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Evaluation of Antibiotic Utilization in Urinary Tract Infection Patients Using Gyssens Method

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Abstract: UTI is one of the most prevalent infections in Indonesia, with a prevalence rate of 15%. Antibiotic resistance complicates UTI treatment. Assessing antibiotic use can help prevent the development of antibiotic resistance. This study analyses the characteristics and profile of UTI patients at Dr Drajat Prawiranegara in 2022 and evaluates antibiotic use based on Gyssens' guidelines. For this investigation, 50 medical records were consecutively sampled. This study reported that 46% of patients were male and 64% female. Patients were 0-5 years (6%), 12-16 years (4%), 17-25 years (12%), 26-35 years (28%), 36-45 years (12%), 46-55 years (16%), 56-65 years (10%), and over 65 years (10%) old. Medical records showed that ceftriaxone (43%), levofloxacin (31%), cefotaxime (16%), cefoperazone (4.1%), and cefoperazone-sulbactam (4.1%) were the most commonly administered antibiotics. All patients received IV antibiotics. The Gyssens technique found that 74% of patients used antibiotics rationally. The remaining 26% use antibiotics irrationally, with differences within each category. This study found that most UTI patients at RSUD Dr Drajat Prawiranegara received medications logically. However, age, gender, medical history, and health problems can impact antibiotic use. For more representative and thorough results, bigger sample sizes and multidisciplinary teams are recommended.

Keywords: Urinary Tract Infection Antibiotics; Quality of Using Antibiotics; Gyssens Method; Infectious Diseases; Antibiotic Resistance; Health Conditions; Urinary Tract Infection patients.

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1. Introduction

The urinary tract is an organ that produces, stores, and excretes urine. The urinary system consists of the kidneys, ureters, bladder and urethra. Urinary Tract Infection (UTI) occurs when microbes infect the urinary tract organs and multiply within them [1]. UTIs are divided into two categories based on their anatomical location: lower UTIs and upper UTIs [2]. Types of UTI include bladder infection (cystitis), urethral infection (urethritis), prostate infection (prostatitis), and kidney infection (pyelonephritis). Most cases of UTI are caused by the pathogenic bacteria Escherichia coli [3]. Urinary tract infection is a common infectious disease that is often found in outpatient settings, emergency departments, and inpatient facilities, with approximately 150 million new cases reported each year [4]. UTI is a type of infection that occurs in almost all countries [5].

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In Indonesia, UTI is a type of nosocomial infection with the highest prevalence, ranging from 5% to 15%, resulting in approximately 90-100 cases per 100,000 population each year [6]; [7]. Antibiotic resistance is a global problem that arises as a result of irrational drug prescribing [8]. The primary treatment for UTIs is antibiotics aimed at eradicating the pathogen, reducing the severity of the infection, and preventing recurrence [9]. UTI treatment has become much more difficult due to antibiotic resistance. The mortality rate from UTI can be as high as 9% if the patient has extensive bacteremia due to antibiotic resistance [10].

One strategy to prevent the development of resistance is to evaluate the use of antibiotics [11]. Therefore, the use of antibiotics needs to be regularly evaluated, standardised, and systematically used in hospitals or other healthcare facilities. The Gyssens category is a methodology for classifying the appropriateness of antibiotic use, assessing whether antibiotics are used effectively [12]; [13]. Gyssens et al. [14] developed an evaluation of antibiotic use that considers several factors, including accuracy, accuracy of selection based on effectiveness, toxicity, cost, price range, duration of administration, dose, interval, route, and time of administration. Departing from the problems above, it is necessary to research to evaluate the appropriateness of using antibiotics in patients diagnosed with urinary tract infections at Dr Prawiranegara's degree with the Gyssens method [15]. This study aims to describe the profile of patients diagnosed with UTI, the profile of antibiotic administration, and evaluate the rationality of giving antibiotics to patients diagnosed with UTI using the Gyssen method at Dr Drajat Prawiranegara, with reference to the management guidelines for the Management of Urinary and Genital Tract Infections [3].

