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Evaluation of Antihypertensive Therapy Inpatients at Mukomuko Regional General Hospital

Puspa Pameswari
Faculty of Pharmacy, Perintis Indonesia University
Corresponding Author: Puspa Pameswari
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Abstract: Research has been carried out on evaluating the use of antihypertensive drugs in inpatients at the general hospital in the Mukomuko area which aims to see the rationality of the use of antihypertensive drugs which includes drug accuracy, dosage accuracy, and drug interactions that occur. The higher the number of cases of hypertension, the number of use of antihypertensive drugs will also increase, so the potential for irrational use of drugs is higher. This research is descriptive with retrospective data collection method from 83 medical records of patients with hypertension who were treated for at least 3 days, either with comorbidities or not. The most commonly used hypertension treatment patterns are amlodipine and Candesartan for single use. The results showed that there was an irrational use of antihypertensive drugs in hospitalized patients at the Mukomuko general hospital which included: dose inaccuracy occurred in 9 cases (10.84%) in the use of Captopril which was given only once a day with a dose of 12.5 mg which should have been given twice a day 25 mg, drug inaccuracies occurred in 9 cases (10.84%) in inappropriate combinations of antihypertensive drugs and 7 cases (8.43%) drug interactions between Captopril and Spironolactone and Furosemide, Candesartan and valsaltran with spironolactone, nipedipine with diltiazem.
Keywords: antihypertensive, dosage accuracy, drug accuracy, drug interactions,hypertension, rationality.

I. INTRODUCTOION

According to the World Health Organization (WHO) hypertension is a world health problem because its prevalence continues to increase along with the increase in population, in 2025 it is estimated that around 29% of the world's citizens are affected by hypertension. WHO predicts the global prevalence of hypertension is 22% of the total world population. The African region has the highest prevalence of hypertension at 27%, Southeast Asia is in the 3rd highest position with a prevalence of 25% of the total population [1]. The prevalence of hypertension in Indonesia is quite high, reaching 34.11% of the total population [2].

Hypertension is the third largest risk factor for premature death, in 2015 WHO stated that one in five adults worldwide experienced an increase in blood pressure which caused 9.4 million deaths worldwide each year [3,4]. The World Health Organization says that the number of hypertensive patients will continue to increase. Hypertension usually does not cause specific symptoms, thus causing many untreated hypertensive patients, of hypertensive patients receiving treatment, only about 10-20% achieve the target of blood pressure control [5,6].

Evaluation of the use of antihypertensive drugs aims to improve the accuracy, safety and ensure the rational use of drugs in patients with hypertension [7]. Evaluation of drug use needs to be carried out in order to achieve the therapeutic goal of reducing cardiovascular morbidity and mortality [8]. The use of appropriate drugs for patients with hypertension is necessary for treatment to be effective. Ineffective use of drugs can result in therapy failure. The negative impact of inappropriate use of antihypertensive drugs is very broad and complex, which can make blood pressure difficult to control and can lead to complications that can worsen the patient's condition [7]. From the increasing number of cases of hypertension, the number of use of antihypertensive drugs will also increase, so that the potential for irrational use of drugs is also higher [9].

In the report received by WHO, there is still irrational use of drugs where there are more than 50% of all inappropriate use of drugs in prescribing, preparing or selling them, while the other 50% are not used properly by patients [10]. Several studies in Indonesia also still show an irrational profile of drug use in hypertensive patients, such as the 2015 Sumawa study regarding the rationality of hypertension drugs in inpatients at Prof. RSUP. Kandou Manado obtained the results of the study, namely the evaluation of the rationale of the use of antihypertensive drugs from the criteria, the wrong drug and the wrong dose were 35.9% [7]. In research conducted by Supadmi 2013, with the title Evaluation of the Use of Antihypertensive Drugs in Chronic Kidney Failure Patients Undergoing Hemodialysis, in get the results that the use of the drug is not the right dose for captopril is 32.35% and for furosemide is 34.61%, the patient is not right for the use of captopril is

26.47% [11].

