Research Article

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Potential Drug Interactions of Antidiabetic Agents in Geriatric Patients with Type 2 Diabetes Mellitus at the Inpatient Unit of a Hospital in Bandung City

ED. Yunisa Mega Pasha ✉, Lutfiani Az-Zahro, Siti Saidah, Mia Nisrina Anbar Fatin

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Abstract: Type 2 diabetes mellitus is a metabolic disease that commonly occurs in geriatric patients and is generally accompanied by comorbidities. This condition can increase medication use and potentially lead to drug interactions that may affect therapeutic effectiveness and cause adverse effects. This study aimed to identify potential antidiabetic drug interactions and analyze the association between length of hospitalization, number of medications used, and potential drug interactions. This was an analytical observational study with a cross-sectional approach and retrospective data collection using a total sampling technique on 41 medical records of geriatric patients with type 2 diabetes mellitus in the inpatient unit from January to December 2024. Potential drug interactions were identified using Medscape and Drugs. com. with severity levels classified as minor, moderate, and major. The results showed 95 potential antidiabetic drug interactions. Moderate interactions were the most common category, accounting for 88 cases (92.6%), while pharmacodynamic interactions were the most dominant mechanism, with 84 cases (88.4%). Of the 41 patients, 73.2% experienced potential drug interactions. Bivariate analysis using Fisher's exact test showed a significant association between length of hospitalization, number of medications used, and potential drug interactions ($p < 0.05$). Potential antidiabetic drug interactions in geriatric patients with type 2 diabetes mellitus may be considered in monitoring medication use, especially in patients with polypharmacy and longer hospital stays. However, this study only evaluated potential drug interactions based on a drug interaction database therefore, further studies are needed to assess the clinical manifestations of drug interactions.

Introduction

Diabetes Mellitus (DM) is a non-communicable disease whose prevalence continues to increase in Indonesia and worldwide. The International Diabetes Federation (IDF) reported that Indonesia ranks fifth globally in the number of DM patients, reaching 19.5 million people, and this number is expected to continue increasing until 2045 (1). Based on data from the 2023 Indonesian Health Survey, the prevalence of DM in Indonesia reached 11.7%, with the highest prevalence found in the 65–74-year age group at 6.7% (2). The high prevalence of DM among the elderly population increases the need for healthcare services, including inpatient care, making geriatric patients a vulnerable group for drug-related problems during hospital therapy.

Type 2 diabetes mellitus is the most common type of DM and is characterized by impaired insulin secretion and insulin function, resulting in increased blood glucose levels (3). In geriatric patients, the aging process causes various physiological changes, including decreased organ function as well as alterations in the pharmacokinetics and pharmacodynamics of drugs, which may increase the risk of adverse drug reactions, toxicity, and drug interactions compared to other adult age groups (4). In addition, geriatric patients are highly susceptible to DM because aging is associated with several physiological changes, including decreased insulin production by pancreatic β-cells, leading to increased glucose intolerance in older adults (5).

In addition to physiological changes, geriatric patients generally have comorbidities that require the use of multiple medications (polypharmacy), especially during inpatient care (6, 7). This condition may increase the risk of potential drug interactions, particularly in hospitalized patients, due to the concurrent use of multiple

medications, changes in clinical condition during treatment, and additional therapies for comorbidities. Therefore, pharmacotherapy management in hospitalized geriatric patients becomes more complex and requires optimal monitoring to prevent drug-related problems (6). Potential drug interactions may affect the effectiveness and safety of therapy, such as causing uncontrolled blood glucose levels, increasing the risk of hypoglycemia or hyperglycemia, prolonging hospitalization, increasing treatment costs, as well as increasing morbidity and mortality and reducing patients'quality of life (8).

In clinical practice, length of hospitalization and the number of medications used are factors frequently associated with an increased risk of potential drug interactions in geriatric patients. The longer a patient is hospitalized, the greater the possibility of changes or additions to drug therapy. Furthermore, the use of multiple medications (polypharmacy) may increase the likelihood of pharmacological interactions due to the concurrent use of several drugs (6).

