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RATIONALIZATION OF MEDICATION USE IN NON-SPECIFIC DIARRHEA, NON-PNEUMONIA ARI, AND MYALGIA IN NORTH GORONTALO 2023

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Abstract

Rational drug use ensures medication is prescribed based on clinical needs in appropriate quantities. However, irrational drug use remains common, including incorrect indications, improper dosages, and administration errors. This study aims to evaluate the rationality of antibiotic use for non-specific diarrhea, non-pneumonia ARI, and myalgia in North Gorontalo Regency, Gorontalo Province, in 2023. Using a descriptive observational cross-sectional design, data were collected retrospectively from patient prescriptions and medical records. Findings indicate that the average number of drugs per prescription sheet at North Gorontalo District Health Centers exceeds WHO's recommended standard of 1.8–2.2 items. While antibiotic and injection drug use generally aligns with WHO indicators, some centers exceeded recommended levels in certain months. Excessive drug prescriptions pose polypharmacy risks, while overuse of antibiotics may contribute to resistance. Overall, antibiotic use for non-specific diarrhea and non-pneumonia ARI, as well as injection drug use for myalgia, is largely rational, though occasional deviations from WHO guidelines were observed.

Keywords: rationalization drug usage, community health center, north gorontalo

Introduction

Rational drug use is the appropriateness of the use of drugs based on the patient's clinical needs in reasonable quantities and at the lowest prices. The use of a drug is considered rational if it meets criteria such as correct indication, correct diagnosis, correct choice of drug, correct dose, correct interval of administration, correct duration of drug administration, correct route of administration, warning of side effects, and correct assessment of the condition. Patients, delivery of drugs (dispensing) appropriately, administration of drugs must be effective, safe with guaranteed quality, always available at an affordable price, information provided is accurate, follow-up is appropriate, and patient compliance with prescribed drugs (Mohiuddin, 2020).

In 1993, *the World Health Organization* (WHO) formulated an indicator evaluation of drug use through *the International Network for the Rational Use of Drugs* (INRUD), which aims to identify health problems in developing countries like polypharmacy in Indonesia and Nigeria, excessive injections in Uganda, Sudan, and Nigeria, and a low percentage of patients who understand timetable dose medicine in Malawi (Hogerzeil et al., 1993). Indicator: prescriber, waiter, patients, and facility health are used as evaluation rationales for drug use. Indicator prescribing aims to identify problems with general prescriptions, where indicators This is line First in evaluation use drug . Indicator prescribing use: describe nonconformity with the drug as well as see patterns in the use of the drug. Parameters assessed from indicator prescribing, that is, the average amount of medication per sheet recipe, percentage prescribing drug with preparation injections,

antibiotics, and names generic, as well as prescribing according to the drug list essential or formulary (*World Health Organization*, 1993, in Ningrum *et al.*, 2022).

According to the Indonesian Ministry of Health in 2017, Rational Drug Use (POR) is a policy in service health to ensure effectiveness, safety, and an affordable cost of treatment in the community at the facility service health and also inside treatment alone. Use drug stated rational If patient get the right medicine in accordance with need clinical , appropriate dose need for period sufficient time , and affordable cost For individual nor public. National PORT has indicators of performance in community health centers that include percentage use of preparation injections in disease myalgia, percentage use of antibiotics in disease non-specific diarrhea, and ARI (Infection Channel Respiration Acute) over non-pneumonia, as well as the average number of drug items in a recipe. Apart from that, the National POR also has a number of criteria for rationality, including accuracy, evaluation, condition, diagnosis, indications, types of medication, dosage, method, and duration of use of medication (Ministry of Health, 2017). Irrationality: use drugs Still often found in practice daily. For example, prescribed medication without a clear indication, nonconformity of the dose given, wrong method of administration and duration of administration, and also prescription expensive drugs are examples of irrationality in prescribing drugs. It's not rational to use medicine in society because it can cause waste costs, especially in cases of resistance to antibiotics because using drugs that aren't rational (Davis et al., 2020).

