

EVALUATION OF POLYPHARMACY AND *EXCESSIVE* POLYPHARMACY IN GERIATRIC INPATIENTS IN GENERAL HOSPITAL

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ABSTRACT

Polypharmacy is the simultaneous use of drugs with 5-9 drugs. Excessive polypharmacy is the simultaneous use of drugs with ≥ 10 drugs. Chronic diseases that are commonly suffered by geriatric patients are prone to causing a person to receive polypharmacy or excessive polypharmacy. This study aims to evaluate polypharmacy and excessive polypharmacy in inpatient geriatric patients, by knowing the factors that may trigger a person to receive polypharmacy. The research uses a cross-sectional study method, using medical record data for the period January to December 2023. The part studied was in the form of sociodemographics, disease history and treatment of patients, as well as length of stay. From the research conducted, the results were obtained from 295 patient data samples with 141 patients (47.8%) and 154 patients (52.5%) were female. The age of patients consisted of 60-74 years old 192 patients (65.1%), 75-90 years old 100 patients (33.9%), and ≥ 90 years 3 patients (1%). The last education of the highest patient with a high school background was 101 patients (34.2%), the highest marital status was married as many as 245 patients (83.1%). The diagnosis of the third disease had the most patients, namely diabetes mellitus as many as 95 patients (15.5%), anemia as many as 70 patients (11.5%), and hypertension as many as 56 patients (9.2%). The prevalence of polypharmacy in geriatric patients was 115 patients (39%) and excessive polypharmacy was 180 patients (61%). Broadly speaking, the sociodemographics of patients do not have a relationship with the occurrence of polypharmacy and excessive polypharmacy. The patient's clinical condition has a relationship with the occurrence of polypharmacy and excessive polypharmacy, this is proven by ap value of 0.000 (<0.05). The length of hospitalization and diagnosis of the patient's disease is a predictor of polypharmacy and excessive polypharmacy

Keywords : Geriatrics, Polypharmacy, Risk Factors, Disease Diagnosis, Excessive Polypharmacy

Introduction

Elderly is someone who enters the age of 60 years and above, where the human age group has entered the final stage of its life phase. According to *the World Health Organization* (WHO), the elderly population in Indonesia is estimated to reach 38 million in 2030 and 61 million in 2050. Globally, the prevalence of *excessive* polypharmacy in the elderly population has been reported to vary widely from 7.4% to 43.4% (Cho et al., 2022).

Polypharmacy, which is the use of several medications simultaneously, is common in

people living with chronic pain (Guilot *et al.*, 2020). Polypharmacy is needed to treat people with multimorbidity, such as the elderly or people with chronic pain. Rational polypharmacy can provide positive clinical outcomes by approaching the disease through multiple mechanisms of action. However, it can also pose potential problems, such as increased risk of drug-related adverse events, as well as drug interactions (Chang *et al.*, 2020).

Polypharmacy is one of the causes of *potentially inappropriate medications* (PIM), is very common in the elderly and indicates a significant cost in health care. Elderly people who are sick or who have weakness, and disabilities, are at high risk of experiencing adverse events due to PIM (Mohamed *et al.*, 2021).

PIM includes the use of medications where the risks outweigh the benefits, especially when there is evidence of alternative therapies that are safer and equally or more effective. This also includes drug misuse, including inappropriate dosing and duration. The presence of multiple comorbid conditions and altered pharmacokinetics and pharmacodynamics make geriatric patients particularly vulnerable to inappropriate prescribing (Davies *et al.*, 2020). Polypharmacy can increase the risk of adverse drug events in geriatric patients. This is due to three reasons. First, because a higher number of medications is accompanied by a higher risk of harmful drug-drug interactions (Santanasto *et al.*, 2019). Second, due to the aging process associated with physiological changes (e.g., weight loss, impaired hepatic and renal excretion, decreased cardiac output, remodeling of body composition) that make older adults more susceptible to adverse drug reactions. Third, because of the high prevalence of chronic multimorbidity in older age leading to an increased risk of drug-disease interactions.

