

Analysis of the Use of Rational Drugs on the Most Treated Diseases in One of Hospitals in Bandung City

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Abstract

An approved drug is a drug that meets indicators with rational drug use criteria. Identification of DDD values for medical records and prescriptions of outpatients and inpatients using WHO-determined methods. Analysis of rational drug use in a hospital in Bandung using diabetes drugs are Acarbose, Glibenclamide, Glimepirid, Metformin, and Pioglitazon. The use of hypertension drugs are amlodipine, lisinopril, candesartan, bisoprolol, irbesartan, furosemide, hydrochlorothiazide, and ramipril. The use of typhoid drugs is chloramphenicol, amoxicillin, cefixime, and levofloxacin. Based on the right criteria the number of rational percentages is 63.43%, the right criteria correspond to the proportion of 95.91%, the right criteria according to the results are 63.43%, and the right criteria based on the results are 46.45%.

Keywords: Rational Drug Use, Disease, Bandung City Hospital, DDD Method.

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1. Introduction

The use of drugs in health care facilities is generally not rational. This inappropriate use of drugs can be in the form of overuse, underuse, errors in prescription or non-prescription use, polypharmacy, inappropriate self-medication (WHO, 2010). The use of drugs is said to be rational if it meets the following criteria: right diagnosis, right indication of disease, right drug selection, right dose, right assessment of the patient's condition, right method of administration, right time interval of administration, right duration of administration, right information, right follow-up, right drug delivery, the drugs given must be effective and safe with guaranteed quality, and be aware of side effects (Ministry of Health, 2011).

Hospital "X" in Bandung City provides 24-hour services for services: inpatient, emergency department (IGD), pharmacy, gynecology, and general clinic. However, services are not yet available for several other diseases, such as ENT, eye, heart and kidney disease, so the prescription does not represent all disease diagnoses. From preliminary observations, it is known that the types of diseases that are mostly handled by the "X" Hospital in Bandung are typhoid, hypertension, diarrhea, diabetes, and dyspepsia. In Indonesia alone, the prevalence of diabetes mellitus (DM) is increasing from year to year. Based on the Indonesian Central Statistics Agency in 2003, there are ± 133 million people over 20 years of age suffering from diabetes, with a prevalence of 14.7% in urban areas and 7.2% in rural areas. So, it is estimated that there are 194 million people aged 20 years and over in 2030 (Riskesdas, 2013).

The prevalence of hypertension in Indonesia which is obtained through measurements at ≥ 18 years of age is 25.8 percent; highest in Bangka Belitung 30.9%, followed by South Kalimantan 30.8%, East Kalimantan 29.6% and West Java 29.4% (Riskesdas, 2013). The prevalence of typhoid fever in Indonesia reaches 1.7%. The highest prevalence distribution is at the age of 5-14 years 1.9%, aged 1-4 years 1.6%, aged 15-24 years 1.5%, and ages <1 year 0.8% (Riskesdas, 2007).

The purpose of the Defined Daily Dose (DDD) system is to research the use of drugs with the aim of improving the quality of drug use. DDD was assumed to be the average daily maintenance dose used for the main adult indication. Descriptive statistics are used to present data and analyze the data obtained (WHO, 2018).

Based on this background, the rationality of drug use is interesting to analyze further about the rational use of drugs in the disease that is mostly handled in the "X" Hospital of Bandung City. The description of drug use in most diseases can represent the prescribing pattern at the Bandung City "X" Hospital based on the guideline. This study will answer two things: first, the use of drugs in the three most diseases in the Hospital "X" Bandung City. Second, knowing the rationality of drug use in the prescription of the three most diseases in the Bandung City "X" Hospital.

2. Method

This research is a retrospective study, using primary data in the form of drug prescription data and secondary data in the form of medical record data taken from the hospital "X" in the city of Bandung. This research was conducted by analyzing the prescribing pattern based on rational drug use including the type of drug, dosage suitability, and drug availability at the "X" Hospital in Bandung with the DDD method. DDD method can be used to determine the possibility of irrational use of drugs through indications of underuse or overuse. Evaluation

of drug use can be easily compared using the DDD method by accessing the website https://www.whooc.no/atc_ddd_index/.

