

Analysis of Potentially Inappropriate Medication (PIM) Risk Factors In Geriatric Hypertension Patients With Comorbids In Inpatients Based On Beer's® 2023 Criteria Hospital X

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ABSTRACT

Hypertension is still a health problem for the elderly. Polypharmacy, which is common in the elderly and cannot always be avoided, often poses a risk of poor outcomes and can increase the risk of Potentially Inappropriate Medication (PIM). The purpose of this study was to identify socio-demographic characteristics, use of drugs that meet the Beer's® 2023 criteria, the relationship between the number of drugs prescribed and the incidence of PIM, the relationship between the length of hospitalization and the incidence of PIM and what risk factors influence the incidence of PIM in geriatric patients with hypertension with comorbidities in hospitalization at Hospital X. The research method used a cross-sectional design with prospective data collection. The results showed that geriatric patients were more in the 65-69 year group by 55%, the most dominant gender was male by 38%, where all patients had various comorbidities which meant receiving ≥ 10 drugs with a maximum length of hospitalization ≥ 5 days. The relationship between the number of drugs and the incidence of PIM has a significant relationship with a value of $(p < 0.25)$ 0.197, which means that the number of drugs and the incidence of PIM has a significant correlation. The relationship between the length of hospitalization and the incidence of PIM has a significant relationship with a value of $(p < 0.25)$ 0.169, which means that the length of treatment affects the incidence of PIM. Risk factors that trigger the incidence of PIM are gender, number of drugs and length of hospitalization.

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INTRODUCTION

Prevalence hypertension in Indonesia, based on the latest data from Indonesian Health Survey (SKI, 2023), reached 34.1%. This figure show improvement compared to with prevalence in Riskesdas in 2018, which was recorded by 25.8% (1) . According to data from the Central Statistics Agency (BPS, 2023), the prevalence hypertension in the elderly (age 60 years) to above) in Indonesia reached 34.1%. This means that around One from three elderly in Indonesia suffer hypertension. Hypertension more general occurs in the elderly, especially Because factor age and the aging process that causes vessels blood become more

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stiff (2) . Based on data from the Bhayangkara Hospital Level I Pusdokkes Police in 2023, delivered that amount patient take care stay reached 51,281 people, with 1,568 of them is patient hypertension (3) .

Hypertension is improvement pressure blood from vessels arteries that are systemic or in progress in a way Keep going continuously in term long time (persistent) (4) . Increase prevalence hypertension the more critical when condition geriatrics own comorbidities that give impact complications the more heavy includes stroke, infarction myocardial, failure heart, atrial fibrillation, diabetes, heart failure kidney and retinopathy. Management appropriate pharmacotherapy and its achievement objective therapy decline pressure blood is factor main in lower the occurrence complications mentioned (5) .

Patient geriatrics is patient carry on the age of suffering multidisease as well as disturbance consequence decline function physiological ; changes physiological cause response to drug become changed. Based on data that shows improvement proportion carry on age (elderly), indicates increasing hope live. However, on the other hand, it can become problem social new Because part big from they is at in vulnerability and poverty (6) .

One of common problems found in further age is polypharmacy and use drug potential No right (PIMs). Polypharmacy is use simultaneously six drug or more by one patient. Therefore that, therapy polypharmacy in patients geriatrics should reduced Because polypharmacy the cause impact negative like improvement cost, effect side effects, decreased functional status body, and syndrome geriatrics (7) . Polypharmacy given to patients geriatrics Of course have impact negative one of them that is the occurrence risk interaction between harmful drugs and enhancement effect side. Incident effect drugs that are not wanted can prevented with method identify potential treatment No appropriate or normal called potentially inappropriate medication (PIMS) (8) .

Research conducted by Schietzel (2024) Potential drugs No right (PIM) make patient experience improvement risk detrimental outcomes. Many lists of criteria explicit give guide For identify PIM and recommend recipe alternative, but complexity of the available list limit its application and the amount of data available in the PIM recipe. For prevent and avoid problem related use drug antihypertensive in patients age continue to be able to provide the desired therapeutic outcome, required good understanding about pattern use medication to patients. In addition That Identification and resolution of DRPs is one of the component important in service care pharmacy For reach success therapy and improve quality life patient. Therefore That required a study about problem related use drug antihypertensive in geriatrics (9) .