In geriatric patients, the risk is higher because physiological changes can affect the body's response to medications (9). In addition, drug dosages administered to geriatric patients often differ from those used in adult patients because of altered drug sensitivity in older adults (10). The STOPP/START criteria and Beers Criteria are commonly used to identify potentially inappropriate medication use in geriatric patients. However, besides inappropriate medication use, the potential for drug interactions is also an important concern because it may significantly affect therapeutic outcomes and patient safety in geriatric populations (11).

Potential drug interactions in patients with type 2 diabetes mellitus may occur between drugs or between drugs and food. This study focused only on potential interactions between antidiabetic drugs and other medications, namely the possibility of changes in the effectiveness or toxicity of a drug due to the concomitant administration of another drug (12). A study conducted by Septiyani *et al.* (2024) showed that geriatric patients had a higher potential for drug interactions, approximately 96%, compared to only 4% in patients without potential drug interactions. These findings indicate that potential drug interactions are still frequently encountered in the management of patients with type 2 DM, although the reported incidence may vary depending on population characteristics, study methods, and the database sources used to identify drug interactions. Several previous studies have also reported that polypharmacy and longer hospital stays are associated with an increased potential for drug interactions in geriatric patients and patients with chronic diseases (6, 13). Based on these conditions, longer hospital stays and the use of multiple medications are suspected to increase the potential for drug interactions in geriatric patients with type 2 DM.

However, studies specifically evaluating the relationship between length of hospitalization, number of medications used, and the potential for drug interactions in geriatric patients with type 2 diabetes mellitus in inpatient settings are still limited, especially in healthcare facilities in Indonesia. Therefore, this study was conducted to identify potential interactions between antidiabetic drugs and other medications using a drug interaction database and to analyze the relationship between length of hospitalization, number of medications used, and the potential for drug interactions in geriatric patients with type 2 diabetes mellitus in the inpatient unit of a hospital in Bandung City.

Methodology

This study was conducted as an observational study using a cross-sectional approach. Data collection was carried out retrospectively by reviewing previous documents and examining the medical records of geriatric patients with type 2 diabetes mellitus in the inpatient unit of a hospital in Bandung City from January to December 2024.

The population in this study consisted of all geriatric patients with type 2 diabetes mellitus who were hospitalized at a hospital in Bandung City during the January–December 2024 period. The sample was selected using a total sampling technique, in which the entire accessible population meeting the inclusion and exclusion criteria was included as the research sample. The study included patients diagnosed with type 2 diabetes mellitus, as identified by ICD-10 codes, regardless of the presence of comorbidities. Participants were required to be at least 60 years old and must have been hospitalized between January and December 2024. Patients were excluded if their medical record data were incomplete or if they were not covered by the BPJS health insurance scheme.

Medical record data were summarized using Microsoft Excel and analyzed using SPSS version 29. Univariate analysis was performed to determine the distribution of gender, age, comorbidities, length of hospitalization, number of medications, antidiabetic drug classes, other drug classes, potential drug interaction events, number of potential drug interaction events per patient, mechanisms of drug interactions, and severity of drug interactions. Potential drug interactions were identified using the Drug Interaction Checker databases, namely Medscape and Drugs. com, accessed in September 2025. The results obtained from both databases were compared to ensure consistency of drug interaction information.

Each combination of an antidiabetic drug with another medication identified as having a potential interaction was counted as one drug interaction event. Interactions between non-antidiabetic drugs were not included in this study. A patient could experience more than one potential drug interaction event if multiple interacting drug combinations were identified during therapy.