A study on several regions in Indonesia with indicator prescribing showed irrationality in using medication in some places. Research at the Community Health Center Kuta District, Bali, in October 2017 obtained results that some met usage targets for drugs rationally from each parameter on the indicator prescribing except for prescribing parameters drug preparation injection (Dewi et al., 2018). Research conducted by Hendrawan (2020) shows that use of the drug under review from prescription at the Community Health Center New Mekar Tanjung Pinang, Riau, in 2019 was not in accordance with indicator prescribing, except for percentages prescribing drug with preparation injection and name generic. Research at Hasan Sadikin Hospital in Bandung showed that the average number of drugs per sheet was 3.05, the use of generic drugs was 23.63%, the percentage of use of antibiotics and injection preparations was 17.20% and 4.84%, and the use of drugs according to the formulary was 36.86% of the 186 prescription sheets and 567 drugs prescribed. In South Jakarta, several studies have been carried out regarding rational drug use. As reported by Kristiyowati (2021), drug use at IMC Bintaro Hospital obtained an average number of drugs per sheet of 2.72 drug uses. generic 53.35%, the percentage of prescriptions for antibiotics and injection preparations was 32.39% and 1.87%, and the percentage of prescriptions according to the formulary was 90%. Research conducted in Palembang City in 2019 by Stiawati found that rational use of medicine at the Palembang City Health Center is still available. No rational except the percentage parameter prescribing injection and percentage antibiotics for infections (Channel Upper respiratory tract infection (ARI)) non-pneumonia (ICU, n.d.). Inaccuracy in use type, dose, and duration of administration of antibiotics against 49 pneumonia patients in the hospital Ibnu Sina Makassar, based on management, the Pneumonia *Community Infectious Diseases Society of America* and *the World Health Organization* have researched by Putri et al. (2014). This obtained results in as many as 18 cases. There is no appropriate choice of type and dose of antibiotics (36.0%), and there are as many as 20 cases of inappropriate use of antibiotics during the delivery period (40.0%).

Based on the above background, researchers will conduct research on *the rationalization of drug use in non-specific diarrhea, non-pneumonia, acute respiratory infections, and myalgia in North Gorontalo Regency, Gorontalo Province, in 2023*.

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Research Methods

Design, place, and time

Study This observational-descriptive study with a cross-sectional study design was carried out very quickly without follow-up. The data used is retrospective data from a recipe patient and recorded medical data. To find out the patient's diagnosis in 202-3 at the Community Health Center, North Gorontalo Regency, Gorontalo Province.

This research was carried out at the North Gorontalo Regency Health Center, Gorontalo Province, in 2024.

Number and method of taking subjects

According to Firdaus (2021), Herman *et al*. (2023) determined the minimum sample size using the Slovin formula with a confidence level of 90%. Amount subject to research: This is a total of 57 recipes.

The target population in this study was patients at the North Gorontalo District Health Center, Gorontalo Province. Subjects were taken using the *purposive sampling method.*

Types and Methods of Data Collection

Data collection was carried out by copying prescription data and patient medical records at the North Gorontalo Regency Health Center, Gorontalo Province. The sample used is prescription data and medical records from 2023, which have been calculated. The patient's medical record is used to see the patient's diagnosis.

Processing and analysis of data

Data collection starts with collecting prescriptions every month in 2023 using a *stratified proportional random sampling technique*. Copying prescriptions is done by taking prescription data at the pharmacy installation in the form of number, prescription date, patient name, gender, patient age, diagnosis, drug name, number of drugs, diarrhea prescription, ARI prescription, and injection prescription. Then the rationality of the drug is checked based on WHO indicators.

Data analysis to determine the pattern of antibiotic drug prescribing in patients with non-specific diarrhea, non-pneumonia, ARI, and myalgia at the North Gorontalo District Health Center, Gorontalo Province, is done by grouping the names of drugs based on therapeutic class, then calculating the percentage of each drug and making it in the form of a diagram. Data analysis in this research is in the form of prescribing indicator values, which can be calculated using the following formula:

1. Average number of drugs per prescription

$$\frac{\textbf{rugs prescribed total number}}{\textbf{prescription sheets studied number}}$$

2. Percentage of drug prescriptions with antibiotics

$$\frac{\textbf{prescriptions containing antibiotics Number}}{\textbf{prescriptions studied total number}} \textbf{x 100}$$

3. Percentage of drug prescriptions with injectable preparations

$$\frac{\textbf{prescriptions containing injection drugs number}}{\textbf{prescriptions studied total number}} \textbf{x 100}$$

