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Factors Influencing use of Antibiotics for Patients with Pneumonia at Eduardo Ximenes Regional Hospital (EXRH), Baucau, Timor-Leste

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Keyword: Pneumonia; use of Antibiotik; Factor Pharmacodynamic; Factor Pharmacokinetic;

Abstract
Introduction: *Pneumonia is an acute respiratory infection that affects the lungs. The lungs are made up of small pockets called alveoli. In a healthy person, the alveoli are filled with air, but when a person is affected by pneumonia, the alveoli become filled with fluid or pus, causing difficulty in breathing and leading to symptoms such as feeling unwell.* ***Objective:*** *To explore the factors influencing the use of antibiotics in patients with pneumonia at Eduardo Ximenes Regional Hospital (EXRH) in Baucau, Timor-Leste.* ***Research Methodology:*** *The researchers employed a quantitative analysis approach with a cross-sectional design. Data collection was carried out using a purposive sampling technique to analyze the factors that influence the use of antibiotics for pneumonia patients at EXRH in Baucau, Timor-Leste.* ***Results and Discussion:*** *The results from EXRH indicated that many respondents had limited knowledge about pharmacodynamics, with 46 respondents (35.4%) reporting frequent lack of knowledge. Regarding pharmacokinetics, 50 respondents (38.5%) showed a lack of understanding, while 53 respondents (40.8%) demonstrated moderate knowledge of host factors.* ***Conclusion:*** *The survey results show that pharmacodynamic and host factors influence the use of antibiotics in patients with pneumonia, while pharmacokinetic factors did not appear to significantly impact antibiotic use.*

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Introduction

Pneumonia is an acute respiratory infection that affects the lungs. The lungs are made up of small pockets called alveoli. In a healthy person, these alveoli are filled with air. However, when a person is affected by pneumonia, the alveoli become filled with fluid or mucus, causing difficulty in breathing and a feeling of illness (WHO, 2016); (Sriwidiastuti et al., 2023); (RENANDA, 2024); (Wibowo & Ginanjar, 2020)

Pneumonia is an infectious disease that causes the death of many children worldwide. In 2019, pneumonia killed 740,180 children under the age of five. It affects children and families globally, but it causes more deaths in South Asia and Africa (WHO, 2020); (Pramesti, 2024);

In 15 countries with high pneumonia incidence in children, over 115.3 (74%) of the 156 million cases worldwide occurred. More than 156 million cases came from 6 countries, which account for 44% of the world's children (Novitry & Permatasari, 2020); (Amelia & Marita, 2023)

According to the Indonesian health profile, the incidence of pneumonia in 2017 was 46.34%, and it increased to 56.51% in 2018 (Zulia et al., 2018). In 2018, 2% of children in Indonesia were diagnosed with pneumonia, including 3,256 children aged 1-4 years, with a total of 8,088 children diagnosed with pneumonia (1.69%) (Wahidah, Wahyuni, & Putri, 2020)

According to data from the Ministry of Health of Timor-Leste, pneumonia occurred in children under five years of age. In 2020, there were a total of 9,122 cases, but in 2021, the number of pneumonia cases decreased to 2,511. Based on this data, the number of pneumonia cases continued to decline in 2021.

Antibiotics are drugs that can be derived from natural, chemical, or synthetic substances that prevent bacteria from multiplying or destroying their development. Antibiotics are effective in treating bacterial infections, but they are ineffective against viruses and vary depending on the type of bacteria involved (dan Rahmawati, 2012)

Antibiotics are a treatment for pneumonia and should be administered every 8 hours (Ompusunggu, 2020). The choice of antibiotics for pneumonia treatment often depends on previous experiences and the clinical context. This is why antibiotic prescriptions may vary based on the selected treatment for pneumonia (PB IDI, 2017); (Azyenela, Aria, & Aristya, 2022); (Yusuf, Auliah, & Sarambu, 2022); (Syaifiyatul, Rahmah, & Alrosyidi, 2020)

The use of antibiotics without medical supervision is common both in developed countries like the U.S. and in developing countries like Indonesia. This practice increases the risk of antibiotic resistance (Gunawan, Tjandra, & Halim, 2021);

At Baucau Regional Hospital, the antibiotics used by patients include ceftriaxone (injection), amoxicillin (oral tablets), gentamicin (injection), ampicillin (injection and oral tablets), and ciprofloxacin (oral tablets).

Methods

The quantitative method is a research approach based on positivism, which involves collecting data. The research focuses on numerical data that can be measured using statistics to analyze the extent of the problems being studied in order to reach a conclusion (Sugiyono, 2018). The method used by the researchers in conducting this study is the quantitative analytical method with a cross-sectional approach.