The severity of drug-drug interactions was classified according to the categories provided by the Drugs.com Interaction Checker as major, moderate, and minor. Major interactions were defined as highly clinically significant interactions and should generally be avoided. Moderate interactions were defined as clinically significant interactions that may require close monitoring, dose adjustment, or therapy modification. Minor interactions were defined as interactions with low clinical significance that generally do not result in meaningful clinical effects but may still require attention and monitoring when necessary.

Bivariate analysis was performed to analyze the statistical association between length of hospitalization, number of medications used, and the potential occurrence of drug interactions using Fisher's exact test with a

significance value of < 0.05. Fisher's exact test was selected because the study sample size was relatively small and the data were analyzed in categorical form. The analysis in this study was not intended to determine causality.

Results and Discussion

Distribution of Patient Characteristics

This study was conducted at a hospital in Bandung City. The sample consisted of 41 geriatric patients with type 2 diabetes mellitus who were hospitalized from January to December 2024 and met the inclusion and exclusion criteria (see **Table 1**).

In this study, geriatric patients with type 2 diabetes mellitus were predominantly female, accounting for 25 patients (61%), compared to 16 male patients (39%). This finding is consistent with several previous studies showing that the prevalence of type 2 diabetes mellitus tends to be higher in women, especially among the elderly population. This condition may be influenced by various factors, such as hormonal changes after menopause, increased body fat composition, decreased insulin sensitivity, and low levels of physical activity among older adults, which may increase the risk of type 2 diabetes mellitus in women (14, 15).

The age group most commonly affected by type 2 diabetes mellitus was 60–69 years, comprising 29 patients (70.7%), compared to 12 patients aged ≥70 years (29.3%). This condition is likely associated with physiological changes related to aging, such as decreased organ function and metabolic alterations that are not balanced by adequate physical activity. In addition, geriatric patients may experience carbohydrate metabolism disorders that can lead to insulin resistance and increased blood glucose levels (16).

The majority of geriatric patients with type 2 diabetes mellitus had comorbidities, accounting for 35 patients (85.4%), while only 6 patients (14.6%) had no comorbidities. Geriatric patients generally experience more than one disease condition, thereby requiring more complex therapeutic management (17). The presence of comorbidities in patients with type 2 diabetes mellitus may also affect the number of medications used during treatment (18). This finding is consistent with the characteristics of hospitalized geriatric patients, who generally have more complex clinical conditions and therapeutic needs than outpatients.

Most geriatric patients with type 2 diabetes mellitus in the inpatient unit received ≥5 medications, accounting for 36 patients (87.8%), while only 5 patients (12.2%) received < 5 medications. The concurrent use of multiple medications in geriatric patients often occurs due to polypharmacy in the management of type 2 diabetes mellitus and other comorbidities. This condition may increase the complexity of therapy and the potential for drug interactions (16). The administration of multiple drug combinations in geriatric patients with type 2 diabetes mellitus aims not only to control blood glucose levels but also to manage comorbidities experienced during treatment (19).

In this study, 28 geriatric patients with type 2 diabetes mellitus (68.3%) were hospitalized for 1–5 days, compared to 13 patients (31.7%) who were hospitalized for more than 5 days. This disparity in duration suggests significant variability in the acute care requirements of elderly individuals. The length of hospitalization in geriatric patients with type 2 diabetes mellitus may be influenced by the patient's clinical condition, the presence of comorbidities, and the complexity of the therapy received during treatment (20). These underlying medical factors often complicate stabilization efforts, thereby directly affecting the time required for comprehensive observation

Table 1. Distribution of patient characteristics.

Characteristics	Number of patients (n=41)	Percentage (%)
Gender		
Male	16	39
Female	25	61
Age		
60-69 years	29	70.7
≥70 years	12	29.3
Comorbidities		
Present	35	85.4
Absent	6	14.6
Number of types of drugs used		
< 5 medications	5	12.2
≥5 medications	36	87.8
Length of hospitalization		
≤5 days	28	68.3
> 5 days	13	31.7
Note: Percentages were calculated based on the total number of patients (n = 41).		

and recovery before the patient is deemed safe for discharge.