Based on this is what prompted researchers to evaluate the use of antihypertensive drugs, seen from the increasing prevalence of hypertension so that there can be discrepancies when using antihypertensive drugs. Therefore, the researcher wants to conduct a study on the evaluation of the use of antihypertensive drugs in inpatients at the Mukomuko general hospital. With the aim of research to see patterns of use of antihypertensive drugs, accuracy of drugs, and accuracy of doses as well as interactions between drugs used to ensure that the use of antihypertensive drugs used by patients is appropriate, safe, and effective in accordance with the patient's clinical condition.

II. RESEARCH METHODS

2.1 Research Instruments

The instruments used in this study were medical records of hypertension patients and data collection sheets.

2.2 Types and Design of Research

This type of research is a non-experimental research that is observational using descriptive methods. Data collection was carried out retrospectively using medical record data of inpatients with hypertension at the Mukomuko general hospital for one year (January – December 2017) which was recorded through a per patient data collection sheet.

2.3 Population and Sample

The population in this study were all medical records of inpatients with hypertension who received antihypertensive treatment at the Mukomuko general hospital for the period January – December 2017. The sample was part of the population. The sample in this study is a population that meets the inclusion criteria. The sampling technique used was purposive sampling, which is a sampling technique based on inclusion criteria, namely medical records of hypertensive patients with or without comorbidities, who were hospitalized and received antihypertensive treatment for at least 3 days as well as medical records of hypertensive patients which were recorded completely and clearly during the January - December 2017.

2.4 Data Analysis

The data that has been collected through data collection sheets, then evaluated the rationale of the use of antihypertensive drugs including patterns of use of antihypertensive drugs, drug accuracy and dosage accuracy, as well as drug interactions that were adjusted based on the literature and standard therapy. The data obtained were then analyzed descriptively with the results expressed in the form of percentages and presented in tabular form using the Microsoft Excel 2010 program.

III. RESULTS AND DISCUSSION

3.1. Profile and Pattern of Antihypertensive Drug Use

The medical records of hypertension patients for the period January – December 2017 that were selected and met the inclusion criteria as samples were 83 medical records. This data collection aims to determine the profile of patient characteristics which include gender, age, comorbidities and patterns of use of antihypertensive drugs used.

3.1.1 Characteristics of Hypertensive Patients by Gender

Table 1. Patient Characteristics by Gender

Patient Characteristics	Parameter	Amount	Percentage
Gender	Man	43	51.8%
	Woman	40	48.2%

From table 1.it can be seen that out of 83 hypertensive patients, male patients amounted to 51.8% (43 patients) while for female patients amount 48.2% (40 patients). Gender is one of the risk factors for hypertension that cannot be controlled. Gender can affect the occurrence of certain non-communicable diseases, one of which is hypertension. In general, men have a greater risk of experiencing an increase in systolic blood pressure than women. This is because men's unhealthy lifestyles such as smoking and consuming alcohol tend to increase blood pressure. However, according to a survey from the National Health Agency (2018) which states that high blood pressure or hypertension is more common in women than men. The effect of sex differences on blood pressure regulation can be related to the role of hormones that affect blood pressure [12, 13].

3.1.2 Characteristics of Hypertensive Patients by Age

Table 2. Characteristics of Patients by Age

Patient Characteristics	Parameter	Amount	Percentage
Age	< 45 years old	14	16.86%
	45-60 years	49	59.04%
	> 60 years old	20	24.10%

Meanwhile, based on age characteristics in this study were categorized into 3 groups referring to the age division by WHO, namely the group of patients aged <45 years as many as 14 patients (16.86%), aged 45-60 years as many as 49 patients (59.04%) and age >60 years as many as 20 patients (24.10%).

Hypertension is a degenerative disease. As you age, your blood pressure will also increase. An increase in a person's blood pressure is caused by structural changes in the large blood vessels, so that the lumen becomes narrower and the walls of the blood vessels become stiffer, so that blood at each heartbeat is forced to pass through the narrow blood vessels than usual and causes an increase in blood pressure [14]. In general, hypertension occurs in individuals over the age of 45 years because they will experience a condition where there will be a state of loss of elasticity in the walls of blood vessels. Such conditions will cause high blood pressure because blood continues to pump without dilatation of blood vessels. This is because arterial pressure increases with age, aortic regurgitation occurs, as well as a degenerative process, which is more common in the elderly [15].