2. Method

This research employs a descriptive observational case series design. The population consisted of patients with a primary diagnosis of Urinary Tract Infection (UTI) at Dr Drajat Prawiranegara Serang in 2022, who received antibiotic therapy [16]. A sample of 48 patients was selected through consecutive sampling, with inclusion criteria for patients with UTIs who had completed treatment during the 2022 period and received antibiotic therapy. The exclusion criteria included patients with other comorbidities that also required antibiotic therapy and those with incomplete medical records. Secondary data was obtained from the medical records of RSUD Dr Drajat Prawiranegara Serang in 2022, including patient identity, diagnosis, antibiotic therapy, antibiotic name, dose, frequency of administration, duration of administration, route of administration, clinical data and laboratory data. The data will be evaluated using the Gyssens method, a flowchart that evaluates the quality of antibiotic use qualitatively. The research results will be analysed descriptively and presented in the form of narration and tables.

3. Result and Discussion

This study employed a retrospective data collection method, utilising medical records of patients treated at RSUD Dr Drajat Prawiranegara, Serang Regency, in 2022. Sampling data were collected in February 2023 at the Medical Record Installation. Fifty patients were selected directly by researchers from a total of 70 patients with a diagnosis of urinary tract infections (UTIs) at RSUD Dr Prawiranegara Degree, Serang Regency. Secondary data collected from patient medical records after a UTI includes patient demographic information, such as gender, age, and weight. Additionally, the data includes information about the antibiotics used, such as the name of the antibiotic, dosage, type of use, indications for use, frequency of use, duration of administration, method of administration, and completeness of the medical record.

3.1. Patient Profile

3.1.1. Patient Characteristics

The results of medical record data from 50 UTI patients at Dr Drajat Prawiranegara of Serang Regency are presented in Table 1, which shows the distribution of patients by sex.

Table 1: Characteristics of UTI patients

Patient Characteristics	N = 50	%
Gender		
Man	18	46%
Woman	32	64%
Age		
0-5 years	3	6%
6-11 years	0	0
12-16 years	2	4%
17-25 years	6	12%
26-35 years	14	28%

36-45 years	6	12%
46-55 years	8	16%
56-65 years	5	10%
>65 years	5	10%
n/d	1	2%
t/d = unknown		

Table 3 shows that UTI was more common in women, 64% (N = 32). compared to men, 46% (N = 18). UTI is a common condition that can affect anyone, but research presented by Guglietta [17] and Bankar et al. [18] shows that women are more vulnerable to UTIs than men. Other research also shows that in Indonesia, there are consistent results where women are more vulnerable than men. This is due to having a shorter urethra, which makes it easier for bacteria to reach the bladder and cause infection. Additionally, the patient's age is categorised according to the Indonesian Ministry of Health's 2009 guidelines, which divide human age into nine age groups [19]. The average age of patients based on medical record data at Dr Drajat Prawiranegara, Serang Regency, is 36 years old with a standard deviation of 18 years [20]. The age range of the patients in the sample was between 4 and 69 years. The range describes the difference between the lowest and highest values in the dataset. In these cases, the patient's age ranged from 4 to 69 years. There is one patient with unknown age or information. The age group with the highest number of UTI cases was the 26-35-year-old group (18%). The risk of UTI tends to increase with age [21]. This is associated with physiological changes in the urinary system [22]. Besides age, other risk factors can influence the relationship between age and UTI, including poor personal hygiene, chronic diseases such as diabetes and immune disorders, as well as the use of urinary catheters.

3.1.2. Patient's Condition at Home

Table 2 presents the state of discharge after medical treatment. A total of 50 patients were the subjects of analysis. According to Table 2, 49 patients, or 98% of the total, experienced an improvement in their condition and were discharged home after receiving medical treatment. Meanwhile, one patient or 2% had no information recorded [23].

Table 2: Patient's condition at home

Characteristics	**N = 50**	**%**
Return state		
getting better	49	98%
n/d	1	2%
t/d = unknown		

Several factors can influence the successful treatment and recovery of UTI patients, including the choice of antibiotics, patient adherence, predisposing factors, general health conditions and environmental factors [24].

