Relationship Between Appropriateness Of Medicine Selection And Therapy Outcome In Outpatients Of Hypertension At Dr. Moewardi Surakarta Hospital

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Abstract

Hypertension is a degenerative disease characterized by blood pressure that exceeds the standard limit of >140/90 mmHg, which can cause diseases such as heart, eyes, kidneys, brain and blood vessels. Drug selection is one of the factors that is very important because it can help the success of therapy. The purpose of this study was to determine the relationship between the accuracy of drug selection and therapeutic outcomes in outpatient hypertension patients at Dr Moewardi Surakarta Hospital using 100 medical record data with retrospective study and using data analysis techniques in the form of univariate test methods, bivariate tests and chi-square tests . The results showed that patients who received treatment with the suitable indication, right drug, correct dose and proper patient criteria were Ninety-two patients (92%). The relationship between the accuracy of drug selection and therapeutic outcomes in outpatient hypertension patients at Dr. Moewardi Surakarta Hospital shows a p-value of 0.030 (p <0.05), It Meaning that there is a significant relationship in the accuracy of antihypertensive drug selection with therapeutic outcomes in the form of achieving blood pressure targets based on JNC VIII in 2014.

Keywords: accuracy, drug selection, dan therapeutic outcome.

1. INTRODUCTION

Hypertension is one of the degenerative diseases that must be watched out for. Hypertension is a condition of blood pressure that exceeds normal limits, namely systolic ≥ 140 mmHg and diastolic ≥ 90 mmHg (Apriyani & Herawati, 2020). High blood pressure that is not immediately resolved will cause risk factors for various types of degenerative diseases; besides that, if left for an extended period, it will be hazardous because it will cause complications to other organs such as the heart, eyes, kidneys, brain, and large blood vessels (Tuloli et al., 2021).

According to the (NHLBI, 2024), one in every three patients has hypertension. Hypertension increases the risk of myocardial infarction, stroke, acute renal failure, and mortality. Handling hypertension can be done in two categories, namely non-pharmacological and pharmacological efforts. Pharmacological therapy efforts have nothing to do but use antihypertensive drugs (Reyaan et al., 2021).

The rational drug use module explains that rational drug use ensures that patients receive treatment according to their clinical needs, in the recommended dose, at a certain period, safely (in terms of side effects, contraindications or resistance), with good quality and at an affordable cost (Kemenkes, 2011), t. The way of review can be seen in terms of the correct diagnosis, the proper indication, the right patient, the right drug, the right dose, the correct information, the right price, the suitable method and duration of administration, and the alert of side effects (Tias, 2023). Inappropriate drug use significantly harms patients in terms of clinical outcomes and adverse drug reactions. Therapeutic outcomes result from

interventions provided by the health system, facilities, and medical personnel. Blood pressure reduction can be seen as one of the primary parameters determining hypertension therapy's success (Tias, 2023).

The aim of this research is to determine the relationship between suitability of drug selection and therapeutic outcomes in hypertension outpatients at Dr. RSUP. Moewardi Surakarta" is to analyze and evaluate how much influence the suitability of drug selection has on the therapeutic results obtained by hypertensive patients undergoing treatment at the hospital

2. METHODS

This type of research is observational descriptive analytic design. The research began with researchers taking data from medical records, including medical record numbers, gender, age, previous medical history, and drug therapy. The second step was univariate data analysis using the SPSS version 26 program with descriptive statistical tests. The population was all patients diagnosed with hypertension at Dr. Moewardi Surakarta Hospital, as many as 3082 patients with 100 samples using the Slovin formula. Inclusion criteria are patients who have undergone outpatient treatment at least 1-time getting drug therapy, age group ≥18 years, recorded blood pressure in medical record sheets, hypertensive patients who get antihypertensive therapy, and exclusion criteria are medical record sheets that do not contain hypertension disease management, pregnant and lactating women, deceased hypertension patients. Rationality in this study was determined through several aspects, including the indication of the drug according to the patient's characteristics, the appropriateness of drug selection based on therapeutic guidelines, identification of inaccuracies in drug selection, and the accuracy of the dose given. This study aims to evaluate whether the selected drugs meet all of these criteria and how this impacts patient outcomes. This *chi-square* analysis was conducted to determine the relationship between the accuracy of drug selection and therapeutic outcomes in outpatient hypertension patients at Dr Moewardi Surakarta Hospital.