Results and Discussion

A description of the distribution of the number of drug items per prescription sheet and the percentage of antibiotic use in cases of non-specific diarrhea in 15 community health centers in North Gorontalo district can be seen in table 1 below. This

Table 1 . Number of drug items and percentage of non-specific diarrhea antibiotic use

Month	who	Public health center								
		Atti ngola	Bia u	How long ago?	Bulo ila	Dam ballo	Gentu ma'am	Illa remember	Orchid	Kwan dang
Jan	Items	2	2.8	3	2.75	0	1.9	2.7	2,2	1.8
	AB	0	0	22%	0%	0%	21%	0%	0%	0.15%
Feb	Items	2.8	3.6	3	4.17	0	5.7	2.7	2.5	3.6
	AB	0%	0%	22%	0%	0%	0%	0%	0.16%	0.16%
Mar	Items	2	3.89	3	3	1.0	1.0	2.9	2.5	3.0
	AB	0%	0%	22%	0%	0%	0%	0%	0.12%	0%
Apr	Items	3.5	3.33	0	6	0	1.3	2,2	3.7	3
	AB	0%	0	0	0	0	10%	7%	17%	0%
May	Items	2,2	2,2	3	2.83	0	4.4	2,2	1.0	4.5
	AB	0	0	0	0	0	11%	0%	0%	0%
Jun	Items	2,4	2,4	3	1	2,4	3,4	2,2	2.1	2.75
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0.15%
Jul	Items	3,2	3,2	3	0	3,2	4.3	2,2	0	0
	AB	31.3%	31.3 %	0%	0%	0%	0%	0%	0%	0%
Aug	Items	2.71	2.71	3	5.17	3.6	3.6	1.4	1.9	1.9
	AB	5.3%	5.3 %	0%	0%	0%	0%	0%	0%	0%
Sept	Items	3	2.50	3	5	1.6	1.5	1.0	4.0	3,4
	AB	0	0	0%	0	0%	0%	0%	20%	0.08%
Oct	Items	3.17	2	3.8	2.5	4.7	7.7	2.25	1.25	3.16
	AB	10.5%	0	0.4	0%	0	0	0	0	0.27
Nov	Items	2.7	2,3	3.7	2,125	1,2	1,2	1,2	2.1	3.3
	AB	0%	0%	0.5%	0%	0%	0%	0%	17%	0.018%
Dec	Items	3	4.5	4.5	5.17	1.3	1.3	5.8	4.8	2.0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%

Month	who	Public health center				
		Sumalata	Tolingula	Pone lo	Moli ngkapoto	Mona no
Jan	Items	3.0	3.1	3.1	0	0
	AB	0%	2.2%	2.2%	0%	0%
Feb	Items	5.5	3,2	3,2	1.75	1.75
	AB	0%	0%	0%	0%	0%
Mar	Items	4.50	3.7	3.7	2.75	2.75
	AB	0%	0%	0%	0%	0%
Apr	Items	4.75	3.5	3.5	3.91	3.91
	AB	0%	1.4%	1.4%	0%	0%
May	Items	3.83	3.8	3.8	4.09	4.09
	AB	0%	0%	0%	0%	0%
Jun	Items	4.17	3,2	3,2	4.17	4.17
	AB	0%	0%	0%	0%	0%
Jul	Items	4.0	4.0	4.0	2.33	2.33
	AB	0%	0%	0%	3%	3%
Aug	Items	3.85	3.3	3.3	3.6	3.6
	AB	0%	1.2%	1.2%	0.3%	0.3%
Sept	Items	2.76	3,4	3,4	2.76	2.76
	AB	0%	4%	4%	0%	0%
Oct	Items	2.50	2.50	2.50	2.50	2.50
	AB	0%	0%	0%	0%	0%
Nov	Items	2.5	2.5	2.5	2.5	2.5
	AB	0%	0%	0%	0%	0%
Dec	Items	2.63	2.63	2.63	2.63	2.63
	AB	0%	0%	0%	0%	0%

Most of the number of medicinal items in each community health center exceeds the maximum WHO requirements (1.8-2.2) with the highest number being in the Illngata community health center in December at 5.8. In addition, Biau and Attinggola health centers in July prescribed 31.3% of antibiotics in excess of WHO requirements (<22.7%). Data on the number of drug items per sheet recipes and percentages use antibiotics in