The Beers® Criteria is one of the the most tools used and trusted by doctors, paramedics health others, educators, researchers, service administrators health, as well as regulators policy, in identify use drugs that are not appropriate (PIM) for patients elderly. It has been observed that research that uses The 2015 and 2019 Beers Criteria document prevalence between 13% and 65% of PIMs in patients carry on age (10) . While research that uses The 2022 Beers® Criteria documents PIM prevalence between 40% and 90% in patients carry on age (11) .

METHODS

Studies conducted that is observational with design *cross-sectional* data collection prospective with give recommendation to pharmacist based on Beer's® 2023 criteria for delivered to power health others.. Selection sample obtained with technique *total sampling*, the tools used are the Beer's® 2023 criteria list and the data sheet data collection. Independent variable in the form of age, type gender, number medication, comorbidities and length of stay stay while the dependent variable in the form of PIM incident.

Research materials This is record medical patient geriatrics hypertension with comorbidities accessed past system information management House sick (SIMRS). Data that has been noted use sheet data collection later matched with a list of medicines in Beer's® 2023 criteria for done analysis regarding PIM.

RESULTS AND DISCUSSION

Table 1. Demographics Patient

Patient Characteristics	Amount		Number of PIMs		
	N	%	There is	There isn't any	
Age	65-69 years	33	55	26	7
	70-79 years	26	43	24	2
	≥ 80 years	1	1	1	0
Gender	Man	38	63	33	5
	Woman	22	36	16	6
Comorbid	1-2 Comorbidities	57	95	47	10
	≥ 3 Comorbidities	3	5	2	1
Amount of Drugs	1-10 drugs	27	45	20	7
	≥ 11 drugs	33	55	29	4
Length of Hospitalization	1-5 days	39	65	34	5
	≥ 6 days	21	35	15	6

From table VI the division category age refer to the guidelines based on Beer's® 2023 criteria can stated below average patient aged 65-69 years as many as 33 patients (55.0%) for patient age 70-79 years as many as 26 patients (43.3%) while patient aged ≥ 80 years as many as 1 patient (1.7%). Statement This in harmony with results study conducted at Hospital X in North Sumatra in 2023 where based on distribution patient diagnosed with hypertension more dominant age 65-69 years 197 patients (54.27%) compared age over 70 years old namely as many as 138 patients (38.02%) while ≥80 years as many as 28 patients (7.71%) (25) . In addition, in line with another study conducted in 2023, it was found that patient with a diagnosis of hypertension group the most dominant age is 60-74 years as many as 126 patients (77.8%) compared with 75-84 years 30 patients (18.5%) while ≥85 years as many as 6 patients (3.7%). This condition happen Because along increase age, arteries big lost its flexibility and become stiff. As a result, the arteries No Can expand with Good moment heart pump blood. So, blood forced flow past vessels more blood narrow on

every pulse heart, which then cause the occurrence hypertension (26) .

Based on the data obtained about type genitals, visible that amount patient geriatrics man reached 38 people (63.3%), which is more Lots compared with patient women totaling 22 people (36.7%). The results of the study This in line with findings carried out at Panembahan Regional Hospital Senopati Bantul, which shows that of the total patients, there were 84 patients men (55%) are more Lots compared with patient geriatrics women, totaling 69 patients (45%) (27) . In addition, in The study was conducted at Dr. Soedarso Pontianak Regional Hospital, there were 79 patients men, who number 53%, are more Lots compared with 71 patients women comprising 47 % of total patients (3) . Prevalence disease hypertension in type sex man more tall compared to women. This is No let go from pattern life that often colored by habits No healthy. Lifestyle kind of smoking, consuming alcohol, pattern bad eating, experiencing obesity, lack of activity physical, as well as exposed pollution environment, can become factor risk for man For experience disease degenerative, both in nature single and also multipathology (3) .

Table 2. Amount Comorbid Hypertension Patient Geriatrics In Hospital X

Characteristics	Number of Patients	Comorbidities or Disease Accompanying
n't any Comorbid	25	-
	15	DM
	5	Heart
	3	Stroke
1 Comorbidities	2	Kidney
	1	Breathing
	1	Cholesterol
	2	DM, Heart
2 Comorbidities	1	Heart, Stroke
	2	DM, CAD
	1	DM, Heart, Gout
3 Comorbidities	1	DM, Heart Kidney
	1	DM, Heart of CAD