Table 3: Types of antibiotics

Type of antibiotic	**N = 50**
Drug	
Cefoperazine sulbactam	2 (4.1%)
Cefoperazone	2 (4.1%)
Cefotaxime	8 (16%)
Ceftriaxone	21 (43%)
Levofloxacin	15 (31%)
n/d	2 (4.0%)
t/d = unknown	

Further discussion of these factors may involve a more in-depth analysis by considering additional data, such as the patient's medication history, socioeconomic factors, and environmental factors that may influence the successful treatment and recovery of UTI patients [25]. Through a better understanding of these factors, more effective interventions and personalised care can be developed to improve the successful treatment and recovery of UTI patients, especially at RSUD Dr Prawiranegara Degree, Serang Regency.

3.2. Antibiotic Prescription Profile

3.2.1. Types of Antibiotics

These data provide information about patterns of drug use in patients. Some of the drugs commonly used to treat urinary tract infections (UTIs) are listed in Table 3. Each drug has a unique spectrum of activity, effectiveness, and side effects that must be considered by medical personnel when treating UTIs. Based on the data in the table, the drug most often used in patients with UTI is Ceftriaxone (Table 4).

Table 4: Characteristics of antibiotics

Antibiotic characteristics	N = 50	%
Effectiveness		
Effective	47	94%
Less effective	1	2%
n/d	2	4%
Security		
Safe	48	96%
Less secure	0	0
n/d	2	4%
Price		
Cheap	48	96%
Expensive	0	0
n/d	2	4%
Spectrum		
Narrow	0	
Wide	48%	96%
n/d	2	4%
t/d = unknown		

Out of a total of 50 patients, 21 patients (43%) received treatment with this drug. Meanwhile, other drugs were used with lower frequency, namely Levofloxacin (15 patients, 31%), Cefotaxime (8 patients, 16%), cefoperazone (2 patients, 4.1%), and Cefoperazone-Sulbactam (2 patients, 4.1%). Ceftriaxone has the highest usage percentage (43%) compared to other drugs.

3.2.2. Characteristics of Antibiotics

The effectiveness of antibiotics is assessed by ensuring that antibiotics are considered in the patient's indications and contraindications. There was one patient who was ineffective because the patient had jaundice. This is because the use of levofloxacin antibiotics in jaundiced patients is not effective [26]. In terms of safety, all drugs are considered based on the patient's condition; however, the two medical records do not specify which antibiotics were used.

Table 5: Administering antibiotics

Administration of antibiotics	N = 50	%
Delivery Route		
Appropriate	47	94%
Not exactly	1	2%
n/d	2	4%
Delivery Time		
Appropriate	48	96%
Not exactly	0	0
n/d	2	4%
Administration Dosage		
Appropriate	48	96%
Not exactly	0	0
n/d	2	4%
Feeding Intervals		

Appropriate	0	0
Not exactly	48%	96%
n/d	2	4%
Delivery Duration		
Appropriate		
Not exactly		
n/d	2	4%
t/d = unknown		

Table 5 shows that, in terms of price, 98% is relatively inexpensive, due to the use of antibiotics in the doctor's office. Drajat Prawiranegara uses a generic formulary. This can alleviate the patient's burden and aligns with the principles of health financing based on the National Health System (SKN), namely adequacy, effectiveness, efficiency, fairness, and transparency [27]. All UTI patients at RSUD Dr Drajat Prawiranegara did not undergo bacterial culture before administration of antibiotics. So it is not possible to assess the spectrum of antibiotics based on the nature of pathogenic microorganisms.

3.2.3. Administering Antibiotics

Based on the data in the table, it can be seen that in a patient population of 50 individuals with a UTI, 48 patients (96%) received treatment via the intravenous (IV) route. Meanwhile, there were two patients (4%) for whom the route of drug administration was unknown (t/d). A high proportion of IV route use in the treatment of UTIs suggests that it is a common practice [28]. Still, it is essential to consider individual factors and patient needs to determine the best route for optimal treatment. The average duration of treatment for UTI patients was 3.62 days with a standard deviation (SD) of 1.52. The median (IQR) of treatment duration was 3.00 days with a range of 1.00 to 9.00 days. There were two patients (4%) for whom the duration of treatment was unknown (t/d). This relatively short duration of treatment may indicate that the UTI patients in this sample responded well to treatment and experienced a rapid recovery [29]. However, it is essential to note that the duration of treatment can vary significantly between individuals and may be influenced by several factors, including the severity of the infection, the patient's response to treatment, and individual patient characteristics. The presence of two patients with an unknown treatment duration indicates a lack of information that requires attention.