This approach is used to analyze the factors influencing the use of antibiotics in patients with pneumonia at the Regional Hospital Eduardo Ximenes (RHEX) in Baucau, Timor-Leste. The total sample size in this research is 130 respondents.

Results and Discussion

1. Result

Gender

Table 1
Frequency distribution according to the respondents' gender at Baucau Regional Hospital.

Gender	Frequency	%
Women	70	53.8
Men	60	46.2
TOTAL	**130**	**100%**

Based on the table above, most respondents were female, with 70 (53.8%), while the minority were male, with 60 (46.2%).

Age of Participants

Table 2
Frequency distribution by age of the respondents at Baucau Regional Hospital.

Age	Frequency	%
14-35	36	27.7
36-55	49	37.7
56-75	39	30.0
76-85	6	4.6
TOTAL	**130**	**100%**

Based on the table above, most respondents were aged 36-55, with 49 (37.7%), while the minority were aged 76-85, with 6 (4.6%).

Level of Education

Table 3
Frequency distribution according to the respondents' level of education at Baucau Regional Hospital.

Level of Education	Frequency	%
Illiteracy	16	12.3
Primary School	4	3.1
Pre-Secondary	23	17.7
Secondary	39	30.0
University	48	36.9
TOTAL	**130**	**100%**

Based on the table above, most respondents had a university education, with 48 (36.9%), while the minority had a primary school education, with 4 (3.1%).

Profession

Table 4

Frequency distribution according to the respondents' profession at Baucau Regional Hospital.

Profession	Frequency	%
Civil servant	23	17.7
Private staff	30	23.1
House wife	37	28.5
Student	18	3.8
Unemployed	22	15.9
TOTAL	**130**	**100%**

Based on the table above, most respondents with the profession of housewife were 37 (28.5%), and the minority of respondents with the profession of student was 18 (3.8%).

Disease: Pneumonia

Table 5

The frequency distribution of pneumonia at the Baucau Regional Hospital is as follows:

Pneumonia	Frequency	%
Good	19	14.6
Enough	73	56.2
Less	38	29.2
TOTAL	**130**	**100%**

Based on the table above, most respondents with sufficient knowledge of pneumonia were 73 (56.2%), while the minority of respondents with good knowledge of pneumonia were 19 (14.6%)

Pharmacodynamic Factors

Table 6

The frequency distribution of pharmacodynamic factors at Baucau Regional Hospital

Pharmacodynamics	Frequency	%
Good	41	31.5%
Enough	43	33.1%
Less	46	35.4%
Total	**130**	**100%**

Based on the table above, most of the respondents experienced a decrease of 46 (35.4%), while the minority of respondents experienced a decrease of 41 (31.5%).

Pharmaceutical Factors

Table 7

The frequency distribution of pharmaceutical factors at Baucau Regional Hospital.

Pharmaceutical	Frequency	%
Good	45	34.6%
Enough	35	26.9%
Less	50	38.5%
TOTAL	**130**	**100%**

Based on the table above, most respondents lacked pharmaceutical factors, with 50 (38.5%), while the minority of respondents had several 35 (26.9%).

Host Factors

Table 8
The frequency distribution of host factors at Baucau Regional Hospital.

Host	Frequency	%
Good	31	23.8%
Enough	53	40.8%
Less	46	35.4%
TOTAL	**130**	**100%**

Based on the table above, most respondents for host factors were 53 (40.8%), while the minority of respondents were 31 (23.8%).

Crosstabulation

Table 9
Pharmacodynamics and Pneumonia.

Pharmacodynamics* Pneumonia Crosstabulation					
Pharmacodynamics	**Pneumonia**				**p-value**
	Good	**Enough**	**Less**	**Total**	
Good	8	12	21	41	0.015
	19.5%	29.3%	51.2%	100.0%	
Enough	22	8	13	43	
	51.2%	18.6%	30.2%	100.0%	
Less	16	17	13	46	
	34.8%	37.0%	28.3%	100.0%	
Total	46	37	47	130	
	35.4%	28.5%	36.2%	100%	

Based on Table 9, the results of the chi-square and p-value statistical test (0.015 < 0.05) indicate that the pharmacodynamic factors have an influence on the use of antibiotics for pneumonia.

Table 10
Pharmaceuticals and Pneumonia

Pharmaceuticals*Pneumonia Crosstabulation					
Pharmaceuticals	**Pneumonia**				
	Good	**Enough**	**Less**	**Total**	**p-value**
Good	19	10	16	45	0.072
	42.2%	22.2%	35.6%	100.0%	
Enough	10	7	18	35	
	28.6%	20.0%	51.4%	100.0%	
Less	17	20	13	50	
	34.0%	40.0%	26.0%	100.0%	
Total	46	37	47	130	
	35.4%	28.5%	36.2%	100%	

Based on Table 10, the results of the chi-square and p-value statistical test (0.072 > 0.05) indicated that the pharmaceutical factors did not influence the use of antibiotics for pneumonia at the Baucau Regional Hospital. Therefore, it can be concluded that the pharmaceutical factors have no influence on the use of antibiotics for pneumonia.