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cases of non-pneumonia ARI in 15 community health centers North Gorontalo district can seen in table 2 below

Table 2 . Number of drug items and percentage of non-pneumonia ARI antibiotic use

Month	who	Public health center									
		Atti ngola	Bia u	How long ago?	Bulo il	Dam ballo	Gentu ma'am	Illa ngata	Orchid	Kwan dang	Limba to
Jan	Items	3.82%	3.3%	3.7	3.75	0	1.0	3,2	3	3.8	1.4
	AB	7.38%	0%	3.2%	0%	0%	0%	0.05%	0.07%	0.07%	0.012 %
Feb	Items	3.71	2.75	3.7	4	3.5	3.9	3.1	3,4	2.0	3.3
	AB	6.35%	0	3.2%	19%	10%	8%	0%	0.18%	0.18%	0%
Mar	Items	3.93	3	3.7	3.42	4.0	4.7	3.0	4.2	3.0	3.0
	AB	8.47%	0%	3.2%	8%	0%	12%	12%	0.2%	0%	0%
Apr	Items	2.87	2.7	3.7	3.6	3.7	3.7	3.7	5.2	3	3.0
	AB	6.98%	0	3.2%	20%	3.2%	2.2%	2.2%	0%	11%	11%
May	Items	3.08	3.0	3.7	3.54	3.6	3.6	3.0	4.0	4.0	4.6
	AB	38.46%	38.4%	3.2%	19%	0%	0%	5%	0.02%	13%	0%
Jun	Items	4	4	3.7	3.0	2.8	2.8	3.0	2.0	3.6	3.6
	AB	0%	0%	3.2%	16.7 %	0%	0%	5%	0.2%	0.06%	0.06%
Jul	Items	3.68	3.68	3.7	2.9	2,4	2.7	2.7	3.3	3.3	4.7
	AB	42.11%	42.1%	3.2%	10%	3.8%	7.8%	7.8%	9%	9%	0%
Aug	Items	3.27	3.27	3.7	3.54	3.7	4.7	1.0	2.9	2.9	2,2
	AB	14.40%	14.4%	3.2%	14%	3.2%	8.6%	0%	0%	0%	0%
Sept	Items	3.18	3.67	3.7	2.7	2.1	2.0	2.0	0	4.7	4.7
	AB	2.86%	0	3.2%	0.15 %	14.2%	17.2%	13.2%	0%	0.03%	0.03%
Oct	Items	3.16	3.28	4.0	3.39	5.3	6.3	4.7	4.7	4.58	4.58
	AB	16.67%	0	0.2	15%	0	11%	11%	11%	0.13%	0.13%
Nov	Items	3,4	3.3	3,4	3.64	2.1	2.1	2.1	3,4	3.5	3.3
	AB	42%	0%	0.1%	14%	0%	0%	0%	0%	0.07%	3%
Dec	Items	3,2	3.3	3.3	3.54	2.5	2.0	2.9	3.0	1.1	4.1
	AB	57%	0%	0%	14%	0%	6%	11%	11%	7%	7%

Month	who	Public health center				
		Sumalata	Tolingula	Ponelo	Molingkapoto	Monano
Jan	Items	4.24	3.8	3.8	0	0
	AB	26%	0%	0%	0%	0%
Feb	Items	5.41	3.7	3.7	3,375	3,375
	AB	26%	0%	0%	0%	0%
Mar	Items	4.70	3.8	3.8	3.38	3.38
	AB	21%	0%	0%	0%	0%
Apr	Items	5.0	3.9	3.9	3.33	3.33
	AB	18%	0%	0%	0%	0%
May	Items	4.89	3.7	3.7	3.07	3.07
	AB	29%	0%	0%	0%	0%
Jun	Items	2.33	3,2	3,2	2.33	2.33
	AB	0%	0%	0%	0%	0%
Jul	Items	4.68	3.8	3.8	4.17	4.17
	AB	2.7%	0%	0%	0%	0%
Aug	Items	5.48	4	4	3,4	3,4
	AB	2.7%	4%	4%	0%	0%
Sept	Items	3.41	3.6	3.6	3.41	3.41
	AB	0%	0%	0%	0%	0%
Oct	Items	3.17	3.17	3.17	3.17	3.17
	AB	0%	0%	0%	0%	0%
Nov	Items	3,4	3,4	3,4	3,4	3,4
	AB	0%	0%	0%	0%	0%
Dec	Items	3,4	3,4	3,4	3,4	3,4
	AB	0%	0%	0%	0%	0%

Most of the number of drug items in each community health center exceeds the WHO maximum requirement limit (1.8-2.2) with the highest number being at the Attinggola Community Health Center in June at 4. In addition, the Biau, Attinggola and Sumalata community health centers prescribe antibiotics that exceed the required percentage of use. antibiotics according to WHO (<22.7%).