Despite the potential negative consequences for geriatric patients receiving polypharmacy, there is increasing acceptance that prescribing multiple medications can be appropriate, and under certain circumstances. Thus, polypharmacy can refer to prescribing too many medications (appropriate) or too many medications (inappropriate). Patients receiving polypharmacy are at higher risk for medication-related problems than those taking fewer medications (Almodóvar & Nahata, 2019).

Research on polypharmacy, especially *excessive* polypharmacy, is important to do. This is because polypharmacy and *excessive* polypharmacy are associated with increased potentially inappropriate medications, medication errors, side effects, ADRs (*Adverse Drug Reactions*), hospitalizations, increased health care costs, and death (Whitney *et al.*, 2021).

Excessive polypharmacy is the most dangerous form, with the highest impact on patient outcomes. *Excessive* polypharmacy is the simultaneous use of 10 or more medications in a patient. However, no studies have been reported focusing on *excessive* polypharmacy in Indonesia. Given the higher risk of adverse health outcomes in geriatric patients using 10 or more medications, it is important to investigate the factors contributing to *excessive* polypharmacy (Soejono & Rizka, 2021).

Most studies on polypharmacy were conducted in developed countries, while data from developing countries, including Indonesia, are still rare. Therefore, this study aims to determine the evaluation of polypharmacy and *excessive* polypharmacy in geriatric inpatients at general hospitals.

The purpose of this study is: 1. To determine the sociodemographic description of

geriatric patients who receive polypharmacy or *excessive* polypharmacy. 2. To evaluate the prevalence of polypharmacy and *excessive* polypharmacy in hospitalized patients. 3. To determine the description of the treatment of geriatric patients who receive polypharmacy or *excessive* polypharmacy. 4. To evaluate the triggering factors so that patients receive polypharmacy and *excessive* polypharmacy. 5. Evaluate the correlation between demographic characteristics and patient diseases with polypharmacy and *excessive* polypharmacy.

The research conducted is expected to: 1. Provide an overview of the prevalence of polypharmacy and *excessive* polypharmacy in hospitalized geriatric patients. 2. As a study material for *stakeholders* in improving health services for geriatric patients to avoid inappropriate drug administration. 3. As a concern for the Indonesian government in providing knowledge related to polypharmacy and *excessive* polypharmacy to geriatric patients, considering the large number of elderly people in Indonesia.

According to *the World Health Organization* (WHO), the elderly are categorized into several age ranges, namely middle age *between* the ages of 45 and 59 years, elderly *between the ages of 60 and 74 years*, old age between the ages of 75 and 90 years, and very old age *over the age of 90 years* (Setiati et al., 2019).

The aging process is a cycle marked by stages of declining organ function, making the body susceptible to various diseases that can lead to death.

Aging factors are divided into two parts. These factors are genetic factors, which involve DNA repair, stress response, and antioxidant defense, and environmental factors, which include chemicals. Both factors can affect cell metabolic activity, causing oxidative stress to the aging process (Alqahtani et al., 2022).

Research methods

The study was conducted using a retrospective *cross-sectional study method* involving inpatient geriatric patients at Sumber Waras Hospital, West Jakarta.

The research population used was all inpatient geriatric patients at Sumber Waras Hospital, West Jakarta.

The study was conducted by recording the medical records of inpatient geriatric patients taken at Sumber Waras Hospital from January to December 2023. The study was conducted during April-June 2024.

Variables

Independent Variable

The independent variables in the study were the sociodemographics of geriatric patients, medical history, and length of hospital stay (LOS).

Dependent Variable

The dependent variables in the study were polypharmacy (the number of drugs given to patients was 5-9 drugs) and *excessive* polypharmacy (the number of drugs given to patients was 10 or more drugs).