Complete information regarding the duration of treatment for UTI patients is crucial in understanding the effectiveness of treatment and ensuring the appropriateness of the treatment provided. In this dataset of medical records, which includes a total of 50 patients treated for urinary tract infections (UTIs), there is information indicating that patient treatment is based on diagnosis and clinical indications, rather than bacterial culture. This indicates that the therapy administered is empirical in nature. In the case of UTI, empiric therapy is often used because certain bacteria, such as Escherichia coli, are commonly responsible for urinary tract infections. Doctors or medical personnel will consider clinical symptoms, patient history, and relevant risk factors to determine the appropriate empiric therapy. Empirical therapy has several drawbacks. Without the results of a bacterial culture, it is not possible to determine with certainty the type of bacteria causing the infection or its sensitivity to specific antibiotics. This can lead to the suboptimal use of antibiotics or the development of increased antibiotic resistance in the long term. In the context of more detailed research or treatment, a bacterial culture examination performed before starting therapy can provide more specific information about the type of bacteria causing it and its antibiotic sensitivity. This enables more effective treatment and a lower risk of antibiotic resistance.

3.3. Medical Record Completeness

Table 6: Medical record completeness

Completeness of Medical Records	**N = 50**
Complete	48 (96%)
Incomplete	0
n/d	2 (4%)
t/d = unknown	

Table 6 shows the complete medical record data from a total sample (n = 50) of only 48 medical records. The rest, two medical records, could not be evaluated due to unrecorded use of antibiotics. Recording medical records is crucial for containing information on the patient's disease progression [30]. Profile of patients diagnosed with UTI who received antibiotics at Dr Drajat Prawiranegara, Serang Regency, demonstrated that 74% of patients received appropriate and rational antibiotic prescriptions. Table 7 is the result of Gyssen's analysis, which provides an overview of the assessment categories for administering antibiotics to patients.

3.4. Evaluation of Antibiotic Prescriptions with the Gyssens Method

Table 7: Gyssens classification of antibiotic rationality

Category	Definition	N	%
Category 0	Appropriate (rational use of antibiotics)	37	74
Category I	Not on time delivery	0	0
Category II A	Incorrect dose administration	5	10
Category II B	Improper administration interval	4	8
Category II C	Incorrect route of administration	0	0
Category IIIA	Giving antibiotics for too long	0	0
Category III B	Giving antibiotics is too short-term	1	2
Category IVA	More effective antibiotics are available	1	2
Category IV B	Safer antibiotics are available	0	0
Category IV C	Cheaper antibiotics are available	0	0
Category IV D	A narrower spectrum of antibiotics is available	0	0
Category V	Use of antibiotics without indication	0	0
Category VI	Incomplete medical records	2	4

3.4.1. Category 0: Correct (Rational administration of antibiotics)

The number of patients who fell into this category was 37 (74% of the total). This demonstrates that the administration of antibiotics to patients is carried out rationally, based on accurate diagnosis and consideration of the appropriate use of antibiotics. Antibiotic prescribing is said to be appropriate if it meets the criteria for the right diagnosis, the right indication of disease, the right drug selection, the right dose, the right route of administration, the right interval of administration, the right duration of administration, alert side effects, the right information and the right assessment of the patient's condition.

3.4.2. Category I: Not on Time Delivery

Category I in the Gyssens criteria refers to observations regarding the inappropriate timing of drugs. This indicates that no patients were found or included in category I in the study conducted. If the administration of the drug is not according to schedule or is late, then it is included in Category I, namely “Not on Time for Administration.”

3.4.3. Category II A: Incorrect Dose Administration

There were five patients (10% of the total) who fell into this category. This assessment indicates that there is an error in determining the dose of antibiotics given to patients. Dosage discrepancies can impact the effectiveness of treatment and increase the risk of treatment failure or unwanted side effects.