3.1.3 Characteristics of Hypertensive Patients Based on Comorbidities

Table 3. Characteristics of Hypertensive Patients Based on Comorbidities

Patient Characteristics	Parameter	Amount	Percentage
Comorbidities			
Dyspepsia		**18**	21.68%
stroke		8	9.64%
Diabetes mellitus		4	4.82%
Pneumonia		2	2.41%
Heart		2	2.41%
Asthma		1	1.20%
Cholesterol		1	1.20%
tuberculosis		1	1.20%
Cholecystitis		1	1.20%
Lymphadenopathy		1	1.20%
Urinary tract infection		1	1.20%
Lung Disorders		5	6.02%
Dyspepsia + Urinary Tract Infection		5	6.02%
Stroke + Diabetes Mellitus		2	2.41%
Dyspepsia + Heart		2	2.41%
Dyspepsia + Dyslipidemia		2	2.41%
Stroke + Heart		1	1.20%
Pneumonia + Heart		1	1.20%
Heart + Urinary Tract Infection		1	1.20%
Diabetes Mellitus + Dyspepsia		1	1.20%
Diabetes Mellitus + Pneumonia		1	1.20%
Dyspepsia + Tubercolosis		1	1.20%
Dyspepsia + Gout		1	1.20%
Dyspepsia + Kidney Failure		1	1.20%
Lung + Heart Disorders		1	1.20%
Dyspepsia + Diabetes Mellitus + Tuberculosis		1	1.20%
Dyspepsia + Pneumonia + Cholecystitis		1	1.20%

The highest number of comorbidities according to the data in Table 3 is dyspepsia with a total of 18 patients or 21.68%.The occurrence of dyspepsia in hypertensive patients is related to the presence of psychosocial factors such as stress, anxiety, and depression which can affect gastrointestinal function and cause disturbances in the balance of the gastrointestinal system which then results in increased gastric acid secretion, thus triggering dyspepsia disorders [16]. This stress factor can also make the body produce more adrenaline hormones and make the heart work stronger and faster so that it will affect the increase in blood pressure which tends to stay or can even increase so that it can trigger hypertension. The presence of these risk factors causes

dyspepsia and hypertension to occur simultaneously [17]. Likewise, lifestyle changes such as lack of exercise, smoking, sleep disorders and irregular eating patterns are also one of the factors causing the high rate of digestive tract disorders in patients with hypertension [18].

As for other comorbidities, stroke suffered by 8 patients or 9.64%. According to the NHLBI (National Heart, Lung, and Blood Institute), 1 in 3 patients has hypertension. Hypertension is also a risk factor for myocardial infarction, stroke, acute renal failure, and also death [19]. Complications of hypertension can affect target organs, such as the heart (ischemic heart disease, left ventricular hypertrophy, heart failure), brain (stroke), kidneys (renal failure) and peripheral arteries (intermittent claudication). Damage to these organs depends on the high blood pressure of the patient and how long the high blood pressure is uncontrolled and untreated [20].

Hypertension in the long term can also cause stroke or by another name CVA infarction. Where this stroke will occur when the arteries in the brain experience thickening so that blood flow to the brain will decrease, then it will cause atherosclerosis due to the suppression effect on cells so that plaque formation in blood vessels will occur more quickly. As a result, blood flow to the brain will be reduced so that the brain will not get an adequate supply of oxygen. This decrease and lack of oxygen supply will result in stroke [21].