3. RESULTS AND DISCUSSION

The results showed a population of kuoutpatient hypertension patients at Dr Moewardi Surakarta Hospital, with as many as 3082 respondents, with 100 respondents who met the inclusion and exclusion criteria that the researchers had determined.

A. Univariate Analysis

Univariate analysis aims to describe or explain the characteristics of the variables studied. Patients' medical records were then processed based on medical record number, gender, age, weight, blood pressure, drugs given, and diagnosis.

1. Characteristics of respondents based on gender, age and Comorbidities

Table 1. Characteristics of Respondents Based on Gender (Processed Primary Data)

Type Gender	**Total**	
	Frequency	**Percentage**
Male	47	47%
Female	53	53%
Total	100	100%
Age	Total	
	Frequency	**Percentage**
28 - 37	3	3%
38 - 47	8	8%
48 - 57	21	21%
58 - 67	30	30%
68 - 77	31	31%
78 - 87	7	7%
Total	100	100%
Type of Disease	**Total**	
	Frequency	**Presentation**
Kidney	3	1,90%
DM	85	53,80%
Heart	39	24,68%
Stroke	6	3,80%
Liver Cirrhosis	11	6,96%
Dyslipidemia	14	8,86%
Total	158	100,00%

Table 1. Shows that the gender of most respondents who suffer from outpatient hypertension at Dr Moewardi Surakarta Hospital is female, namely 53 respondents

(53%). According to (Chiburdanidze, 2013), the lifetime risk of hypertension is 80-90% in women and 81-83% in men. The development of hypertension in women is faster than in men. Blood pressure tends to increase in old age and the risk of developing hypertension increases after women experience menopause (Asmarianti, 2015). The age of most respondents in outpatient hypertension patients at Dr Moewardi Surakarta Hospital is the age range of 68 -77 years, as many as 31 respondents (31%). Hypertension is one of the degenerative diseases. With age, blood pressure will also increase due to physiological changes. (Febri Nilansari *et al*., 2020). Due to the ageing process, physiological function decreases, which causes many non-communicable diseases to arise in geriatrics. Non-communicable diseases that attack geriatrics are the most common, including hypertension, stroke, arthritis, and chronic obstructive pulmonary disease (COPD) (Ismaya & Emelia, 2022). The most common type of comorbidities suffered by outpatient hypertensive patients at Dr. Moewardi Surakarta Hospital is diabetes mellitus, with as many as 85 cases (53.80%), followed by heart disease as many as 39 cases (25.68%). Hypertensive disease can be one of the main risk factors for cardiovascular and cerebrovascular diseases, so complications will arise in hypertensive patients, such as kidney disease, DM, heart disease, and others (Ismaya & Emelia, 2022).

2. 2.Characteristics of respondents based on the use of antihypertensive drugs

Table 2. Characteristics of Respondents Based on the Use of Antihypertensive Drugs (Processed Primary Data)