3.4.4. Category II B: Improper Administration Interval

There were four patients (8% of the total) who fell into this category. This assessment indicates that the interval for administering antibiotics to patients does not align with the recommended treatment interval. The accuracy of the administration interval is crucial for maintaining the level of antibiotics in the body within the effective therapeutic range.

3.4.5. Category IIIA

- Category III A in the Gyssens antibiotic evaluation refers to the administration of antibiotics beyond the recommended duration for the type of infection being treated.
- When the patient is not included in category III A, it indicates that the medical team involved has ensured that antibiotics are administered for the correct duration, in line with the principles of rational antibiotic use. The correct duration of treatment is very important to maximise treatment effectiveness, reduce the risk of antibiotic resistance, and avoid unnecessary side effects.

3.4.6. Category III B: Administration of Antibiotics is Too Short

There was one patient (2% of the total) who fell into this category. This assessment indicated that the patient's course of antibiotics did not reach the recommended duration. In the medical record, 500 mg of levofloxacin was administered every 24

hours at 24:00 WIB for 3 days. In this case, a 3-day administration of levofloxacin could be considered too short. A longer treatment duration may be necessary to ensure the complete elimination of the infection.

3.4.7. Category IV A: More Effective Antibiotics are Available

There was one patient (2% of the total) who fell into this category. This assessment suggests that there are more effective alternative antibiotics that can be used in these patients. In this patient, it was found from the medical record that a co-diagnosis of jaundice accompanied the patient. The use of levofloxacin is not recommended because it is not effective and has the potential to interfere with liver function, especially in populations with previously impaired liver function. So the use of beta-lactam antibiotics is more recommended than levofloxacin in patients with impaired liver function [31].

3.4.8. Category IV B: Some Antibiotics are Safer or Less Toxic

Category IV B implies that other antibiotics are safer or less toxic for use. In this study, no medical record data were included in category IV B. Antibiotics with a better safety profile or lower toxicity can be considered more desirable alternatives for use in patient treatment.

3.4.9. Category IV C: There are Cheaper Antibiotics

Category IV C indicates that other antibiotics are cheaper to use. No patients received more expensive drugs in this study. RSUD Dr Drajat Prawiranegara utilises a formulary that is both generic and affordable for patients, ensuring that the drugs used are of generic origin.

3.4.10. Category IV D: There are Antibiotics with a Narrower Spectrum

- Category IV D refers to the presence of a narrower-spectrum antibiotic for use.
- Selection of a narrower-spectrum antibiotic can be important in some situations, especially when there is a need to avoid widespread use of antibiotics, which could contribute to more rapid antibiotic resistance, and to minimise the risk of side effects.
- There were no patients included in the IV D category because no bacterial culture was performed, so this category could not be assessed.

3.4.11. Category V: Use of Antibiotics Without Indication

- Category V is the use of antibiotics without any clear indication or reason. The use of antibiotics without clear indications is a serious problem because it can cause negative impacts, such as antibiotic resistance, unnecessary side effects, and unnecessary costs.
- The decision to use antibiotics should be based on a correct diagnosis, clinical guidelines, and valid medical indications.

3.4.12. Category VI: Incomplete medical records

There were two patients (4% of the total) who fell into this category. This category indicates that there are deficiencies or defects in the patient's medical record, which may impact the evaluation and decision-making process when administering antibiotics. Complete and detailed medical records are important for assessing the patient's response to antibiotic therapy and ensuring optimal care coordination. The Gyssens assessment category indicating the appropriateness of rational antibiotic administration (category 0) is important for controlling antibiotic resistance. By choosing an appropriate antibiotic with the right spectrum, adequate dosage, and the right interval of administration, it can help prevent the development of resistance in the bacteria that cause UTIs. Categories II A, II B, III B, and IV A indicate areas where improvements in treatment policy and antibiotic selection can help reduce the risk of resistance.

Evaluation of the categories in the Gyssens table can help improve adherence to established treatment guidelines. Proper administration of antibiotics according to widely recognised guidelines can increase the effectiveness of treatment and reduce the risk of unwanted side effects. The findings of inappropriate assessment categories, such as categories II A, II B, III B, IV A, and VI, can serve as a basis for improvement through education and training of medical personnel on the rational use of antibiotics. Category VI, which indicates incomplete medical records, underscores the importance of the accuracy and completeness of medical documents in supporting informed decision-making [40]. Comprehensive medical records provide the necessary information to evaluate a patient's response to antibiotic therapy, track changes in medication, and ensure optimal care coordination among medical teams [39].