3.1.4 Pattern of Antihypertensive Drug Use

Table 4. Pattern of Antihypertensive Drug Use

Therapy		Amount	Percentage
Monotherapy		**28**	**33.73%**
CCB	Amlodipine	10	12.05%
ARB	Candesartan	9	10.85%
	Valsartan	4	4.82%
ACE-I	Captopril	2	2.41%
diuretic	Furosemide	1	1.20%
	Hydrochlorthiazide	1	1.20%
β– Blockers	Bisoprolol	1	1.20%
Combination of 2 Drugs		**32**	**38.55%**
CCB + ARB	Amlodipine + Candesartan	17	20.48%
	Amlodipine + Valsartan	10	12.05%
CCB + ACE-I	Amlodipine + Captopril	4	4.82%
	Amlodipine + Spironolactone	1	1.20%
Combination of 3 Drugs		**21**	**25.30 %**
CCB + ACE-I + ARB	Amlodipine + Captopril + Valsartan	4	4.82%
	Amlodipine + Captopril + Candesartan	1	1.20%
CCB + ACE-I + diuretic	Amlodipine + Captopril + Spironolactone	1	1.20%
	Amlodipine + Captopril + Furosemide	1	1.20%
	Amlodipine + Captopril + Hydrochlorthiazide	1	1.20%
CCB + ACE-I + β-Blocker	Amlodipine + Captopril + Bisoprolol	1	1.20%
CCB + ARB + β–Blockers	Amlodipine + Valsartan + Bisoprolol	4	4.82%
CCB + ARB + Diuretic	Amlodipine + Valsartan + Spironolactone	1	1.20%
	Amlodipine + Candesartan + Spironolactone	1	1.20%
	Amlodipine + Candesartan + Furosemide	1	1.20%
	Nifedipine + Candesartan + Diltiazem	1	1.20%
CCB + ARB + ARB	Amlodipine + Valsartan + Candesartan	1	1.20%
CCB + CCB + ACE-I	Amlodipine + Nifedipine + Candesartan	1	1.20%
Diuretics + ARB + β–Blockers	Spironolactone + Candesartan + Bisoprolol	1	1.20%
Diuretics + ARB + ACE-I	Furosemide + Valsartan + Captopril	1	1.20%
Combination of 4 Drugs			
CCB + ACE-I + Diuretic + Diuretic	Amlodipine+ Captopril + Spironolactone + Furosemide	1	1.20%
Combination of 5 Drugs			
CCB + ACE-I + ARB + Diuretics + β–Blockers	Amlodipine + Captopril + Valsartan + Furosemiode + Bisoprolol	1	1.20%

In table 4.the results show that the use of a single antihypertensive was 33.73% (28 patients), a combination of two antihypertensive was 38.55% (32 patients) and a combination of three antihypertensive was

25.30% (21 patients). The use of mono-therapy antihypertensive drugs according to the recommendations of JNC 7 is given to hypertensive patients who are not accompanied by comorbidities and are recommended to control a healthy lifestyle. Meanwhile, combination therapy is given to patients with hypertension accompanied by other complications of cardiovascular disease such as diabetes mellitus and heart failure. Giving two kinds of drugs as initial therapy is also recommended if the blood pressure is found to be more than 20/10 mmHg above the determined blood pressure target. For example, if the target blood pressure is <140/90 mmHg, then combination therapy can be started if the patient has blood pressure 160/100 mmHg [22].

3.1.5 Use of Antihypertensive Drug Mono-therapy

Pharmacological therapy of hypertension begins with the use of a single drug (mono-therapy). Depending on baseline blood pressure levels, on average antihypertensive mono-therapy treatment reduces systolic blood pressure by about 7-13 mmHg and diastolic blood pressure by 4-8 mmHg. JNC 7 recommends low-dose thiazides as the initial treatment of choice in primary hypertension. Meanwhile, JNC 8, recommends ACE-I, ARB, low-dose thiazide diuretic, or CCB for non-black patients [23]. It can be seen in table 4 that the single use of antihypertensive used is CCB (12.05%), ARB (15.67%), ACE-I (2.41%), diuretics (2.40%), and it can be said the choice of mono-therapy in inpatients at the general hospital in the Mukomuko area has followed the recommendations of JNC 8.

Based on table 4, it can be seen that amlodipine is the most widely used CCB antihypertensive drug, either alone or in combination with other antihypertensive drug groups in the management of hypertension. All Calcium Chanel Blockers are effective alone for the treatment of mild to moderate hypertension. All calcium channel blockers lower blood pressure by inhibiting Ca2+ influx through tension-sensitive L-type calcium channels in arteriolar smooth muscle, which ultimately leads to smooth muscle relaxation and decreased peripheral vascular resistance [24].