Variation	Drug class	Drug Type	Frequency	Percentage Drug Type	Percentage Drug Class
Single	ACEI	lisinopril	1	2,94%	26,47%
		Ramipril	7	20,59%	
		Tanapres	1	2,94%	
	ARB	Candesartan	13	38,24%	41,18%
		Telmisartan	1	2,94%	
	BB	Propanolol	1	2,94%	2,94%
	CCB	Amlodipine	10	29,41%	29,41%
	Total		34	100,00%	100,00%
Two Combination	ACEI + CCB	Amlodipine + Tanapres	2	4,26%	19,15%
		Lisinopril + Herbesser cd	2	4,26%	
		Lisinopril + Amlodipine	1	2,13%	
	ARB + CCB	Ramipril + Amlodipine	4	8,51%	46,81%
		Candesartan + Herbesser cd	2	4,26%	
		Candesartan +Adalat oros	1	2,13%	
		Candesartan + Amlodipine	17	36,17%	
		Candesartan + Diltiazem	1	2,13%	
		Candesartan + Amlodipine + Adalat Oros	1	2,13%	
	ACEI + BB	Ramipril+Carvedilol	1	2,13%	6,38%
		Ramipril + Bisoprolol	1	2,13%	
		Tanapres+Bisoprolol	1	2,13%	
	ARB + BB	Candesartan + Bisoprolol	7	14,89%	14,89%
	ACEI + Diuretik	Bioprexum+Ramipril +Furosemide	1	2,13%	6,38%
		Ramipril+Mediresix	2	4,26%	
	CCB + Diuretik	Amlodipine+Furosemide	1	2,13%	2,13%
	ACEI + BB	Bioprexum+Bisoprolol	1	2,13%	2,13%
	BB + CCB	Bisoprolol+Adalat Oros	1	2,13%	2,13%
	Total		47	100,00%	100,00%
Three Combination	ACEI + BB + CCB	Ramipril + V Bloc + Adalat Oros	1	5,88%	23,53%
		Ramipril + Bisoprolol + Amlodipine	3	17,65%	
	ARB + BB + Diuretik	Candesartan+Concor + Furosemide	4	23,53%	23,53%
	ARB + Diuretik + Alfa Blocker	Candesartan+ Furosemide+Terazosin	1	5,88%	5,88%
	ARB + BB + CCB + Diuretik	Candesartan + Concor + Amlodipine + Furosemide	1	5,88%	5,88%
	BB + Diuretik + Angiotensi II Antagonis	Concor + Furosemide + Uperio fct	1	5,88%	5,88%
	ARB + BB + CCB	Amlodipine + Bisoprolol + Candesartan	3	17,65%	23,53%
		Candesartan + Concor + Furosemide	1	5,88%	
	BB + CCB + Diuretik	Bisoprolol + Adalat Oros + Furosemide	1	5,88%	5,88%
	ARB + CCB + Diuretik	Candesartan + Amlodipine + Spironolacton	1	5,88%	5,88%
	Total		17	100,00%	100,00%

Abbreviation:
ACEI: Angiotensin-Converting Enzyme Inhibitor
ARB: Angiotensin II Receptor Blocker
BB: Beta Blocker
CCB: Calcium Channel Blocker
Diuretics: Drugs that increase urine output
Alpha Blockers: Drugs that block alpha adrenergic receptors.

3. Evaluation of rationality based on the accuracy of the indication

Table 3. Evaluation of Rationality Based on Accuracy of Indication (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Appropiate	100	100%
Inappropriate	0	0%
Total	100	100%

Based on research conducted on 100 respondents of outpatient hypertension patients at Dr Moewardi Surakarta Hospital, the accuracy of drug selection based on appropriate indications is 100%. These results follow Ardian's research (2013), which found that the accuracy of drug selection based on appropriate indications reached 100%. All patients with stage 1, stage 2, or hypertension with outpatient complications at Hospital "A" in 2013 were given antihypertensive treatment of ACEI, ARB, BB, CCB, and diuretics so that the use of anti-hypertension can be categorized as appropriate indications.

4. Evaluation of rationality based on drug accuracy

Table 4. Evaluation of Rationality Based on Drug Appropriateness (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Appropiate	94	94%
Inappropriate	6	6%
Total	100	100%

Table 4. The accuracy of selecting antihypertensive drugs patients receive based on appropriate medications is 94%. The drugs obtained by hypertensive patients are said to be suitable because the prescribed drug is the drug of choice or the primary choice drug for hypertensive patients. The types of antihypertensive medications found in this study are lisinopril, ramipril, tanapres, bioprexum, candesartan, telmisartan, bisoprolol, propranolol, carvedilol, v bloc, concor, amlodipine, herbesser cd, Adalat oros, diltiazem, terazosin, uperio fct, spironolactone, furosemide, and mediresix.