Patient geriatrics who have comorbid most is 1-2 comorbidities as many as 53 patients (88.3%) then For patient with ≥ 3 comorbidities as many as 7 patients (11.7%). The study conducted at Banjarmasin Regional Hospital indicated that there were 122 patients who had comorbid (86%) while those who do not own comorbid as many as 19 patients (13.5%) in the study this is the average patient experience more from One disease (10) . In addition, in research at Hospital X in North Sumatra in 2023, where most dominant diagnosis is hypertension as many as 104 patients (28.65%) while disease heart as many as 80 patients (90%) and diabetes mellitus as many as 50 patients (13.77%) Increase age can increase risk the occurrence multimorbidity and disease chronic degenerative. As the age, complexity problem health issues faced somebody tend increased. This is cause patient geriatrics more prone to experience various disease at a time (25) . Based on research conducted at Undata

Regional Hospital, located in Central Sulawesi Province, patients who had most dominant disease namely 2 diseases as many as 43 patients (29.04%) while 3 diseases as many as 27 patients (29.04%) and 1 disease as many as 16 patients (17.20%) (28) . This due to the fact that race geriatrics experience decline organ function and often have more from One disease. This condition make they prone to to various factor risk diseases, such as hypertension, diabetes mellitus, dyslipidemia, and obesity As age, declining health status can impact significant on quality life elderly. Various factor like decline function body, disturbed balance, and increasing risk various disease and falls, all of them related with the aging process (28) .

Table 3List of PIM Events in Patients Inpatient Geriatrics

PIM Events	Number of Patients	Percentage
Category 1	56	62
Category 2	-	-
Category 3	-	-
Category 4	13	14
Category 5	20	22
Category 6	-	-

From the data above results study PIM events from 6 categories only there are 3 categories found on study This that is Category 1 Use potential drug No right for the elderly as many as 56 patients (62%) namely aspirin, ketorolac, omeprazole, nifedipine, etc., while category 5 drugs – drugs that must be avoided or reduced the dosage various levels function kidney in the elderly as many as 20 patients (22%) namely spironolactone, gabapentin and category 4 interactions potential drugs important in a way clinical that must be avoided elderly as many as 15 patients (16%) namely ramipril + spironolactone and candesartan + spironolactone

Table 4. List of PIM Incidents per Prescription Sheet for Inpatient Geriatric Patients

PIM Events	Number of Patients	Percentage
1 PIM	25	51
2 PIM	13	27
3 PIM	6	12
4 PIM	4	8
5 PIM	1	2
Total	49	100

From the data above results study PIM incident per sheet recipe, majority patient get 1 PIM namely as many as 25 patients (51%), followed by patients who received 2 PIMs as many as 13 patients (27%), while 3 PIMs as many as 6 patients (12%) and those who received 4 PIMs as many as 4 patients (8%) and 5 PIMs as many as 1 patient (2%), in line with the study conducted at Hospital x, Bengkulu City where majority patient 27 patients (23.48%) received 1 PIM, followed by 17 patients (14.78 %) who received 2 PIMs, while 9 patients (7.83%) received 3 PIMs and 2 patients (1.74 %) received 4 PIMs (34) .

Patient Therapy Data By Beer's® Categories 2023

Table 4 Categorized Drugs in Beer's® Group 2023

Drug Name	Amount	Percentage
Category 1		
Aspirin	18	20
Ketorolac	10	11
Omeprazole	10	11
Nifedipine	6	7
Alprazolam	3	3
Glimepiride	3	3
Clonidine	3	3
Digoxin	2	2
Glibenclamide	1	1
Lansoprazole	1	1
Category 2		
There is no patients who receive therapy drug with category This		
Category 3		
There is no patients who receive therapy drug with category This		
Category 4		
Ramipril + Spironolactone	5	5
Candesartan + Spironolactone	8	9
Category 5		
Spironolactone	18	20
Gabapentin	2	2
Category 6		
There is no patients who receive therapy drug with category This		

Data Analysis

Analysis bivariate use *chi-square* about connection variable age, type gender, comorbid, number drug with PIMs and PIMs with length of stay stay can be seen in the table following:

Table 5. Connection Age To PIM Events

Age	Amount		N	p-value
	There isn't any	There is		
65-69 years	9	24	33	0.111
70-79 years	2	24	26	
≥ 80 years	0	1	1	
Total	11	49	60	

From the table on show results bivariate analysis using *Chi Square* shows cells, namely 3 and there is an Expected Count <5. It is known The minimum value of Expected Count is 0.18. With existence Expected Count value <5 and cells more from 20% which is 50% to

make a *Chi Square* test No fulfilled, because analysis done on a 3x2 table then the formula used namely "Likelihood Ratio". In the *Chi Square* test obtained mark of 0.111 ($p > 0.05$) with This concluded that No There is connection significant between age with PIM incident.