Operational Definition of Variables

No.	Variables	Operational Definition	Category	Scale
1	Age	Age of patient at the time of hospitalization	60 - 74 years 75-90 years > 90 years	Ordinal
2	Gender	Gender of inpatient geriatric patients	Male Female	Nominal
3	Marital status	Marital status of inpatient geriatric patients	Single Married Divorced	Nominal
4	Level of education	educational status of inpatient geriatric patients	Elementary School Middle School High School College Not School	Ordinal
5	Medical History	Diseases that cause patients to receive <i>excessive</i> polypharmacy	Diagnosis of myocardial infarction, chronic heart failure, peripheral vascular disease, COPD, diabetes mellitus, kidney disease, liver disease, cancer, neurological and other conditions when the patient enters	Nominal
6	<i>Length Of Stay</i> (LOS)	Time required during hospitalization	< 3 Days ≥ 3 Days	Nominal
7	Polypharmacy	Administration of 5-9 drugs to patients	≥ 5 drugs	Nominal
8	<i>Excessive</i> Polypharmacy	Treatment of administering 10 or more drugs to a patient	≥ 10 drugs	Nominal

Data analysis

Descriptive Analysis

The results of the screened medical records were analyzed to obtain a description of the characteristics of inpatient geriatric patients by displaying percentages based on the criteria.

Statistical Analysis

The following statistical analysis uses the *Chi-Square test*. The *Chi-Square test* is a form of statistical test used to determine whether or not there is a relationship between categorical variables. The *Chi-Square test* can also help to determine whether the difference between two variables is caused by chance or a relationship between the two. In this case, the researcher wants to analyze the relationship between two variables which include a comparison of sociodemographic variables and patient disease diagnoses with polypharmacy and excessive polypharmacy.

Results and Discussion

The research data were taken from medical record data of geriatric inpatients at Sumber Waras Hospital, with various complaints of illness and treatment received. Screening was carried out on medical record data, which met the inclusion criteria. The number of patient data taken in this study was 295 patient data samples.

Table 1 Sociodemographic Characteristics of Geriatric Patients

Category	Characteristics	Polypharmacy	Percentage (%)	Excessive Polypharmacy	Percentage (%)	P-value
Age	60-74 years old	82	71,3	110	61,1	0.007
	75-90 years old	30	26,1	70	38,9	
	>90 years old	3	2,6	0	0	
Gender	Man	58	50,4	83	46,1	0.468
	Woman	57	49,6	97	53,9	
Last Education	Not school	4	3,5	5	2,8	0.919
	Elementary School	34	29,6	48	26,7	
	Junior High School	27	23,5	40	22,2	
	Senior High School	38	33	63	35	
Wedding Status	College	12	10,4	24	13,3	0.533
	Unmarried	2	1,7	6	3,3	
	Married	94	81,8	151	83,9	
	Divorce	19	16,5	23	12,8	

Based on the data in table 1, the sociodemographic data of inpatient geriatric patients receiving polypharmacy and excessive polypharmacy were obtained with a total of 295 patient data. In patients aged 60-74 years, there were 192 patients with 82 polypharmacy patients (71.3%) and 110 excessive polypharmacy patients (61.1%), in the age range of 75-90 years, there were 100 patients with 30 polypharmacy patients (26.1%) and 70 excessive polypharmacy patients (38.9%), and in the age range >90 years, there were 3 patients receiving polypharmacy (2.6%). In addition, a *P-value* of 0.007 was obtained, which stated that there was a significant difference in the age of those receiving polypharmacy with excessive polypharmacy. From the following data, it can be seen that the majority of inpatient geriatric patients were aged 60-74 years.

On category type sex, patient shared become two that is man And Woman. Amount patient

various sex man as much as 141 patient with 58 patient polypharmacy (50.4%) and 83 patients with *excessive* polypharmacy (46.1%), and patients with the type female gender as many as 154 patients with 57 polypharmacy patients (49.6%) and 97 patient *excessive* polypharmacy (53.9%). Besides That, obtained mark *P-value* as big as 0.468 Whichstated that there was no significant difference in gender. receiving polypharmacy or *excessive* polypharmacy. From the following data it can also be seenthat patient geriatrics take care stay most various sex Woman.