3.1.6 Use of Combination of 2 Antihypertensive Drugs

According to JNC 7 a combination of 2 antihypertensive drugs is given to patients with stage 2 hypertension or stage 1 hypertension patients who cannot achieve their blood pressure targets using hypertension mono-therapy [25]. The combination of two low-dose drugs is recommended for conditions of blood pressure >20/10 mmHg above target and not controlled by mono-therapy. Physiologically the concept of a combination of 2 drugs (dual therapy) is quite logical, because the response to a single drug is often limited by counter-activation mechanisms [23].Based on table 4. the two most widely used combination treatments were the combination between the CCB+ARB group of 32.53% (27 patients) and the CCB and ACE-I group of 6.02% (5 patients). The recommended combination of 2 classes of low-dose antihypertensive drugs is CCB and ARB; ARB and Diuretic [23].The JNC Guideline 8 recommends a combination of an ACE-I or an ARB with a CCB and/or a thiazide. This concept is similar to the UK guidelines which recommend the combination of an ACE-I or ARB with a CCB [26].

An important issue in the treatment of hypertension using ARB and ACE-I is, the efficacy of ARB therapy is equivalent to ACE-I or not. Both classes of drugs block the renin-angiotensin system, but ARBs and ACE-I have some differences in several important aspects: (1) ARBs are more effective at reducing angiotensin-1 receptor (AT_1) activation than ACE-Is. ACE-I reduces Angiotensin II produced by ACE, but does not inhibit other Angiotensin II formation pathways that are not ACE. Because ARBs block the AT1 receptor, all actions of Angiotensin II through the AT_1 receptor are inhibited regardless of the mechanism of angiotensin II formation. (2) In contrast to ACE-I, ARBs allow activation of AT_2 receptors. ACE-I increases renin release but ACE-I blocks the conversion of Angiotensin I to Angiotensin II, causing a decrease in Angiotensin II levels. Blocking of the AT_1 receptor by ARBs increases the release of renin which results in an increase in circulating levels of Angiotensin II. This increased level of Angiotensin II is available to activate the AT2 receptor. (3) ACE-I can increase the level of Angiotensin (1-7) more than ARB because ACE plays a role in the formation of Angiotensin (1-7). (4) ACE-I increases the levels of a number of ACE substrates, including bradykinin. ACE processes a range of substrates therefore inhibition of ACE causes an increase in the levels of ACE substrates and a decrease in the levels of related products [24].

3.1.7 Use of Combination of 3 Antihypertensive

Based on table 4, it is known that the combination using 3 antihypertensive drugs is the most widely used, namely the combination of CCB + ARB + ACE-I (6.02%), CCB + ARB + β-Blockers (4.82%) and CCB + ARB + Diuretics. (4.82%) Combination therapy of 3 antihypertensive drugs aims to maximize the ability to lower blood pressure, minimize drug side effects, and maintain the patient's blood pressure in the normal range so that blood pressure does not fluctuate easily which can result in a 5 times greater risk of stroke. The combination of 3 antihypertensive drugs is given if the use of two combinations of hypertension does not reach the therapeutic target. The use of these 3 combinations was chosen based on the benefits of each group. Treatment with more than one drug will increase the chances of reaching your blood pressure goals more

quickly. The use of drug combinations often results in greater reductions in blood pressure at lower doses than when the drugs are used as mono-therapy, so the likelihood of side effects is less [25].Increasing the dose and adding other classes of antihypertensive drugs can be done if the target blood pressure is not achieved within one month of treatment [27].

3.2 Evaluation of Antihypertensive Drug Use

Evaluation of the rationality of drug use is an effort made with the aim of evaluating and assessing whether the therapy given to patients already has efficacy and safety based on the patient's clinical condition which aims to ensure rational use of drugs to hypertensive patients [28].Rational use of drugs is very important to increase the success of therapy. If people with hypertension do not receive proper treatment, it is feared that it will lead to a higher severity of hypertension. Evaluation of the use of antihypertensive drugs in this study was carried out qualitatively by looking at the right patient, right indication, right drug, and right dose. Evaluation of the use of antihypertensive drugs can be seen in Table 5.