A description of the distribution of the number of drug items per prescription sheet and the percentage of injection drug use in myalgia cases in 15 North Gorontalo district health centers can be seen in table 3 below.

Table 3 . Number of drug items and percentage of injection drug use

Month	who	Public health center								
		Atinggola	Biau	Long ago	Buloila	Dambalo	Gentuma	Illangata	Orchid	Kwan
Jan	Items	4	2	2,3	0	0	0	0	0	0
	AB	0	0	0%	0%	0%	0%	0%	0%	0%
Feb	Items	2.6	2	2,3	0	0	0	0	0	0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mar	Items	2.33	2	2,3	0	0	0	0	0	0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%
Apr	Items	0	2	0	0	0	0	0	0	0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%
May	Items	1.8	1.8	0	0	0	2,3	1.8	2,2	0
	AB	0	0	0%	0%	0%	0%	0%	0%	0%
Jun	Items	0%	1	0	0	0	0	1.8	1.8	0
	AB	1	0%	0%	0%	0%	0%	0%	0%	0%
Jul	Items	0	0	0	0	3.3	3.0	2.25	2.25	2.25
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aug	Items	2.25	2.25	2,3	0	2,3	2,3	1.8	1.8	1.8
	AB	0%	0%	0%	0%	0	0%	0%	0%	0%
Sept	Items	2	2.40	0	0	4.3	0	0	0	0
	AB	0	0	0%	0%	0%	0%	0%	0%	0%
Oct	Items	2.28	0	0	0	0	3.0	3.0	0	0
	AB	6.3%	0	0%	0%	0%	0%	0%	0%	0%
Nov	Items	2	2,2	2.5	0	0	0	6.3	0	0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%
Dec	Items	1.5	1.0	1.0	0	1.0	1.0	1.8	0	0
	AB	0%	0%	0%	0%	0%	0%	0%	0%	0%

Month	who	Public health center				
		Sumalata	Tolinggula	Ponelo	Molingkapoto	Monano
Jan	Items	5.0	3.8	3.8	0	0
	AB	0%	0%	0%	0%	0%
Feb	Items	3.8	2,4	2,4	2,2	2,2
	AB	0%	0%	0%	0%	0%
Mar	Items	3.50	2.5	2.5	0	0
	AB	0%	0%	0%	0%	0%
Apr	Items	3.75	2.8	2.8	0	0
	AB	0%	0%	0%	0%	0%
May	Items	3.80	2.5	2.5	0	0
	AB	0%	0%	0%	0%	0%
Jun	Items	0	2.0	2.0	0	0
	AB	0%	0%	0%	0%	0%
Jul	Items	0	0	0	0	0
	AB	0%	0%	0%	0%	0%
Aug	Items	3.56	2.5	2.5	1.8	1.8
	AB	0%	0%	0%	0%	0%
Sept	Items	0	2.6	2.6	0	0
	AB	0%	0%	0%	0%	0%
Oct	Items	0	0	0	0	0
	AB	0%	0%	0%	0%	0%
Nov	Items	0	0	0	0	0
	AB	0%	0%	0%	0%	0%
Dec	Items	0	0	0	0	0
	AB	0%	0%	0%	0%	0%

Most of the number of medicinal items in each community health center exceeds the maximum WHO requirement (1.8–2.2), with the highest number being in the Illngata community health center in November at 6.3. In addition, Attinggola Community Health Center prescribed injections in excess of WHO requirements (0%) by 6.3% in October.