In the last education category, the last education of patients was grouped into five categories, namely the category of no school, elementary school, junior high school, high school, and college. Based on the data of the last education category, there were 9 patients with a background of no school with 4 polypharmacy patients (3.5%) and 5 *excessive* polypharmacy patients (2.8%), 82 patients with an elementary school background with 34 polypharmacy patients (29.6%) and 48 *excessive* polypharmacy patients (26.7%), 67 patients with a junior high school background with 27 polypharmacy patients (23.5%) and 40 *excessive* polypharmacy patients (22.2%), 101 patients with a high school background

with 38 polypharmacy patients (33.0%) and 63 *excessive* polypharmacy patients (35%), and 36 patients with a college background with 12 polypharmacy patients (10.4%) and 24 *excessive* polypharmacy patients (13.3%). In addition, a *P-value* of 0.919 was obtained, which stated that there was no significant difference in the last education of those who received polypharmacy or *excessive* polypharmacy. From the following data, it can be seen that the majority of inpatient geriatric patients had a high school education. In the marital status category, it is divided into three categories, namely unmarried, married, and divorced. Based on the following categories, data was obtained for 8 unmarried patients with 2 polypharmacy patients (1.7%) and 6 *excessive* polypharmacy patients (3.3%), 245 married patients with 94 polypharmacy patients (81.8%)

and 151 patients *with excessive* polypharmacy (83.9%), and 42 patients were divorced with 19 polypharmacy patients (16.5%) and 23 *excessive* polypharmacy patients (12.8%). In addition, a *P-value* of 0.533 was obtained, which stated that there was no significant difference in the marital status of those receiving polypharmacy or *excessive* polypharmacy. From these data, it can also be seen that the majority of inpatient geriatric patients were married.

Prevalence of Polypharmacy and *Excessive* Polypharmacy in Hospitalized Geriatric Patients

Table 2 Prevalence of polypharmacy and excessive polypharmacy

Category	Age	Frequency	Percentage (%)	p-value
Polypharmacy	60-74 year	82	71,3	0.897
	75-90 year	30	26,1	
	>90 year	3	2,6	
<i>Excessive</i> Polypharmacy	60-74 year	110	61,1	0.873
	75-90 year	70	38,9	
	>90 year	0	0	

Table 2 shows the prevalence of polypharmacy and *excessive* polypharmacy in

hospitalized geriatric patients. Based on the data obtained, patients with the most therapy given with *excessive* polypharmacy compared to polypharmacy. The prevalence of polypharmacy obtained was 115 patients (39%) and *excessive* polypharmacy obtained was 180 patients (61%). From the data obtained, at Sumber Waras Hospital, more patients received *excessive* polypharmacy treatment (≥ 10 drugs) compared to polypharmacy (5-9 drugs).

Overview of Treatment for Inpatient Geriatric Patients

Table 3 Types of therapy for inpatient geriatric patients

Types of Therapy Which Given	Frequency	Percentage(%)
Omeprazole	206	69.8
Ceftriaxone	154	52.2
Amlodipine	96	32.5
Paracetamol	94	31.9
Ondansetron	91	30.8
Cefixime	85	28.8
Ranitidine	78	26.4
Bisoprolol	71	1.0
Candesartan	67	24.1
Furosemide	66	22.4
Atorvastatin	61	20.7
Clopidogrel	61	20.7
Ketorolac 3%	61	25.8
Acetylcysteine	55	18.6
Simvastatin	54	18.3
Miniaspi	54	18.3
Mefenamic Acid	50	16.9
KSR 600	50	16.9
Lansoprazole	49	16.6
Bicnat tab	49	16.6
Levofloxacin	44	14.9
Metformin	42	14.2
Sucralfate Syrup	40	13.6
Isosorbide Dinitrate	38	12.9
Ramipril	36	12.2
Curcuma	34	11.5
Caco3	33	11.2
Spironolactone	32	10.8
Ciprofloxacin	30	10.2
Tranexamic Acid	28	9.5

Table 3 shows the types of drugs given to inpatient geriatric patients receiving polypharmacy and *excessive* polypharmacy treatment. Based on the data obtained, there are 3 types of drugs that are most often used, namely omeprazole with a total of 206 patients (69.8%), ceftriaxone with a total of 154 patients (52.5%), and amlodipine with a total of 96 patients (32.5%).