Based on results A study conducted at Blitar Regional Hospital in 2022 indicated that age to PIM incident no own significant influence of 0.432 ($p > 0.05$). Conditions such as This Can happen because of amount limited samples and the presence of other factors may be more play a role compared to age in influence PIM incident (34).

Table 6. Sex Relations To PIM Events

Gender	Amount		N	p-value
	There isn't any	There is		
Man	5	33	38	0.189
Woman	6	16	22	
Total	11	49	60	

From the table on show results bivariate analysis using *Chi Square* on variable type sex to PIM incidence has a significant relationship with results of 0.189 ($p < 0.25$). Based on results studies conducted in Palestine in 2023 related type sex show that between type sex to PIM incidence has a significant relationship with results of 0.207 ($p < 0.25$). Gender can influence incident potential use drugs that are not appropriate in a way significant Because difference biological, physiological, and social between men and women (47).

Table 7. Connection Comorbidities To PIM Events

Comorbidities	Amount		N	p-value
	There isn't any	There is		
1-2 Comorbidities	10	43	53	1,000
≥ 3 Comorbidities	1	6	7	
Total	11	49	60	

From the table on show results bivariate analysis using *Chi Square* on comorbid variables to PIM incident no have a significant relationship with results of 1,000 ($p < 0.25$). Based on results a study conducted at Blitar Regional Hospital in 2022 showed that comorbid to PIM incident no own significant influence of 0.437 ($p < 0.05$). Conditions such as This Can happen because of amount limited and deep samples a number of case patients who have comorbid has handled with guidelines good therapy (34).

Table 8. Connection Amount of Drugs Against PIM Events

Amount of Drugs	Amount		N	p-value
	There isn't any	There is		
1-10 drugs	7	20	27	0.197
≥ 11 drugs	4	29	33	
Total	11	49	60	

From the table on show results bivariate analysis with use *Chi Square* on the number of variables drug to PIM incidence has a significant relationship with results of 0.197 ($p < 0.25$). Based on results study conducted at Dr. Moch Ansari Saleh Banjarmasin Regional Hospital in 2022 related to amount drug show that between amount drug to PIM incidents have a very significant impact of 0.03 ($p < 0.05$) because the more tall amount drug so the more tall PIM events, risks interaction medicine and its presence decline function physiological in patients (10) .

Table 9. Relationship of Length of Hospitalization To PIM Events

PIM Events	Amount		N	p-value
	Length of Hospitalization 1-5	≥ 6		
There isn't any	5	6	11	0.169
There is	34	15	49	
Total	39	21	60	

From the table on show results bivariate analysis with use *Chi Square* on the number of variables drug to PIM incidence has a significant relationship with results of 0.169 ($p < 0.25$). Based on results study conducted at Dr. Moch Ansari Saleh Banjarmasin Regional Hospital in 2022 regarding length of stay stay show that between the length of stay stay to PIM events have very significant influence of 0.00 ($p < 0.05$). Conditions such as This Can happen because PIM can cause effect side and worsening condition patient as well as burden psychological and physical in patients (10) .

CONCLUSIONS

Risk factors that trigger PIM incident namely type gender, number medication and length of stay stay. Study This more many in the group age 65-69 years by 55% with type sex man amounted to 63.3% and length of stay 1-5 days stay by 65.0% and the most comorbidities have 1-2 comorbidities by 95%. Use drugs included in beer's® 2023 criteria, namely There are 14 types type medication that comes in in criteria namely, aspirin by 20%, spironolactone by 20%, ketorolac by 11%, omeprazole by 11%, candesartan by 9%, nifedipine by 7%, ramipril by 5%, while alprazolam, glimepiride, clonidine by 3%, and digoxin by 2% and glibenclamide, lansoprazole by 1%. Connection amount drug to PIM incident with amount medicine at Hospital X has significant relationship with Sig value 0.197 (< 0.25) which means show that amount drug to PIM events have the correlation that meaningful. Long term care relationship stay with PIM incidents at Hospital X have significant relationship with Sig value 0.169 (< 0.25) which means the detection time early PIM incident.

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