3.5. Bivariate Associations

Table 8 presents a comparison of the characteristics between the two age groups: those under 35 years and those 35 years and older. In the secondary analysis of this study, significant differences were observed in body weight, with the age group of 35 years and older having a higher average body weight. Additionally, there were significant differences in systolic pressure, with the age group of 35 years and older having a higher mean systolic pressure. This difference can be attributed to several factors that need to be taken into consideration. First, the age factor may play an important role in this. In older age groups, the natural ageing process can result in hormonal changes, reduced levels of physical activity, and decreased metabolic rates [32]. Comorbidity factors may also contribute to the differences in body weight between the two age groups [33].

Table 8: Bivariate association by age group

Characteristics	<35, N = 25	>=35, N = 24	difference[3]	95% CI[4]	p-values[3]
Gender1			0.66	0.17, 2.5	0.6
Man	8 (32%)	10 (42%)			
Woman	17 (68%)	14 (58%)			
Weight2	44 (18)	57 (10)	-13	-26, -0.41	0.044
n/d	13	13			
Length of Treatment 2	3.96 (1.33)	4.33e (1.79)	-0.37	-1.3, 0.54	0.4
n/d	1	0			
Return state 1			0.00	0.00, 41	>0.9
getting better	24 (96%)	24 (100%)			
n/d	1 (4.0%)	0 (0%)			
body temperature 2	37.14 (0.84)	36.94 (1.04)	0.20	-0.35, 0.76	0.5
n/d	1	0			
RR2	21.50 (2.73)	22.00 (2.43)	-0.50	-2.0, 1.0	0.5
n/d	1	0			
N2	99 (19)	98 (30)	1.8	-13, 16	0.8
n/d	1	0			
systole2	119 (16)	136 (37)	-18	-34, -0.75	0.041
n/d	3	0			
Diastole2	76 (12)	78 (17)	-1.9	-10, 6.6	0.7
n/d	3	0			
Main Diagnostics 1					0.4
Cystitis	24 (96%)	22 (92%)			
UTI Complications	0 (0%)	2 (8.3%)			
n/d	1 (4.0%)	0 (0%)			
Drugs2					0.6
Cefoperazine sulbactam	1 (4.2%)	1 (4.2%)			
Cefoperazone	0 (0%)	2 (8.3%)			
Cefotaxime	5 (21%)	3 (12%)			
Ceftriaxone	11 (46%)	9 (38%)			
Levofloxacin	6 (25%)	9 (38%)			
n/d	2 (8.3%)	0 (0%)			
Dosage1					0.3
1000mg	9 (38%)	7 (29%)			
2000mg	3 (12%)	8 (33%)			
3000mg	1 (4.2%)	0 (0%)			
500mg	9 (38%)	8 (33%)			
700mg	1 (4.2%)	0 (0%)			
750mg	0 (0%)	1 (4.2%)			
n/d	2 (8.3%)	0 (0%)			
Intervals (Hours)2	17.0 (7.0)	19.8 (6.1)	-2.8	-6.6, 1.1	0.2
n/d	2	0			
Route1			00.00	00.00,4	>0.9
IV	23 (96%)	24 (100%)			
n/d	2 (8.3%)	0 (0%)			

Duration (days)2	3.48 (1.16)	3.83 (1.81)	-0.36	-1.2, 0.54	0.4
n/d	2	0			
Category Gyssens1					<0.001
Category 0	13 (52%)	23 (96%)			
Category II A	5 (20%)	0 (0%)			
Category II B	4 (16%)	0 (0%)			
Category III B	1 (4.0%)	0 (0%)			
Category IVA	0 (0%)	1 (4.2%)			
Category VI	2 (8.0%)	0 (0%)			
[1]Categorical Variable = n (%)					
[2]Numerical Variable = mean (SD)					
[3]Fisher's exact test and Welch Two Sample t-test					
[4]CI = Confidence Interval					