Factors Causing Geriatric Patients to Receive Polypharmacy and Excessive Polypharmacy

Table 4 Factors Causing Geriatric Patients to Receive Polypharmacy and Excessive Polypharmacy

Category	Polypharmacy	Percentage (%)	Excessive Polypharmacy	Percentage (%)	
Diseases experienced by patients	DM	24	14,3	71	16
	Anemia	18	10,7	52	11,7
	Hypertension	29	17,3	27	6,1
	Hypokalemia	12	7,1	33	7,4
	Pneumonia	11	6,5	33	7,4
	CKD	5	3	36	8,1
	Hyponatremia	12	7,1	27	6,1
	CAD	5	3	29	6,5
	Dehydration	9	5,4	24	5,4
	TB	10	6	22	5
	CHF	5	3	23	5,2
	Dyslipidemia	10	6	17	3,8
	PPOK	8	4,8	17	3,8
	Bronchopneumonia	2	1,2	12	2,7
LOS	<3 days	61	57,5	45	42,5
	≥3 days	54	28,6	135	71,4

In table 5.4, there is an overview of the factors that allow geriatric patients to receive polypharmacy and excessive polypharmacy. Based on the data obtained, there were 3 diseases that were most experienced, namely DM with 95 patients where polypharmacy was 24 patients (14.3%) and received excess polypharmacy as many as 71 patients (16%), anemia with 70 patients who received polypharmacy as many as 18 patients (10.7%) and received excessive polypharmacy as many as 52 patients (11.7%), and hypertension as many as 56 patients where received polypharmacy as many as 29 patients (17.3%) and received excessive polypharmacy as many as 27 patients (6.1%). LOS (Length Of Stay) data was also obtained for the patients who were hospitalized the most ≥3 days. This is evidenced by the number of patients hospitalized ≥3 days, 189 (64.1%) and <3 days, 106 patients (35.9%).

Sociodemographic and Clinical Relationship of Patients with Polypharmacy and Excessive Polypharmacy

Table 5 Sociodemographic and Clinical Relationships with Polypharmacy and Excessive Polypharmacy

Category	Polypharmacy	Percentage (%)	Excessive Polypharmacy	Percentage (%)	Frequency	Percentage (%)	P-value
Age							
60-74 years old	82	71,3	110	61,1	192	65,1	0.007
75-90 years old	30	26,1	70	38,9	100	33,9	
>90 years old	3	2,6	0	0	3	1	
Gender							
Man	58	50,4	83	46,1	141	47,8	0.468
Woman	57	49,6	97	53,9	154	52,2	

Last Education							
Not School	4	3,5	5	2,8	9	3,1	
Elementary School	34	29,6	48	26,7	82	27,8	
Junior High School	27	23,5	40	22,2	67	22,7	0.919
Senior High School	38	33	63	35	101	34,2	
Collage	12	10,4	24	13,3	36	12,2	
Wedding Status							
Unmarried	2	1,7	6	3,3	8	2,7	
Married	94	81,8	151	83,9	245	83,1	0.533
Divorce	19	16,5	23	12,8	42	14,2	
Complications/Co morbidities							
≤ 2 diseases	29	25,2	15	8,3	44	14,9	0.000
> 2 diseases	86	74,8	165	91,7	251	85,1	
LOS (Length of Stay)							
< 3 days	61	57,5	45	42,5	106	35,9	0.000
≥ 3 days	54	28,6	135	71,4	189	64,1	

Table 5 shows the relationship between sociodemographics and clinical patients with polypharmacy and *excessive* polypharmacy. Based on the data obtained, in general it can be seen that there is no significant relationship between sociodemographics and polypharmacy and *excessive* polypharmacy. However, there is one category in sociodemographics that has a relationship with polypharmacy and *excessive* polypharmacy, namely the age category, where the significance value obtained is 0.010 (<0.05). The diagnosis of the disease experienced by the patient (clinical condition) has a relationship with polypharmacy and *excessive* polypharmacy. This is obtained from the p value of 0.000 (<0.05). Likewise, the LOS (*Length Of Stay*) category appears to have a relationship with polypharmacy and excessive polypharmacy, which is stated with a significance value (*p-value*) of 0.000 (<0.05)

Sociodemographic Overview of Hospitalized Geriatric Patients

Based on sociodemographic data of inpatient geriatric patients receiving polypharmacy and *excessive* polypharmacy with a total of 295 patient data. The majority of inpatient geriatric patients were aged 60-74 years. This is also supported by research conducted by (Faisal et al., 2023) which states that the majority of patients are in the 60 to 74 year age group. This can be caused because increasing age can increase functional disorders that can be caused by irregular lifestyles, stress, and so on. In addition, increasing age of a person is usually always associated with a decrease in routine sports activities and a decrease in a person's physiological hormonal activity.