Distribution of Comorbidities in Geriatric Patients with Type 2 Diabetes Mellitus in the Inpatient Unit

Table 2 shows that there were 14 types of comorbidities among geriatric patients with type 2 diabetes mellitus in the inpatient unit. The most common comorbidity was hypertension, found in 17 patients (27.9%). Hypertension and type 2 diabetes mellitus have a complex relationship and frequently occur together in geriatric patients. These conditions are associated with insulin resistance, endothelial dysfunction, and metabolic changes that may increase the risk of cardiovascular complications (16). The high prevalence of hypertension in this study is also consistent with the characteristics of hospitalized geriatric patients, who generally experience more than one chronic disease.

Distribution of Antidiabetic Drug Use in Geriatric Patients with Type 2 Diabetes Mellitus in the Inpatient Unit

Insulin aspart was the most commonly used antidiabetic drug among geriatric patients with type 2 diabetes mellitus in the inpatient unit, accounting for 30 patients (44.1%). Insulin aspart is generally used in hospitalized patients to rapidly control blood glucose levels,

Table 2. Distribution of comorbidities in geriatric patients with type 2 diabetes mellitus in the inpatient unit.

No	Comorbidities	Number	Percentage (%)
1.	Hypertension	17	27.9
2.	Acute kidney injury	8	13.1
3.	Hypertensive heart disease	6	9.8
4.	GERD	5	8.2
5.	Dyslipidemia	4	6.6
6.	Dyspepsia	4	6.6
7.	Pneumonia	4	6.6
8.	Vertigo	4	6.6
9.	Urinary tract infection	3	4.9
10.	Stroke	2	3.3
11.	Congestive heart failure	1	1.6
12.	Coronary artery disease	1	1.6
13.	Chronic obstructive pulmonary disease	1	1.6
14.	Tuberculosis	1	1.6
Total		61	100
Note: Percentages were calculated based on the total number of comorbidities identified (n=61)			

Table 3. Use of antidiabetic drugs in geriatric patients with type 2 diabetes mellitus in the inpatient unit.

Types of Antidiabetic Drugs	Class	Drug Name	Number	Percentage (%)
Insulin	Rapid-acting insulin	Insulin aspart	30	44.1
	Long-acting insulin	Insulin detemir	12	17.6
		Insulin glargine	8	11.8
	Combination of rapid-acting and long-acting insulin	Insulin aspart-insulin degludec	1	1.5
Oral antidiabetics	Biguanids	Metformin	10	14.7
	Thiazolidinediones	Pioglitazone	3	4.4
	Sulfonylureas	Glimepiride	2	2.9
	Alpha-glucosidase inhibitors	Acarbose	1	1.5
	Combination of SGLT-2 inhibitors and biguanides	Dapagliflozin-metformin	1	1.5
Total			68	100
Note: Percentages were calculated based on the total number of antidiabetic drugs used (n=68).				

particularly in patients with clinical conditions requiring glycemic control during treatment (21, 22).

The most commonly used oral antidiabetic drug in this study was metformin as seen in **Table 3**, accounting for 10 patients (14.7%). Metformin belongs to the biguanide class and is recommended as first-line therapy for type 2 diabetes mellitus because it is effective in controlling blood glucose levels with a relatively low risk of hypoglycemia (21, 22). The pattern of antidiabetic drug use in this study may have been influenced by the clinical condition of hospitalized geriatric patients and the presence of comorbidities requiring therapy adjustments during treatment.

Distribution of the Use of Other Medications in Geriatric Patients with Type 2 Diabetes Mellitus in the Inpatient Unit

The use of other medications in geriatric patients with type 2 diabetes mellitus in the inpatient unit was dominated by antihypertensive agents (see **Supplementary Table 1**). This finding is consistent with the distribution of comorbidities in this study, in which hypertension was the most common comorbidity among geriatric patients with type 2 diabetes mellitus. The most frequently used antihypertensive class was calcium channel blockers (CCBs), as this class is commonly used to control blood pressure in geriatric patients with relatively good tolerability (23). The high use of antihypertensive and other supportive medications among hospitalized geriatric patients reflects the complexity of therapy, which may increase the potential for the concurrent use of multiple drug combinations during treatment.