The data used are patient prescription data and medical record data stored at the "X" Hospital in Bandung City for the period of January-March 2020. The prescription data used are patient prescription data and medical record data for the three diseases that are mostly handled at Hospital "X" in the city of Bandung.

The population in this study were all patient medical record data and all drug prescribing data obtained in the three most frequently treated diseases, both outpatient and inpatient treatment at the "X" Hospital in Bandung City with a total of 309 patients, based on criteria inclusion:

- (a) Patients who have complete medical record data and undergo inpatient and outpatient treatment.
- (b) Medical record data that has complete data including: Patient's data (name, age, gender), drug bio (dosage, drug stock, drug name), and International Statistical Classification of Diseases (ICD).
- (c) Patients aged ≥ 18 years.
- (d) Patients suffering from three diseases are mostly treated at the "X" Hospital in Bandung City.

Meanwhile, the exclusion criteria in this study were medical record data that did not include the inclusion criteria. Based on these calculations the sample to be analyzed in this study amounted to 175 patients.

3. Result and Discussion

Most Diseases Treated by "X" Hospital

A total of 1,757 inpatients and outpatients at the Bandung City "X" Hospital in January-March 2020. Patients who met the inclusion criteria were patients with complete medical record data; includes the patient's name, age (≥ 18 years), gender, patients including those suffering the most diseases in the Bandung City "X" Hospital, drug dosage, drug names and the International Statistical Classification of Diseases (ICD). From 1,757 patients, 309 patients were selected as a population who met the inclusion criteria. Of these 309 patients, 175 patients were taken to be analyzed based on the Slovin formula.

Table 1. Data Description of Most Diseases in January-March 2020 at "X" Hospital Bandung City

Diseases	ICD	Month			Total	Inclusion Criteria Data
		January	February	March		
Typhoid fever	A01.0	91	103	145	339	39
Diarrhea and gastroenteritis of presumed infectious origin	A09	9	10	6	25	5
Tuberculosis of lung, without mention of bacteriological or histological confirmation	A16.2	15	4	15	34	10
Dengue haemorrhagic fever	A91	4	3	3	10	2
Unspecified diabetes mellitus without complications	E14	127	104	130	361	81
Essential (primary) hypertension	I10	123	105	119	347	55
Dyspepsia	K30	38	33	29	100	5
Cough	R05	0	18	1	19	5

Based on a sample count of 175 patients; then obtained data: Diabetes mellitus patients = 81 patients, Hypertension patients = 55 patients, and Typhoid patients = 39 patients.

The prevalence of diabetes mellitus in Indonesia increased by 1.6% from 2013. In 2013, people with diabetes mellitus at the age of ≥ 15 years amounted to 6.9%, while in 2018 it was 8.5% (Riskesdas, 2018). WHO predicts an increase in the number of people with diabetes in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030 (Soelistijo et al., 2015)?

The highest prevalence of hypertension in Indonesia by province is South Kalimantan at 44.1% and the lowest is Papua at 22.2% (Riskesdas, 2018).

According to Riskesdas (2007), the prevalence of typhoid fever in Indonesia reaches 1.7%. The highest prevalence distribution was at ages 5-14 years (1.9%), ages 1-4 (1.6%), ages 15-24 years (1.5%) and ages <1 year (0.8%). In this study, there were 39 patients with typhoid fever aged ≥ 18 years.

Rational Use of Medicines

Measurement of rational drug use, using criteria set by the Ministry of Health. This measurement analyzes 4 criteria: (1) the right dose, (2) the right drug, (3) the right duration of the drug, and (4) the right diagnosis.

Table 2. Distribution of Drug Use Patterns Based on Correct Dosage at “X” Hospital in Bandung City for the Period of January-March 2020 (N = 175)