Table 5. Evaluation of the Rationality of Use of Antihypertensive Drugs

Evaluation of Rationality	Parameter	Amount	Percentage
Patient	Right Patient	83	100%
	Incorrect Patient	0	0%
Indication	Precise Indication	83	100%
	No Indication	0	0%
Dose	Right dose	74	89.16%
	Incorrect Dosage	9	10.84%
Drug	Right Medicine	74	89.16%
	Improper Medication	9	10.84%

3.2.1 Evaluation of Drug Use Based on Appropriate Indication

Appropriate indication is the suitability of drug administration with the patient's symptoms and a diagnosis that has been established and has proven therapeutic benefits [29]. Drug selection refers to the establishment of a diagnosis. If the diagnosis made is not appropriate then the drugs used will also not give the desired effect. According to the JNC 7 guidelines, the use of antihypertensive drugs when measured from blood pressure can be seen in the hypertension treatment algorithm, namely if the systolic blood pressure is 140-159 mmHg or diastolic blood pressure is 90-99 mmHg, antihypertensive mono-therapy should be given, and if the systolic blood pressure is 160 mmHg or diastolic blood pressure 100 mmHg should be given a combination of 2 drugs [25].Evaluation of the accuracy of indications is a process of assessing the selection of drugs according to the patient's needs based on a diagnosis established based on medical reasons [28].

Based on research that has been conducted on 83 hypertensive patients, the value of the accuracy of the indications reached 100%. The use of antihypertensive drugs is categorized as appropriate indication because antihypertensive drugs such as CCBs, ACEIs, ARBs, loop diuretics, potassium-sparing diuretics and -blockers are given to patients with a diagnosis of stage 1, stage 2, stage 3 hypertension or hypertension with comorbidities.

3.2.2 Evaluation of Drug Use Based on the Right Patient

Right patient is the suitability of drug selection that considers the patient's condition so that it does not cause contraindications or conditions that can increase the risk of drug side effects [30]. Evaluation of the patient's accuracy in this study was carried out by comparing the contraindications of the drug given with the patient's condition which was seen from the comorbidities that the patient was suffering from or if there was a history of allergies listed in the medical record.

Based on the research that has been done on 83 hypertensive patients, it is stated that the patient is 100% correct. This is in line with research which shows that evaluating the patient's accuracy in the use of antihypertensive is carried out by comparing the contraindications of the drug given with the patient's condition in the medical record data because all drugs prescribed are in accordance with the pathological and physiological conditions of the patient and do not cause contraindications in the patient [28].

3.2.3 Evaluation of Drug Use Based on Appropriate Dosage

The right dose is the suitability of the dose of antihypertensive drug with the therapeutic dose range, in terms of the dose of use per day based on the patient's special condition. If the prescription of antihypertensive drugs is in the range of the minimum dose and the recommended daily dose, the prescription is said to be the right dose. Doses that are too low can cause blood levels of the drug to be below the therapeutic range so that it

cannot provide the expected response, namely the therapeutic outcome in the form of lowering blood pressure is not achieved. On the other hand, drug doses that are too high can cause blood levels of the drug to exceed the therapeutic range, causing the main side effect of antihypertensive, namely hypotension and other possible toxic effects [30].Evaluation of drug dose selection includes the amount of the dose, frequency, and duration [31].

Based on table 5, it is known that from 83 patients, 9 patients (10.84%) were assessed as having the wrong dose and 74 other patients (89.16%) were assessed as having the right dose. The reason for this inaccuracy is the insufficient dose of captopril given. The dose of captopril received by the patient is 12.5 mg a day, while according to the JNC 8 literature for hypertension, the minimum dose of captopril in a day is 50 mg in 2 doses per day. Drug doses that are too low can cause drug levels in the blood to be below the therapeutic range so that they cannot provide the expected response, namely the therapeutic outcome in the form of lowering blood pressure is not achieved. Administration of drug doses that are not standardized can have a broad impact on patients. If the dosage of the drug listed on the prescription is not correct, then the patient failed to get the correct treatment related to the disease. This can lead to complications [32].Treatment of hypertension is a repeated and long-term treatment, so precise dosing is important to achieve maximum therapeutic effect [31].