Table 11
Host and Pneumonia

Host*Pneumonia Crosstabulation					
Host	Pneumonia				p-value
	Good	Enough	Less	Total	
Good	5	10	17	31	0.024
	16.1%	32.3%	51.6%	100.0%	
Enough	25	10	18	53	
	47.2%	18.9%	34.0%	100.0%	
Less	16	17	13	46	
	34.8%	37.0%	28.3%	100.0%	
Total	46	37	47	130	
	35.4%	28.5%	36.2%	100.0%	

Based on Table 11, the results of the chi-square test and p-value (0.024 < 0.05) indicate that host factors have an influence on the use of antibiotics for pneumonia.

2. Discussion

Influence of pharmacodynamic factors on the use of antibiotics for pneumonia

Based on the research findings, respondents showed varying levels of knowledge regarding pharmacodynamic factors, with a good level of understanding classified at 41 (31.5%), an adequate level at 43 (33.1%), and a low level at 46 (35.4%). The results from the Chi-square and p-value statistical tests (p-value = 0.015, which is < 0.05) suggest that pharmacodynamic factors significantly influence the use of antibiotics for pneumonia.

Pharmacodynamic factors also have a significant impact on antibiotic use for pneumonia because many respondents lacked proper or sufficient knowledge about the correct and rational use of antibiotics for pneumonia.

Factors that require attention include the specific types of antibiotics used, the duration of their use (due to the lack of results from Isomantage and bacterial tests), and the mechanism of action. The most used antibiotics are those targeting weak immunity and collateral effects.

Influence of pharmaceutical factors on the use of antibiotics for pneumonia

Based on the survey results, the respondents' knowledge of pharmaceutical factors was classified as follows: 45 (34.6%) had good knowledge, 35 (26.9%) had sufficient knowledge, and 50 (38.5%) had less than sufficient knowledge.

The results of the chi-square and p-value statistical test (0.072 > 0.05) showed that pharmaceutical factors did not influence the use of antibiotics for pneumonia at Baucau Regional Hospital. Therefore, it can be concluded that pharmaceutical factors have no significant impact on the use of antibiotics for pneumonia. Pharmaceutical factors refer to the processes that occur in the body when medicines are consumed, including absorption, distribution, metabolism, and excretion. The influence of pharmaceutical factors on antibiotic use is closely related to absorption. Correct administration of medication is essential to achieve the target concentration of antibiotics, which ultimately results in effective bactericidal activity. The method of antibiotic administration depends on the site and severity of the infection, and it can be oral or parenteral (Sastramihardja, 2012).

Regarding distribution, when an antibiotic is in the body, its ability to reach the site of infection depends on factors such as drug concentration, molecular characteristics, binding with plasma proteins, solubility in fat, ion charge, tissue affinity, the presence or absence of inflammation, and active transport mechanisms.

Elimination factors are also important. The elimination process becomes crucial when drug concentrations in the blood rise, potentially causing toxic effects. Broad-spectrum antibiotics are sometimes used temporarily in the absence of specific bacterial results. The mechanisms of action for bactericidal antibiotics are especially important for patients with weakened immune systems and other factors such as collateral effects.

Influence of Host Factors on the Use of Antibiotics for Pneumonia

Based on the survey results, the respondents' knowledge of host factors was classified as follows: 31 (23.8%) had good knowledge, 53 (40.8%) had sufficient knowledge, and 18 (34.0%) had less than sufficient knowledge.

The results of the chi-square and p-value statistical tests ($0.024 < 0.05$) indicate that host factors do have an influence on the use of antibiotics for pneumonia.

The host factors that influence the use of antibiotics include the body’s defense mechanisms, which have a strong antibiotic effect and still require the defense system of the organism. In some situations, when the organism's defense mechanisms are compromised, bactericidal antibiotics become effective. Other factors include age, genetics, body condition, medications, and disturbances in the nervous system (*Directorate General of Medical Care Ministry, 2006*).

Conclusion

The results of the chi-square and p-value statistical test ($0.015 < 0.05$) indicate that pharmacodynamic factors have an influence on the use of antibiotics for pneumonia. The results of the chi-square and p-value statistical test ($0.072 > 0.05$) show that pharmaceutical factors do not influence the use of antibiotics for pneumonia at the Baucau Regional Hospital. Therefore, it can be concluded that pharmaceutical factors have no significant impact on the use of antibiotics for pneumonia. The results of the chi-square and p-value statistical test ($0.024 < 0.05$) suggest that host factors have an influence on the use of antibiotics for pneumonia.

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