Diseases	Drug Name	Rational Use (Guidlines Index WHO DDD)	Hospital “X”		Percentage (%)
			Rational	Not- Rational	
Diabetes Mellitus	Acarbose 5mg /10mg	300mg	2	0	1,14
	Glibenclamid 2,5mg /5mg	10mg	1	0	0,57
	Glimepiride 1mg/2mg/3mg/4mg	2mg	35	1	18,85 (Rational)
					0,57 (Not- Rational)
	Metformin 500mg/850mg	2000mg	35	0	18,82
	Pioglitazon 15mg/30mg	30mg	7	0	4
	Total		80	1	45,71 (Rational) 0,57 (Not- Rational)
Hypertension	Amlodipine 5mg /10mg	5mg	16	0	9,14
	Lisinopril 5mg /10mg /20mg	10mg	15	1	0,57 (Rational)
					0,57 (Not- Rational)
	Candesartan 8mg/16mg	8mg	7	0	9,14
	Bisoprolol 5mg	10mg	7	0	4
	Irbesartan 150mg/300mg	150mg	1	0	0,57
	Furosemid 40mg	40mg	2	0	1,14
	HCT 25mg	25mg	1	0	0,57
Ramipril 150mg/300mg	2,5mg	0	6	3,42	
	Total		48	7	27,42 (Rational) 4 (Not- Rational)
Typhoid	Chloramphenicol 250mg /500mg	3000mg	23	1	13,14 (Rational)
					0,57(Not Rational)
	Amocixillin 250mg/500mg	1500mg	-	-	-
	Cefixime 500mg	500mg	10	0	1,14
	Ciprofloxacin 500mg	1000mg	-	-	-
	Total		33	1	18,85 (Rational) 0,57 (Not Rational)

In this study, prescription rationality was reviewed based on the criteria for the accuracy of the dose based on the DDD index guidelines. Typhoid, hypertension, and diabetes mellitus did not meet 100% of the appropriate dose criteria.

Diabetes mellitus contained 0.57% incorrect dose and 45.71% correct dose. In the treatment of Diabetes Mellitus, drug dosage should consider the state of the functioning of the body's organs wherever possible; for example, the condition of the function of the kidney organs has decreased work function so that the administration of drug doses as therapy will have an effect (PERKENI, 2011).

Hypertension is a disease with the highest number of irrational prescribing, especially in the drug ramipril. In hypertension, there were 2 drugs in the wrong dose, including Lisinopril and Ramipril. For drug prescription, there were 4% incorrect dose and 27.42% correct dose, because the DDD dose per day was 10 mg, but there was 1 case who received DDD dose reaching 30 mg per day. Captopril uses more than other ACE inhibitors such as lisinopril and ramipril. The administration of an angiotensin-converting enzyme inhibitor (lisinopril) can further reduce arterial stiffness compared to a calisum canal blocker (amlodipine) in hypertensive patients who have never been treated before (Ayuthia, 2015).

The fact shows that there are 0.57% typhoid diseases that are handled with the wrong dose and 18.85% are handled with the right dose. Chloramphenicol is still consumed and is one of the standard therapies for typhoid fever, but the drawbacks of chloramphenicol are high recurrence rates, high rates of carrier occurrence, and bone marrow toxicity (WHO, 2011).

Table 3. Distribution of Drug Use Patterns Based on Correct Drug Data at Hospital "X" in Bandung City Period January-March 2020 (N = 175)

Diseases	Name of Medicine in Hospital	Reference (Fornas, 2017)	Total Patient	Notes		Percentage (%)
				Accurate	Not-Accurate	
Diabetes Mellitus	Acarbose	Acarbose 5mg/100mg	2	2	-	1.14
	Glibenclamide	Glibenclamide 2,5mg/5mg	1	1	-	0,57
	Glimepiride	Gliclazide80mg	-	-	-	-
	Metformin	Metformin 500mg/850mg	33	36	-	18.85
	Pioglitazon	Glimepirid 1mg/2mg/3mg/4mg	32	35	-	18,28
		Glipizid 5mg/10mg	-	-	-	-
		Pioglitazon 15mg/30mg	1	1	-	0,57
		Total	81	0	0 (Not Rational) 46,28 (Rational)	
Hypertension	Amlodipine	Amlodipin 5mg/10mg	16	16	-	9,14
	Lisinopril	Imidapril 5/10	-	-	-	-
		Captopril 12.5mg/25mg/50mg	-	-	-	-
		Lisinopril 5mg/10mg/20mg	16	16	-	9,14
	Ramipril	Ramipril 2,5mg/5mg/10mg	6	6	-	3,42
	Irbesartan	Irbesartan 150mg/300mg	1	1	-	0,57
	Candesartan	Kandesartan 8mg/16mg	7	7	-	6,85
	Bisoprolol	Atenolol 50mg/100mg	-	-	-	-
		Bisoprolol 5mg	7	7	-	6,85
		Propranolo 10mg	-	-	-	-
Furosemid	Diltiazem 30mg	-	-	-	-	
Hidroklorotiazide	Hidroklorotiazide 25mg	1	1	-	0,57	
		Total	55	0	0 (Not Rational) 31,42 (Rational)	
Typhoid	cloramphenicol	cloramphenicol 250mg/500mg	24	24	-	11,42
	Amocixillin	Amocixillin 250 mg/500mg	-	-	-	-
	Levofloxacin	-	5	-	5	2,85
	Cefixime	Cefixime 500mg	10	10	-	5,71
	Ciprofloxacin	Ciprofloxacin 500mg	-	-	-	-
			Total	39	0	0 (Not Rational) 22,28 (Rasional)