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Discussion

Diarrhea is a condition of defecation with abnormal frequency, namely more often than usual with soft or liquid feces. This condition is caused by viral or bacterial infections or germs in the digestive tract. This disease can be transmitted from person to person who has poor hygiene or through contaminated food or drinks (Kristanti et al., 2022). Infection channel breathing I am a disease. Infection acute that attacks one part or more of the channel breath starts from the nose (the canal upper) to the alveoli (the ducts bottom), such as the sinuses, cavities, ear, middle, and pleura. ISPA is caused by more than 300 types of bacteria, viruses, and rickettsia. The ARI disease section above is in general caused by viruses, while ARI is in general caused by bacteria. Myalgia, or painful muscle, is a painful muscle that contracts over and over again. Keep going continuous and static will effect muscle become spasm or inflamed. When muscles are inflamed, swollen, or rigid Because of fatigue, the space between skin and muscles is depressed, resulting in a narrowing of the flow in the lymphatic flow gland (BALANCE, 2024).

Many factors influence the rationality of drug use. However, WHO concluded that the three main factors are prescribing patterns, services provided to patients, and the availability of facilities to rationalize drug use. Prescribing factors have a direct influence on the accuracy of administering the medication to be consumed by the patient. Patient service factors influence the accuracy of diagnosis and therapy for patients, as well as the information that patients should receive so that they understand the goals of their therapy and the use of their medication. The facility factor, namely the availability of essential medicines and their list, is a support for health workers to be able to carry out rational use of medicines (Sani et al., 2023).

North Gorontalo is a district in Gorontalo Province, with the capital city being Kwandang. This district was formed based on Law Number 11 of 2007 on January 2, 2007 and was the result of the third expansion in 2007 of Gorontalo Regency. North Gorontalo Regency is geographically located at coordinates 0° 53' N and 122° 39' E, with administrative boundaries in the north bordering the Sulawesi Sea; in the south, it borders Boalemo Regency, Gorontalo Regency, and Bone Bolango Regency; in the west, it borders directly with Buol Regency, Central Sulawesi Province; and in the east, it borders North Bolaang Mongondow Regency, North Sulawesi Province. The number of health centers in North Gorontalo Regency is 15, including Atinggola Health Center, Gentuma Health Center, Kwandang Health Center, Molingkapoto Health Center, Ponelo Health Center, Dambalo Health Center, Anggrek Health Center, Ilangata Health Center, Sumalata Health Center, Dulukapa Health Center, Buloila Health Center, Tolinggula Health Center, Community Health Center Biawu, and Limbato Community Health Center (BPS North Gorontalo Regency, 2019).

This research is a descriptive observational study with a *cross-sectional research design* conducted at one time. The research aims to evaluate drug prescribing based on WHO (*World Health Organization*) indicators at the North Gorontalo District Health Center, Gorontalo Province (Paramashanti & Benita, 2020). WHO indicators are guidelines or standards used to evaluate the rationality and appropriateness of drug use. The indicators used in this research, namely the main indicators, are the average number of drugs per prescription sheet, the percentage of antibiotic drugs, and the percentage of drugs prescribed by injection. The data used in the research is prescription data from 15 community health centers in North Gorontalo Regency, Gorontalo Province. The prescription data used are recipes for 2023, calculated by taking population data so that the number of samples that meet the inclusion and exclusion criteria is 57.

The average number of drug items per prescription sheet aims to measure the degree of polypharmacy. The average number of drug items per prescription sheet at the

North Gorontalo District Health Center exceeds the upper limit of the WHO reference standard average of 1.8–2.2 drug items per prescription sheet for non-specific diarrhea, non-pneumonia, ARI, and myalgia. This shows that the number of drugs prescribed by community health centers in North Gorontalo Regency is higher than the WHO target, causing drug polypharmacy. The result of drug polypharmacy is that in patients there are more frequent side effects, interactions, drug toxicity, and iatrogenic diseases; there is more frequent prescription of drugs that are not in accordance with the diagnosis of the disease and are excessive; as well as non-compliance with the use of drugs according to the rules for use (*inadherence*).

The problem of polypharmacy occurs, possibly because doctors focus on providing therapy for the symptoms that arise rather than diagnosing the disease. Pressure from patients who want a quick disappearance of disease symptoms also encourages doctors to prescribe many drugs, such as analgesics and antibiotics. Apart from that, doctors' prescribing patterns can also be influenced by excessive commercial information from drug manufacturers, advice from professional colleagues, academic literature, and government regulations (Nagarathna et al., 2015).