Older patients tend to have a higher risk of other medical conditions such as diabetes, hypertension or hormonal disorders. These conditions may contribute to weight gain in patients aged 35 years and older [34]. Furthermore, lifestyle and diet can also affect differences in body weight between the two age groups [35]. All of these can lead to significant weight gain. Finally, the level of physical activity can also be a factor that differentiates the two age groups in terms of body weight. Patients aged 35 years and over tend to have lower levels of physical activity, which can reduce calorie burn and lead to the accumulation of body fat [36]. The systolic pressure variable also had a significant difference between the two age groups. According to the table provided, there was a significant difference in systolic pressure between patients with UTI who were 35 years of age or older and those under 35 years of age [37]. The average systolic pressure in the 35-year-old or older age group is higher than that in the under-35-year-old age group. Factors that can influence include increasing age, as blood vessels tend to experience ageing and damage [38]. This process is known as atherosclerosis, in which the walls of the blood vessels become harder and stiffer [41]. As a result, blood pressure increases because the heart has to work harder to pump blood through the narrow blood vessels [42].

In addition, an increase in systolic pressure in the age group of 35 years or more can also be caused by the presence of cardiovascular disease or other medical conditions. Factors such as hypertension, coronary heart disease, or heart valve disorders are more common in older age groups. These diseases can cause an increase in systolic pressure due to obstruction of blood flow or impaired heart function [43]. In patients with UTI, the increase in systolic pressure in the 35-year-old and older age group may also be related to the severity of the infection [44]. More severe urinary tract infections can lead to a more intense inflammatory response, characterised by increased heart activity and blood pressure [45]. Therefore, patients in the older age group with more severe UTIs may have a higher systolic blood pressure [46]. Significant differences in body weight and systolic blood pressure between patients with a UTI at the age of 35 years or older and those under the age of 35 may be due to factors such as the ageing of blood vessels, the presence of cardiovascular disease, an unhealthy lifestyle, and the severity of the infection [47]. This difference highlights the importance of considering age and other medical conditions in assessing systolic blood pressure in patients with UTIs [48].

4. Conclusion and Recommendation

This study took (N = 50) medical records selected by consecutive sampling. Characteristics and profiles of UTI patients at RSUD Dr Prawiranegara for the 2022 period, based on gender, are as follows: 46% male (N = 18) and 54% female (N = 32). The age range of patients based on the division of age classification is, 0-5 years as much as 6% (N = 3),12-16 yearsas much4% (N = 2), 17-25 yearsas much12% (N = 6), 26-35 yearsas much28% (N = 14), 36-45 yearsas much12% (N = 6), 46-55 yearsas much16% (N = 8), as much56-65 years 10% (N = 5), and >65 yearsas much10% (N = 5). The most commonly prescribed type of antibiotic was ceftriaxone (43%), followed by levofloxacin (31%), cefotaxime (16%), cefoperazone (4.1%), and cefoperazone-sulbactam (4.1%)—total UTI treatment using IV antibiotic therapy. The quality of antibiotic use in patients diagnosed with urinary tract infections at RSUD Dr. was evaluated using the Gyssens method in Drajat Prawiranegara, Serang Regency, and found to be in accordance with the Gyssens category (category 0). The rational use of antibiotics was 74% (N = 37). Data that are classified as irrational are as much as 26%; Category II A = 10% (N = 5), Category II B = 8% (N = 4), Category III B = 2% (N = 1), Category IV A = 2% (N = 1), Category VI = 4% (N = 2). Further research is needed with a larger sample size to obtain more representative results. Additionally, it is crucial to consider other risk factors that may influence the use of antibiotics in patients with urinary tract infections, including age, gender, medical history, and underlying health conditions. This research can involve a multidisciplinary team, including doctors, pharmacists and related medical personnel, to carry out a more comprehensive analysis. Collaboration among various healthcare professionals can increase awareness of the importance of rational antibiotic use and reduce the risk of antibiotic resistance. It is also recommended to conduct research at various times and locations, not limited to Dr Prawiranegara's Degree only.

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Ethics and Consent Statement: This study was conducted in accordance with the ethical standards of the affiliated institutions of all authors. Ethical approval was obtained from the relevant review board, and informed consent was obtained from all participants before data collection.

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