Table 4. Distribution of Hypertension Combination Drug Use Based on JNC (Joint National Committee VIII) (N = 175)

Diseases	Drug Name	Total Patient	Notes		Percentage (%)
			Accurate	Not Accurate	
Hypertension (N=55)	Amlodipine + Candesartan	5	5	-	2,85
	Lisinopril + Irbesartan	1	1	-	0,57
	Lisinopril + Amlodipin	3	3	-	1,71
		Total	9	0	5,14 (Rational)

Table 5. Distribution of Diabetes Mellitus Combination Drug Use with Correct Criteria for Drugs Based on PERKONI (N = 175)

Diseases	Name of Medicine in Hospital	Total Patient	Notes		Percentage (%)
			Accurate	Not Accurate	
Diabetes Mellitus (N=81)	Metformin + Glimepirid	13	13	-	7,42
		Total	13	0	7,47 (Rational)

In this study, the rationality of prescribing was reviewed based on the criteria for drug accuracy using the national guideline formulary, JNC (Joint National Committee VIII), and PERKONI.

The rationale for prescribing in terms of the accuracy of the drug for diabetes mellitus had met the exact criteria for the drug with the most monotherapy: metformin with a percentage of 8.85%, and combination with metformin + glimepirid with a percentage of 7.42%. Selection of the right drug can be weighed from the accuracy of the class of therapy and the type of drug according to the diagnosis. In addition, drugs must also be proven benefits and safety. The right drug in the type 2 diabetes mellitus therapy is a suitability in the selection of drugs from several types of drugs that have an indication of diabetes mellitus disease (PERKONI, 2011).

In hypertension, the drug has met the exact criteria with the most monotherapy is amlodipine with a percentage of 9.24%, and combination with candesartan + amlodipine with a percentage of 2.85%. A single antihypertensive drug is often not enough and other antihypertensive drugs are usually added gradually until hypertension can be controlled (POM, 2015). Clinical studies show that in patients at high risk of cardiovascular and kidney disease, the administration of ARB therapy with CCB is superior because it reduces metabolic side effects in patients with metabolic disorders (Mallat, 2012).

Meanwhile, typhoid did not yet fully fulfill the criteria for the right drug with the percentage of inappropriate drug being 2.85%. There are five patients who received treatment not using antibiotics that have been stipulated in Fornas. The five patients received the antibiotic levofloxacin. The route of administration of the antibiotic levofloxacin used in this study was mostly intravenous. Oral antibiotics should be the first choice for infection therapy (Permenkes, 2011).

Table 6. Distribution of Drug Use Patterns Based on the Accurate Duration of Drugs at Hospital "X" in Bandung City in January-March 2020 (N = 175)