The percentage of antibiotic prescriptions aims to measure antibiotic use because these drugs are often used excessively, which can cause resistance and waste therapy costs (Islam, 2021). The percentage of antibiotic prescriptions in the Atinggola, Biau, and Sumalata community health centers in a particular month was higher compared to WHO <22.7%.

Doctors prescribe antibiotics for patients who have been diagnosed with an infectious disease using clinical information and laboratory examination results. Antibiotics are not given for infectious diseases caused by viruses or self-limiting *diseases*. The doctor chooses the type of antibiotic based on information about the spectrum of bacteria that cause infection and the pattern of sensitivity to antibiotics, the results of microbiology examinations or estimates of the germs that cause infection, the pharmacokinetic and pharmacodynamic profile of the antibiotic, de-escalating after considering the microbiology results, the patient's clinical condition, and the availability of drugs. Antibiotics are chosen based on *cost-effectiveness* and safety (Han et al., 2021). Antibiotic prescribing should be done rationally to provide economic benefits (reducing therapy costs) and clinically (preventing antibiotic resistance) to prevent undesirable things. The wise use of antibiotics is by using antibiotics with a narrow spectrum for strict indications with adequate doses, appropriate intervals, and duration of administration. The use of antibiotics must also be limited and prioritized over the use of first-line antibiotics (Damlin, 2020).

The percentage of injection prescriptions is intended to measure two important things overall: excessive drug use and wasted costs. The research results showed that injection prescriptions at the Attinggola Community Health Center were 6.3% in October, higher when compared to the WHO indicator of 0%. Injection is a sterile preparation in the form of a solution, emulsion, suspension, or powder that must be dissolved or suspended before use. It is injected by piercing the tissue into the muscle or through the skin. Giving an injection is an invasive procedure that must be carried out using sterile techniques. Types of injection include subcutaneous injection (SC), intramuscular injection (IM), intradermal injection (ID), and intravenous injection (IV) (Lau, 2024).

Medication is prescribed by injection when the results of a doctor's clinical examination state that the patient needs medication to be given quickly. The patient has the limitation of not being able to take oral medication and gets a reaction to the drug being quickly absorbed. Injection preparations are given to patients who are uncooperative; for example, the patient cannot swallow the medicine, but a quick effect is

needed. Injections are given for medicines that are ineffective when used orally or medicines that are damaged by digestive juices for patients who are unconscious or cannot take medicine (*non-cooperative*) (Sudheer & Meera, 2022).

Study This obtained the same result as research (Melissa *et al.*, 2022) that there is nonconformity in the use of medication in patients based on indicators that have been determined by the WHO at Pertamina Central Hospital. Additionally, research This should also reveal irrationality in drug use based on prescribing, in accordance with the study by Olii et al. (2014), who revealed that administrative incompleteness in prescriptions is known to cause irrational use of drugs. Results study The report also explains that of the 508 Jamkesda outpatient prescriptions from the Cardiovascular Polyclinic at the Labuang Baji Hospital Pharmacy in Makassar for the period January–June 2014, 89.2% of the prescriptions did not contain the doctor's initials, 23.2% of the prescriptions used five types of medicine in one sheet., 74.8% of prescriptions used diuretic drugs as the first choice of therapy, and 1133 cases of drug interactions were found. In addition, drug interactions also have an influence on the irrationality of drug use. Although cases of drug interactions when using antibiotics rarely occur, as in research by (Santi et al., 2021), the results of drug interactions when using therapy with antibiotics are less likely to interact. This is shown by the mechanism of pharmacokinetic interactions in 3.80% of cases and pharmacodynamic interactions in 7.60% of cases. Based on minor or moderate severity, drug interactions between antibiotics and other drugs account for 11.40% of cases.

Conclusion

The use of antibiotics for non-specific diarrhea and non-pneumonia ARI in North Gorontalo District Health Centers is generally rational, although certain months show antibiotic use exceeding WHO recommendations. Similarly, injection drug use for myalgia is mostly appropriate, except at Attinggola Health Center, where usage exceeded WHO standards by 6.3% in October. These findings highlight the need for continuous monitoring to ensure adherence to rational drug use guidelines and minimize the risks of antibiotic resistance and polypharmacy.

Future research should integrate an analysis of doctors' prescribing patterns, prescription screening, and rational drug use evaluation for non-specific diarrhea, non-pneumonia ARI, and myalgia to provide a more comprehensive assessment and improve prescribing practices.

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