Table 5. Evaluation of Rationality Based on Drug Inaccuracy (Processed Primary Data)

No.	Medicine Antihypertensives	Patient Condition	Reference (JNC 8)	Total	
				Frequency	Percentage
1	Mediresix + Ramipril	DKD + DM 2 + HT 1	ACEI, ARB	1	16,67%
2	Amlodipine	Thrombocytosis + DM 2 + RA + HT 1	CCB/Tiazide + ACEI/ARB	1	16,67%
3		DM 2 + HT 2 + OA + Dyslipidemia	CCB/Tiazide + ACEI/ARB	1	16,67%
4	Bisoprolol + Candesartan	DM + HT	CCB, Thiazide, ACEI, ARB	1	16,67%
5		Arterosclerosis + HT + DM	CCB, Thiazide, ACEI, ARB	1	16,67
6	Amlodipine + Furosemide	DM + HT + DKD	ACEI, ARB	1	16,67%
		Total		6	100%

Abbreviations:
DKD: Diabetic Kidney Disease.
DM: Diabetes Mellitus
HT: Hypertension
RA: Rheumatoid Arthritis
OA: Osteoarthritis
Dyslipidemia: Lipid imbalance in the blood
ACEI: Angiotensin-converting enzyme inhibitor
ARB: Angiotensin II Receptor Blocker
CCB: Calcium Channel Blocker
Thiazide: A class of diuretics used to treat hypertension.

5. Rationality evaluation based on dose accuracy

Table 6. Evaluation of Rationality Based on Dosage Accuracy (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Aproppiate	100	100%
Inappropriate	0	0%
Total	100	100%

Table 6. The accuracy of selecting antihypertensive drugs patients receive based on the correct dose is 100%. The antihypertensive treatment prescribed by doctors to outpatient hypertensive patients 100% uses preparations with an oral route of use. Hypertension treatment is repeated over time, so dosage accuracy is essential for maximum therapeutic effects.

6. Evaluate rationality based on patient accuracy.
7.

Table 7. Evaluation of Rationality Based on Patient Accuracy (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Aproppiate	95	95%
Inappropriate	5	5%
Total	100	100%

Research that has been conducted on 100 respondents of hypertension patients were adjusted to JNC VIII standards shows the results of evaluating the rationality of drug use based on patient accuracy, namely as many as five respondents were declared inappropriate patients (5%), and the remaining 95 respondents were declared appropriate patients (95%). This result differs from previous research conducted by (Sumawa et al., 2015) on evaluating rationality based on appropriate patients in the hospitalization of Prof. Kandou Manado Hospital with a total sample of 39 medical records and using JNC VII standards, stating that the number of proper patients was 100%.

One of the inaccuracies in this study was caused by drugs given that were not suitable for the patient's condition, namely the administration of Concor (bisoprolol) to hypertensive patients with comorbidities of DM and dyslipidemia. The treatment in the prescription was considered inappropriate because bisoprolol is not recommended in the JNC VIII literature for hypertension with comorbidities of DM and dyslipidemia.

8. Therapy outcome

Table 8. Hypertension Patient Therapy Outcome (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Achieved	61	61%
Not Achieved	39	39%
Total	100	100%

Research conducted on 100 hypertensive patient respondents was adjusted to JNC VIII. The results of evaluating the rationality of drug use based on therapeutic outcomes are that 61 respondents declared their therapeutic outcomes (61%), and the remaining 39 respondents claimed not to have achieved their therapeutic outcomes (39%). The results showed that there are still hypertensive patients who seek treatment at Dr. Moewardi Surakarta Hospital and receive antihypertensive drugs that are not beneficial to the patient's clinical condition, namely to the target of reducing blood pressure that has not been achieved. Factors that influence uncontrolled hypertension are patient non-compliance in taking medication, patient age and genetic factors (Adistia et al., 2022).

9. Appropriateness of drug selection

Table 9. Drug Selection Accuracy Table (Processed Primary Data)

Category	Total	
	Frequency	Percentage
Appropriate	92	92%
Inappropriate	8	8%
Total	100	100%

Research that has been conducted on 100 hypertensive patient respondents was adjusted to the criteria for the accuracy of drug selection, including the suitable indication, the right patient, the correct dose, and the right drug, resulting in 92 respondents being declared appropriate drug selection (92%) and the remaining eight respondents were declared inappropriate drug selection (8%).

