specialty-driven practice of prescription writing (Runganga et al., 2014).

Among the most obvious implications of polypharmacy on this population, the increased probability of drug-drug interactions (DDIs) has been highlighted, especially due to the medication that acts on the central nervous system, cardiovascular system, and kidney functions. The finding that 15.2 % of patients in our cohort reported severe DDIs equals that of Doucet et al. (1996), who also established that drug interactions made significant contributions to hospital admissions in a large number of older users and women. It is indicated that medication reconciliation is a significant safety intervention necessary in hospital admission, particularly in the case of the geriatric patient.

“Prescription of potentially inappropriate medications” (PIMs), as witnessed in more than 40 % of the population in our study, is also troublesome. The use of PIMs has been associated with negative effects such as falls, delirium, and extended stay in hospitalization, with high assertions seen in several studies (Undela et al., 2014; Pérez et al., 2018). The Beers Criteria and STOPP/START screening frameworks are just some of the tools that are useful when detecting such risks; nevertheless, the incorporation of these tools into the surgical workflow is less than ideal. Most importantly, Cooper et al. (2015) pointed out that in cases where such tools are in place, systematic intervention must be provided to enhance adherence, especially in high-risk perioperative environments.

The implication of polypharmacy and inappropriate prescribing spills over the pharmacological territory into the wider functions of day-to-day living. The results of our study found that patient outcomes after surgery (high medication burden) are much higher, at 12.4 %. This is supported by the evidence provided by Trabold and Metterlein (2014), who highlighted the use of polypharmacy and the presence of anticholinergic load as the primary risk factors of delirium experienced after an operation. McIsaac et al. (2019) also showed that previous exposure to high-anticholinergic drugs, e.g., sedative-hypnotics and tricyclic antidepressants, leads to further health care resource use and negative recovery outcomes among older adults.

When there is a concomitant psychiatric comorbidity, the neurocognitive implication of polypharmacy is of special interest. Multiple CNS-active medications were more probable in our study in patients with diseases like depression, anxiety, or dementia, and inclined the patients to experience adverse events. A recent systematic review and meta-analysis by Yu et al. (2024) supports this, finding that polypharmacy and rates of cognitive decline in older persons were significantly correlated, regardless of the baseline comorbidity rates. That is why it is reaffirmed that an integrated psychiatric and geriatric assessment should be performed in preoperative management to inform deprescribing when necessary.

The second important finding of our data was longer hospital stay among those patients who had ≥5 medications. The association is consistent with the findings of a research by Liu et al. (2024), which showed that polypharmacy resulted in a lower quality of life and a greater burden of institutional care, particularly when frailty and malnutrition are present. This association not only increases patients' susceptibility during surgery, but it also places a strain on the resources of the healthcare system. Preventive measures are therefore supposed to be aimed at identifying the patients at high risk early through the help of frailty indices and drug risk scores.

The correlation between polypharmacy and unplanned readmissions found in our study is comparable to that of Maher et al. (2014), who revealed the strong relationship between polypharmacy, especially the use of psychotropic and cardiovascular medications, and hospital readmission and the acquisition of post-hospitalization complications. Problems like therapeutic duplication and under-prescriptions of the necessary drugs that are evidence of medication-related effects like therapeutic duplication and under-prescriptions of the necessary drugs were also present in our cohort, revealing the two-fold burden of overtreatment and clinical omission. The discreet inconsistencies reflect the significance of the planned medication reviews, preferably on a multidisciplinary team consisting of pharmacists, surgeons, internists, and psychiatrists.

From a pharmacovigilance perspective, the prevalence of drug-related issues and adverse reactions is an indication that a more effective system of surveillance and assessment should be put in place. Laporte (2016) affirmed that the safety of medication in older adults needs to be considered in terms of the issue of public health per se, with the proactive pharmacovigilance being capable of eliminating the downstream consequences, such as the acquisition of a delirium in hospital, falls, and even death. Whitman et al. (2016) also recommended oncology- and surgical geriatrics-specific screening tools, and according to them, generic medication safety interventions are unlikely to be effective in managing these vulnerabilities in the problem-focused subgroups.

It is also noteworthy that problems of optimization of medication use in older adults can be solved through interventions whose effectiveness has been proven. Pharmacist-led medication reviews, electronic PIM alerts, and shared decision-making models were shown to lead to a significant

reduction of inappropriate prescribing, and patient outcomes were also shown to be improved in a Cochrane review done by Cooper et al. (2015). Even though previous research is mostly focused on primary or post-acute care, our findings expand this circle to the perioperative surgical area, supporting the necessity of medication stewardship in surgical departments. To sum up, the current study contributes to the collection of literature related to the dangers of polypharmacy and inappropriate prescribing to older surgical patients. The low prevalence of the factors implies that standard perioperative routines need improvement in the overall medication evaluation. Deprescribing, multidisciplinary care, and use of validated screening tools for medications should be the focus of interventions that should remain dominant elements of surgical safety and geriatrics.

5. Conclusion

The existing observational study, one involving a hospital setting, points to the significant weight of polypharmacy in older surgical patients with simultaneous medical and psychiatric comorbidities. The results confirm that more than 2/3 of the patients were subjects of polypharmacy, with almost a quarter of patients exposed to extreme polypharmacy, which is indicative of the increasing complexity of pharmacological treatment of the vulnerable population. Furthermore, proactive medication monitoring should be pursued due to the occurrence of clinically important drug-drug interactions and possibly inappropriate drugs, particularly in perioperative treatment. One of the study's key findings is that worse clinical outcomes such postoperative delirium, extended hospital stays, and readmissions are closely linked to polypharmacy. Matters of psychiatric comorbidity, particularly when such is treated with numerous genetically central nervous system-active drugs, were remarkably associated with inappropriate prescription and greater occurrence of Adverse events. The results not only affect patient safety but also load healthcare facilities with significant resource expenditures and care duration. The study stresses the significance of instilling the multidimensional geriatric assessment, psychiatric screening, as well as prescription evaluation into the usual process of surgical care in older adults. Multidisciplinary collaboration of surgeons, geriatricians, psychiatrists, and clinical pharmacists is necessary to preserve rational prescribing, reduce the risk, and improve the recovery. To conclude, polypharmacy among geriatric surgical patients is a clinically relevant multidimensional problem. To overcome this challenge, it is essential to consider systemic changes, i.e., implement evidence-based deprescribing protocols, incorporate validated screening tools for inappropriate medications, and encourage interprofessional collaboration. Further studies must examine the intervention schemes that would be integrated into the workflow of surgical departments to enhance medication safety, better clinical outcomes, and healthy aging among patients of complex populations.

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