Analysis of Potential Antidiabetic Drug Interactions in Geriatric Patients with Type 2 Diabetes Mellitus in the Inpatient Unit

Potential drug interactions in this study were identified using Medscape and Drugs. com based on their mechanisms and severity levels. Potential drug interactions may occur when one drug affects another drug within the body (24). Of the 41 geriatric patients with type 2 diabetes mellitus who were hospitalized, 30 patients (73.2%) experienced potential drug interactions, while 11 patients (26.8%) did not experience potential drug interactions. The high potential for drug interactions in geriatric patients with type 2 diabetes mellitus is likely associated with the presence of chronic diseases and the use of combination therapy during treatment (25).

A total of 95 potential interactions between antidiabetic drugs and other medications were identified (see **Table 4**). Based on their mechanisms, drug interactions are classified into pharmacokinetic and pharmacodynamic interactions. Pharmacodynamic interactions were more common, accounting for 84 cases (88.4%), compared to pharmacokinetic interactions with 11 cases (11.6%). The predominance of pharmacodynamic interactions in this study indicates that potential drug interactions were more closely related to changes in physiological responses and pharmacological effects among drugs used concomitantly (18). Pharmacokinetic

Table 4. Results of the analysis of potential antidiabetic drug interactions.

Drug Interactions	Number	Percentage (%)
Potential drug interactions*		
Present	30	73.2
Absent	11	26.8
Total	41	100
Number of drug interaction events per patient**		
1-2	14	46.7
3-4	10	33.3
> 4	6	20
Total	30	100
Mechanisms of drug interactions***		
Pharmacokinetics	11	11.6
Pharmacodynamics	84	88.4
Total	95	100
Severity of drug interactions***		
Minor	3	3.2
Moderate	88	92.6
Major	4	4.2
Total	**95**	**100**

Notes: * Percentage calculated based on the total number of patients (n = 41); ** Percentage calculated based on the number of patients experiencing drug interactions (n = 30); *** Percentage calculated based on the total number of drug interaction events (n = 95).

interactions occur when one drug affects the absorption, distribution, metabolism, or excretion of another drug (19).

Drug interactions were classified into three severity categories: minor, moderate, and major. Based on severity, moderate interactions were the most frequently identified, accounting for 88 cases (92.6%), whereas major interactions accounted for 4 cases (4.2%) and minor interactions for 3 cases (3.2%).

Minor interactions were relatively uncommon in this study. The most frequently identified minor interaction was the combination of glimepiride and omeprazole. Concomitant use of omeprazole with glimepiride may increase glimepiride concentrations, thereby increasing the risk of hypoglycemia. Moderate interactions were the most dominant category in this study. The most frequently identified moderate interaction was insulin aspart combined with furosemide. This combination may affect blood glucose control and reduce the effectiveness of insulin aspart, thereby requiring therapeutic monitoring during treatment. Major interactions were identified in 4 cases (4.2%), with the most common combination being insulin aspart and levofloxacin. Levofloxacin is known to affect blood glucose regulation, thereby increasing the risk of hypoglycemia or hyperglycemia in patients with type 2 diabetes mellitus (26).