In the gender category, the most common gender is female with 154 patients with 57 polypharmacy patients (49.6%) and 97 *excessive* polypharmacy patients (53.9%). This is supported by research conducted by Clare *et al.* (2021), where researchers obtained the most gender data, namely female. Research by Aryaldy and Rose (2019) stated that based on the research conducted, it was obtained that most patients were male. This difference could occur because patients at Sumber Waras Hospital are more often female than male. Psychologically,

women tend to think about something deeply, causing women to experience stress more easily. Biologically, women are more prone to stress because there are changes in the hormonal system in the body. Physiological processes in the body occur when receptors receive stimulation from stressors for the first time. The stimulus is transmitted to the hypothalamus which causes the hypothalamus to release the hormone *corticotrophin-releasing factor* (CRF) which stimulates the anterior pituitary gland to release *adenocorticotrophic hormone* (ACTH) which then stimulates the adrenal glands to release the hormones cortisol (hydrocortisone), adrenaline (adrenaline) and noradrenaline (norepinephrine) (Styoningsih, R., Amananti, W., & Meliyana, 2020).

In the last education category, most patients have a high school education background with a total of 101 patients, of which 38 patients have polypharmacy (33.0%) and 63 patients *have excessive* polypharmacy (35%). This may be due to the lack of patients in terms of economy in financing higher education.

Prevalence of Polypharmacy and *Excessive* Polypharmacy in Hospitalized Geriatric Patients

Based on the data obtained, patients with the most therapy given with *excessive* polypharmacy compared to polypharmacy. The prevalence of polypharmacy obtained was 115 patients (39%) and *excessive* polypharmacy obtained was 180 patients (61%). This is different from several studies that have been conducted, where the average study stated that most geriatric patients received polypharmacy compared to *excessive* polypharmacy. According to research by (Pazan & Wehling, 2021), in Scotland the prevalence of polypharmacy in geriatric patients ranged from 28.6% to 51.8% while *excessive* polypharmacy ranged from 7.4% to 18.6%.

According to research by (Faisal et al., 2023), the prevalence of *excessive* polypharmacy is 8.67%, and globally the prevalence of *excessive* polypharmacy also varies from 7.4% to 43.4%. This is also supported by research by Aryaldi and Rose (2019), where in Indonesia the prevalence of *excessive* polypharmacy (5.17%) is less than polypharmacy (59.9%). Cross-sectional studies from Ireland, Scotland, and Sweden state that the prevalence of *excessive* polypharmacy is in the range of 7.4% to 11.7%. In addition, another study from Italy of 13%, and from Japan based on national pharmacy claims data reported the prevalence of *excessive* polypharmacy ranging from 12.3%, 35.8%, and 43.3% among patients aged 50-64, 65-79, and >80 years.

This difference may occur due to differences in population in each place. In addition, geriatric patients often have to be treated by several doctors with different specialists. The lack of communication and collaboration between medical service providers and pharmacists results in the use of too many drugs simultaneously. This is also supported by research conducted by (Tanzil et al., n.d.) which states that polypharmacy and *excessive* polypharmacy are the result of a prescribing cascade that occurs when drug side effects are misinterpreted as new medical problems, so that more drugs are prescribed to treat symptoms induced by the initial drug. Patients with polypharmacy and *excessive* polypharmacy have an increased risk of mortality with more chronic diseases. In a study from the UK, the fall rate was 21% higher in geriatrics receiving polypharmacy, 50% higher in those receiving *excessive* polypharmacy than non-polypharmacy (Pazan & Wehling, 2021).