Diseases	Drug Name	Rational Use (Guidlines Index WHO DDD)	Hospital "X"			Percentage (%)
			Usage	Rational	Not Rational	
Diabetes Mellitus	Acarbose 5mg /10mg	3x1	3x1	2	0	1,14
	Glibenclamide 2,5mg /5mg	2x1	2x1	1	0	0,57
	Glimepiride 1mg/2mg/3mg/4mg	2x1	2x1 (Rational)	35	1	18,85 (Rational)
			3x1 (Tidak Rasional)			0,57 (Not Rational)
	Metformin 500mg/850mg	4x1	3x1	35	0	18,82
	Pioglitazon 15mg/30mg	1x1	1x1	7	0	4
	Total			80	1	45,71 (Rational) 0,57 (Not Rational)
Hypertension	Amlodipine 5mg /10mg	1x1	1x1	16	0	9,14
	Lisinopril 5mg /10mg /20mg	1x1	1x1 (Rational)	15	1	0,57 (Rational)
			2x1 (Not Rational)			0,57 (Not Rational)
	Candesartan 8mg/16mg	1x1	1x1	7	0	9,14
	Bisoprolol 5mg	2x1	2x1	7	0	4
	Irbesartan 150mg/300mg	1x1	1x1	1	0	0,57
	Furosemid 40mg	1x1	1x1	2	0	1,14
	HCT 25mg	1x1	1x1	1	0	0,57
Ramipril 150mg/300mg	1x1	2x1	0	6	3,42	
Total			48	7	27,42 (Rational) 4 (Not Rational)	
Typhoid	Cloramfenikol 250mg /500mg	3x2	3x2 (Rational)	23	1	13,14 (Rational)
			4x2(Not Rational)			0,57(Not Rational)
	Amocixillin 250mg/500mg	-	-	-	-	-
	Cefixime 500mg	1x1	1x1	10	0	1,14
	Ciprofloxacin 500mg	-	-	-	-	-
Total			33	1	18,85 (Rational) 0,57 (Not Rational)	

In this study, prescription rationality was reviewed based on the criteria for the accuracy of the duration of the drug based on the DDD index guidelines. For typhoid, hypertension and diabetes mellitus, they do not meet the exact criteria for the duration of the drug.

Diabetes mellitus contained 0.57% incorrect dose and 45.71% correct dose. Hypertension is a disease with

the highest number of irrational prescribing, especially in the drug ramipril. In hypertension, there were 2 drugs in the wrong dose, including Lisinopril and Ramipril. For drug prescribing, there were 4% inaccurate doses and 27.42% correct doses, because the DDD dose per day was 1x1 per day, but there was 1 case that received DDD doses reaching 3x1 per day. Typhoid there was 0.57% inaccurate dose and 18.85% correct dose.

The more frequent taking medication per day (for example: 4 times a day), the lower the adherence to taking medication. Medicines that must be taken 3 times a day should mean that the drug must be taken at intervals of every 8 hours (Kemenkes, 2011).

Table 7. Distribution of Drug Use Patterns Based on Correct Diagnosis at "X" Hospital in Bandung City in January-March 2020 (N = 175)

Diseases	Notes		Percentage (%)
	Correct	Incorrect	
Diabetes Mellitus (N=81)	Correct	42	24
	Incorrect	39	22.28
Hypertension (N=55)	Correct	23	13.14
	Incorrect	22	12.57
Typhoid (N=39)	Correct	17	9.71
	Incorrect	22	12.57

Based on this study, the rationality of prescribing in terms of accuracy criteria for diabetes mellitus, hypertension, and typhoid did not meet the criteria for precise diagnosis. The percentage of all incorrect diagnoses was 47.42%, while the correct diagnosis was 46.85%. Drug use is called rational if it is given for a correct diagnosis. If the diagnosis is not made correctly, the choice of drug will be forced to refer to the wrong diagnosis. As a result, the drugs given will not match the indications they should be (Ministry of Health, 2011).

4. CONCLUSION AND SUGGESTION

Conclusion

1. The use of drugs in diabetes mellitus is acarbose, glibenclamide, glimepirid, metformin, and pioglitazone. In hypertension are amlodipine, lisinopril, candesartan, bisoprolol, irbesartan, furosemide, hydrochlorothiazide, and ramipril. Typhoid is chloramphenicol, amoxicillin, cefixime, and levofloxacin.
2. Based on the results of the analysis regarding the rationality of drug use based on the 3R (Right dosage, Right drug, and Right diagnosis) in Bandung City "X" Hospital patients on January-March 2020, it can be concluded that the percentage of right dosage is 63.43%, the right drug is equal 95.91%, right diagnosis was 46.45%, and correct duration of drug was 63.43%.

Suggestion

Optimization of improving the quality of services on the rationality of drug use at the "X" Hospital in Bandung City needs to be reviewed on its suitability in terms of: the right dose, the right drug, the right diagnosis, and the duration of the drug with guidelines for rational drug use according to WHO or the Ministry of Health of the Republic of Indonesia.

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