Description of Potential Antidiabetic Drug Interactions with the Highest Frequency in Geriatric Patients with Type 2 Diabetes Mellitus in the Inpatient Unit

Based on the interaction mechanism, potential drug interactions in this study were predominantly pharmacodynamic interactions. This predominance can be observed in several of the most frequently identified drug combinations in **Table 5**, such as insulin aspart combined with candesartan, furosemide, dexamethasone, and levofloxacin. The combination of insulin aspart with candesartan or ramipril may increase insulin sensitivity, thereby increasing the risk of hypoglycemia (27). Meanwhile, the concomitant use of furosemide and dexamethasone with insulin aspart may reduce the antidiabetic effect by increasing blood glucose levels, thus requiring regular blood glucose monitoring (28). The combination of insulin aspart and levofloxacin was classified as a major interaction because fluoroquinolones are known to disrupt blood glucose regulation, potentially causing hypoglycemia or hyperglycemia (29).

In addition to pharmacodynamic interactions, several pharmacokinetic interactions were also identified, such as

Table 5. Overview of potential drug interactions with the highest frequency. Percentages were calculated based on the total number of drug interaction events (n=95).

No	Drug interaction events		Mechanism of Drug Interaction	Severity of Drug Interaction	Number	Percentage (%)
	Drug A	Drug B				
1	Insulin aspart	Sucralfate	Pharmacodynamics	Moderate	8	8.42
2	Insulin aspart	Candesartan	Pharmacodynamics	Moderate	7	7.37
3	Insulin aspart	Furosemide	Pharmacodynamics	Moderate	7	7.37
4	Metformin	Insulin aspart	Pharmacodynamics	Moderate	6	6.32
5	Metformin	Amlodipine	Pharmacodynamics	Moderate	5	5.26
6	Metformin	Ondansetron	Pharmacokinetics	Moderate	4	4.21
7	Insulin aspart	Dexamethasone	Pharmacodynamics	Moderate	4	4.21
8	Insulin glargine	Sucralfate	Pharmacodynamics	Moderate	3	3.16
9	Insulin aspart	Bisoprolol	Pharmacodynamics	Moderate	3	3.16
10	Insulin aspart	Levofloxacin	Pharmacodynamics	Major	3	3.16
11	Insulin detemir	Sucralfate	Pharmacodynamics	Moderate	3	3.16
12	Glimepiride	Omeprazole	Pharmacokinetics	Minor	2	2.11
13	Metformin	Ramipril	Pharmacodynamics	Moderate	2	2.11
14	Metformin	Levofloxacin	Pharmacodynamics	Moderate	2	2.11
15	Metformin	Insulin glargine	Pharmacodynamics	Moderate	2	2.11
16	Insulin aspart	Ramipril	Pharmacodynamics	Moderate	2	2.11
17	Glimepiride	Acetyl salicylic acid	Pharmacodynamics	Moderate	1	1.05
18	Glimepiride	Aluminum hydroxide	Pharmacokinetics	Moderate	1	1.05
19	Glimepiride	Magnesium hydroxide	Pharmacokinetics	Moderate	1	1.05
20	Glimepiride	Sucralfate	Pharmacodynamics	Moderate	1	1.05

metformin combined with ondansetron and glimepiride combined with magnesium hydroxide or aluminum hydroxide. These pharmacokinetic interactions may affect drug absorption and elimination processes, thereby potentially altering the effectiveness of antidiabetic therapy (30). The findings of this study indicate that drug interaction mechanisms in geriatric patients with type 2 diabetes mellitus not only occur at the receptor level but also involve changes in physiological responses and pharmacological effects among drugs used concomitantly.

Analysis of the Relationship Between Research Variables and Potential Drug Interactions

The analysis of the relationship between length of hospitalization and the potential for drug interactions showed a p-value of 0.008 ($p < 0.05$), indicating a significant association between length of hospitalization and the potential for drug interactions (see **Table 6**). Patients with longer hospital stays tended to have a higher potential for drug interactions, which is likely associated with therapy complexity and an increased number of medications used during treatment (25).

However, a study conducted by Priambudi *et al.* (2022) reported different findings, showing no association between length of hospitalization and the potential for drug interactions. These findings suggest that longer hospitalization does not always increase the potential for drug interactions, as this may also depend on therapy management and drug monitoring performed by healthcare professionals (31). Differences in results between studies may be influenced by variations in patient characteristics, sample size, and methods used to identify drug interactions.