Table 10. Table of Inaccurate Drug Selection (Processed Primary Data)

No	Appropriate Indication		Right Medicine		Correct Dosage		Right Patient	
	C	IC	C	IC	C	IC	C	IC
1	v		v		v			v
2	v			v	v		v	
3	v			v	v		v	
4	v		v		v			v
5	v			v	v		v	
6	v			v	v			v
7	v			v	v		v	
8	v			v	v		v	

Information: C : Complete and IC: Incomplete

The selection of antihypertensive drugs is appropriate if the patient receives treatment that meets the criteria of the right drug, the correct dose, and the right patient.

Meanwhile, the selection of antihypertensive drugs is said to be inappropriate if the patient receives treatment; either one, both, or all three do not meet the aspects of rational therapy.

B. Bivariate Analysis

The relationship between drug selection accuracy and therapeutic outcomes

Table 11. Relationship between the accuracy of drug selection and therapeutic outcomes (Primary data processed)

Category	Description	Therapy *Outcome*		Total	p-value
		Not Achieved	Achieved		
Appropriateness of Drug Selection	appropriate	33	59	92	
	Inappropriate	6	2	8	.030*
Total		39	61	100	

*significant (chi square)

The results showed that outpatient hypertension patients at Dr. Moewardi Surakarta Hospital, whose drug selection accuracy was appropriate and the therapy outcome *was* also achieved, were 59 respondents (64.1%). In comparison, outpatients who received inappropriate drug selection and the therapy outcome was also not achieved were 6 respondents (75.0%). The study results that can be seen next are the number of respondents who received inappropriate drug selection accuracy, but the therapy outcome *was* achieved, namely, 33 respondents (35.9%). In comparison, respondents who received appropriate drug selection accuracy but the therapy outcome was not achieved were two respondents (25%).

The relationship between the accuracy of drug selection and therapeutic outcomes. The *chi-square* test shows the results (*p-value* = 0.030); because the p-*value* <0.05, it can be concluded that there is a significant relationship between the accuracy of drug selection and therapeutic outcomes in outpatient hypertension patients at Dr Moewardi Surakarta Hospital. These results follow the research (Mpila & Lolo, 2022) the title of the relationship the rationality of the use of antihypertensive drugs on clinical outcomes *of* hypertensive patients at the Immanuel Manado Clinic, that there is a significant relationship between the rationality of the use of antihypertensive drugs on clinical outcomes *with* a p-*value* of 0.000 ($p < 0.05$).

This study has limitations, such as a small sample size that reduces the generalizability of the results. Data collection that relies on patient reports may cause bias, and variations in treatment protocols may result in inconsistencies. This study also did not consider other factors, such as lifestyle and comorbidities.

For future research, it is recommended to include a larger and more diverse sample, use a longitudinal design to understand cause-and-effect relationships and apply mixed methods to gain deeper insights. In addition, exploration of additional variables and intervention studies should be conducted to improve medication selection and adherence. With these limitations and implications in mind, future studies can better understand the relationship between medication selection and therapeutic outcomes in hypertensive patients.

4. CONCLUSIONS

Based on the findings of research done on 100 medical records of hypertension patients who met the inclusion criteria in the outpatient department of Dr. Moewardi Surakarta Hospital, it is possible to conclude that:

1. Outpatient hypertension patients at Dr. Moewardi Surakarta Hospital have met the JNC VIII criteria, with the results of 100 patients (100%) appropriate indications, 94 patients (94%) appropriate drugs, 100 patients (100%) appropriate doses, and 95 patients (95%) appropriate patients.
2. The selection of antihypertensive drugs in the outpatient department of Dr. Moewardi Surakarta Hospital is said to be appropriate if the patient receives treatment that meets the criteria of the suitable indication, the right drug, the correct dose and the right patient, showing the results of 92 patients (92%) with the proper drug selection. In

comparison, patients with therapeutic outcomes achieved were 61 patients (61%). The p-*value* obtained is 0.030 (p <0.05), so it can be concluded that Ho is accepted, meaning there is a relationship between the accuracy of drug selection and the therapeutic outcome of outpatients at Dr. Moewardi Surakarta Hospital.

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