3.2.4 Evaluation of Drug Use Based on Appropriate Drug Selection

Drug selection is said to be appropriate if the type of drug is selected based on the consideration of the magnitude of the benefits and risks because the treatment is individual by taking into account that the effect of the drug is sometimes not the same for each individual [31].Evaluation of drug accuracy in this study was assessed based on the suitability of the selection of therapy groups, either singly or in combination, taking into account the diagnosis written in the medical record and comparing it with the literature used, namely JNC 7 [25].

Based on table 5, it is known that from 83 patients, 9 patients (10.84%) were judged to be inappropriate for the drug and 74 patients (10.84%) were deemed to be on the right drug. Inaccuracy of drugs in this study occurred due to inappropriate combinations and selection of therapeutic variations that were not in accordance with JNC 7. The accuracy of drugs in this study was judged based on the classification of hypertension and the age of the patient. In JNC 7 it is stated that a combination of drugs is given to patients with stage 1 hypertension who fail to reach the target blood pressure and stage 2 hypertension patients so that if there are patients with stage 2 hypertension but only receiving mono-therapy, the drug is considered inappropriate. According to JNC 7, grade 2 hypertension cannot be reduced with one drug, so the initial stage is combination therapy. Combination therapy can lower blood pressure more with minimal side effects [30].

Some patients with stage 1 hypertension but aged > 60 years or with other complications, the use of combination drugs is considered appropriate because the increasing age or the presence of other complications the higher the risk of increasing blood pressure so that the use of combination antihypertensive drugs will better control blood pressure and reduce the risk of damage to other organs. The other inaccuracy occurs due to a combination of valsartan and candesartan where these two drugs are part of the same class, namely ARB. Combinations of antihypertensive drugs should be selected from different classes, starting with lower doses to increase effectiveness and reduce the potential for side effects [33].

3.3 Drug Interactions

Some use of antihypertensive drugs that interact with each other so they should not be given at the same time [34].

a) Captopril with Glimepirid
   If the above drugs are used simultaneously, it will cause increased hypoglycemia and a temporary increase in insulin sensitivity by ACEI.
b) Captopril with Spironolactone
   Concurrent use of the above drugs may result in an increase in the serum potassium concentration.
c) Captopril with Furosemide
   If the above drugs are combined, the effect of furosemide will decrease and may inhibit the action of captopril. So, if combined, the drugs above have no effect.
d) Candesartan with spironolactone
   If the above drugs are combined, it will cause kidney problems and diabetes.
e) Nifedipine with Diltiazem
   Nifedipine increases the concentration of diltiazem and diltiazem increases the plasma concentration of nifedipine.
f) Spironolactone with Valsartan.
   If the above drugs are combined, it will cause kidney problems and diabetes.
g) Captopril with Allopurinol
   The risk of hypersensitivity may be higher when allopurinol and captopril are co-administered compared with the drug alone.

IV. CONCLUSION

Based on the results of research that has been conducted on 83 medical records of hypertensive patients, it was found that :The profile of the use of antihypertensive drugs in inpatient hypertensive patients at the general hospital in the Mukomuko area based on patient characteristics, namely male gender by 51.80% and female by 48.20%, with an age range of <45 years of 16.86%, age 45-60 years old by 59.04%, and age >60 years by 24.10%. The most common type of antihypertensive drug use was amlodipine, either single use 12.05% or combination of 2 drugs 38.55%, combination of 3 drugs 22.90%. Two-combination therapy, namely the CCB+ARB drug class of 32.53%, the 3-combination therapy CCB+ARB+ACE-I 6.02%, CCB + ARB + Diuretic 4.82%, and CCB+ARB+β-Blocker 4 ,82%. And the use of antihypertensive drugs in inpatient hypertensive patients at the general hospital in the Mukomuko area was based on the criteria of 100% correct indication, 100% correct patient selection, 89.16% correct drug selection and 89.16% correct dosage.

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