The analysis of the relationship between the number of medications used and the potential for drug interactions yielded a p-value of 0.014 ($p < 0.05$), indicating a significant association between the number of medications used and the potential for drug interactions. These findings suggest that an increased number of medications in patients with type 2 diabetes mellitus tends to be associated with a greater potential for drug interactions due to increased therapy complexity (32).

This study has several limitations, including a relatively limited sample size due to the use of a total sampling technique based on patient medical records that met the study criteria during the data collection period. In addition, this study did not evaluate other factors that may influence the occurrence of drug interactions, such as disease severity, number of comorbidities, and patient clinical conditions. The identification of drug interactions in this study was also based solely on a drug interaction database and therefore could not directly describe the clinical manifestations of drug interactions in patients. Therefore, the findings of this study are expected to serve as preliminary data and as a reference for further studies involving a broader range of variables and larger sample sizes.

Conclusion

Potential antidiabetic drug interactions were more commonly identified in geriatric patients with type 2 diabetes mellitus in the inpatient unit compared to patients without potential drug interactions. Pharmacodynamic interactions were the most frequently identified mechanism, while the severity of interactions was predominantly categorized as moderate. A significant association was found between length of hospitalization, number of medications used, and the potential for drug interactions. However, this study only identified potential drug interactions based on a drug interaction database and did not directly evaluate the clinical manifestations of drug interactions. Therefore, further studies are needed to more comprehensively evaluate the clinical risks associated with drug interactions.

Abbreviations

DM = Type 2 Diabetes Mellitus; IDF = International Diabetes Federation; BPJS = Social Security Administering Body; ICD = International Classification of Diseases; SPSS = Statistical Package for the Social Sciences; SGLT = Sodium-Glucose Cotransporter; CCB = Calcium Channel Blocker.

Declaration

Author Information

ED. Yunisa Mega Pasha
*Corresponding author
Faculty of Pharmacy, Bhakti Kencana University,

Table 6. Results of the analysis of the relationship between research variables and potential drug interactions.

Variables	Potential drug interaction events				Total	p -value
	Present	%	Absent	%		
Length of hospitalization						
≤5 hari	17	60.7	11	39.3	28	*0.008
> 5 days	13	100	0	0	13	
Total	30	73.2	11	26.8	41	
Number of medications used						
< 5 medications	1	20	4	80	5	*0.014
≥5 medications	29	80.6	7	19.4	36	
Total	30	73.2	11	26.8	41	

Note: *p-value < 0.05 indicates a significant association based on Fisher's exact test.

Bandung 40614, Indonesia.
Contribution: Formal analysis, Writing - Original Draft, Writing - Review & Editing, Conceptualization, Formal Analysis, Methodology, Supervision, Writing – Original Draft, Validation.

Lutfiani Az-Zahro
Faculty of Pharmacy, Bhakti Kencana University, Bandung 40614, Indonesia.
Contribution: Formal analysis, Project administration, Writing - Original Draft, Data Curation, Formal Analysis, Methodology, Project Administration, Writing – Original Draft.

Siti Saidah
Faculty of Pharmacy, Bhakti Kencana University, Bandung 40614, Indonesia.
Contribution: Formal analysis, Conceptualization, Validation, Methodology.

Mia Nisrina Anbar Fatin
Faculty of Pharmacy, Bhakti Kencana University, Bandung 40614, Indonesia.
Contribution: Formal analysis, Conceptualization, Validation, Methodology.

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Conflict of Interest
The authors declare no conflicting interest.

Data Availability
The data that support the findings of this study are available from the corresponding author upon reasonable request, subject to ethical and institutional restrictions.

Ethics Statement
This observational study was approved by the Health Research Ethics Committe of Bhakti Kencana University. Written informed consent was obtained from all participants.

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Supplementary Material
The supplementary material is available on the following link.

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