Based on the data obtained, there are 15 types of drugs that are most often received by

patients. The drugs that are often received by patients are omeprazole, ceftriaxone, amlodipine, paracetamol, ondansetron, cefixime, ranitidine, bisoprolol, candesartan, furosemide, atorvastatin, clopidogrel, ketorolac 3%, acetylcysteine, and simvastatin. Drug interactions in amlodipine and simvastatin must be considered. This is similar to the study conducted by Aryaldi and Rose (2019), where drug therapy data were widely given to patients, one of which was amlodipine and simvastatin. Amlodipine can increase the action of simvastatin, which can potentially increase the risk of myopathy/rhabdomyolysis, which should limit the dose to no more than 20 mg/day when used simultaneously.

The administration of several drug therapies also needs to be considered. Simultaneous administration of omeprazole and clopidogrel can reduce the anti-clotting effect of clopidogrel by omeprazole. Administration of furosemide and candesartan can lower blood pressure, both systolic and diastolic blood pressure. This is supported by research by (Angin, M., Saputri, G., & Fahmi, 2023), which states that the use of furosemide and candesartan in three control times experienced a significant decrease in blood pressure in both blood pressure, both systolic and diastolic, in hypertensive patients.

Factors That Allow Geriatric Patients to Receive Polypharmacy or *Excessive* Polypharmacy

Based on the data obtained, there are several chronic diseases that are most often suffered, namely diabetes mellitus, anemia, hypertension, heart disease, kidney failure, lung disease. The acquisition of this data is supported by research conducted by several previous researchers, namely (Faisal et al., 2023), (Zahlan et al., 2023), and several other studies both in Indonesia and in developed countries, that the above diseases are often found in patients who receive polypharmacy or *excessive* polypharmacy. This can occur because in geriatric patients, there are various physiological changes in the organs and body systems that can affect the response to drugs.

Data obtained from geriatric patients at Sumber Waras Hospital mostly suffer from diabetes mellitus. Diabetes mellitus that is often experienced by geriatric patients is type 2 diabetes mellitus. Type 2 DM can be characterized by hyperglycemia and hyperinsulinemia caused by insulin resistance. Diabetes mellitus can cause stomach disease, one of which is nerve damage caused by high blood sugar levels. If a patient suffers from diabetes mellitus accompanied by stomach disease, they will have many complications and a worse prognosis than patients without diabetes mellitus (Tseng, 2021).

Length of stay (LOS) can also be a predictor of geriatric patients receiving polypharmacy or *excessive* polypharmacy. Inpatients in hospitals for a long time require many drugs simultaneously. The length of stay can be influenced by several factors including the severity of the disease, the patient's condition, the risk of therapy received by the patient, and other medical interventions received by the patient while being treated in the hospital. The results of this study are in line with research conducted by (Kurniawan et al., 2020) which showed that the average length of stay for patients was 4-5 days with a discharge status of cured. Patients with a long length of stay are more likely to have drug interactions than patients with a short LOS.

Sociodemographic and Clinical Relationship of Patients with Polypharmacy and *Excessive* Polypharmacy

In general, patient sociodemographics have no relationship to polypharmacy or *excessive* polypharmacy, either from the category of gender, education level, and marital status. However, there is one category in sociodemographics that has a relationship to polypharmacy and *excessive* polypharmacy, namely the age category. The results of this study are in line with previous studies, one of which was by (Faisal et al., 2023), which stated that polypharmacy and *excessive* polypharmacy will increase over time. This can occur due to the physiological decline of elderly patients. The patient's clinical condition and LOS have a relationship to the occurrence of polypharmacy and *excessive* polypharmacy. The more diseases a patient experiences, the more likely the patient is to receive polypharmacy or *excessive* polypharmacy. The longer a patient is hospitalized, the more likely they are to receive polypharmacy or *excessive* polypharmacy

Conclusion

The results of the study obtained can be concluded that the provision of polypharmacy and *excessive* polypharmacy in geriatric patients still occurs a lot, both in Indonesia and in other developed countries. This is feared to have undesirable effects on patients. There are also several diseases related to the potential for geriatric patients to receive polypharmacy and *excessive* polypharmacy, including diabetes mellitus, kidney disease, heart disease, and other chronic diseases. This can be a factor in someone receiving polypharmacy, as well as the length of hospitalization. The longer a patient is hospitalized, the more treatment must be received.

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