RESEARCH ARTICLE

Drug related problems in patients with pneumonia at Jasa Kartini Tasikmalaya city hospital

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Abstract

Background: Pneumonia is a severe infection that attacks lung tissue and is caused by bacteria, viruses or fungi. The incidence of Drug Related Problems (DRPs) in pneumonia can affect treatment outcomes leading to increased mortality and morbidity. **Objective:** To determine DRPs in pneumonia patients hospitalised at the Jasa Kartini Hospital (RSJK) Tasikmalaya City. **Method:** A descriptive observational study with retrospective data collection and consecutive sampling was conducted from January - December 2021. Demographic, quantitative, and DRPs data analysis with the number of patients who met the inclusion criteria (n = 69). **Result:** Based on demographics, pneumonia mostly affects elderly patients (> 65 years) by 29.0%, female (52.2%), housewife work (34.8%) with Length Of Stay between five and six days (42.0%), diagnosis of pneumonia with comorbidities (73.9%), as well as payment status using private payment (43.5%). Based on quantitative analysis, the most widely used drugs were non-generic drugs (70.1%) and antibiotics (18.2%). Drug Related Problems (DRPs) as many as 50 cases with an category indication without drugs 11 cases (22.0%) which include indications of pulmonary tuberculosis, diarrhea, and hypertension; drugs without indication 0 cases; underdose in eight cases (16.0%) which included Analsik, Largactil, Alganax, Sanmol, Ketorolac, Risperidon, ranitidine; drug overdose in 12 cases (24.0%) which included Tracetat, Sanmol Syrup, Codipront, Citicolin, Lansoprazole, Lancid, Furosemid; wrong drug 0 cases, drug interaction 19 cases (38.0%) with major (10.5%), moderate (68.4%) and minor (21.1%) categories; and adverse drugs 0 cases. **Conclusion:** Several treatments for pneumonia patients at the Tasikmalaya City Hospital for the period January to December 2021 experienced DRPs.

Introduction

Pneumonia is an acute infection that attacks the lung tissue (alveoli) caused by various microorganisms such as viruses, bacteria and fungi (Ministry of Health RI, 2020). WHO (World Health Organization) in 2020 reported that pneumonia was the single largest infectious cause of death for children worldwide. In 2019, the WHO reported that it accounted for 14% of all deaths of children under five years old, killing 740,180 children (WHO, 2019). Based on the 2018 Basic Health Research (Riskesdas) data, the prevalence of pneumonia of all ages has increased from 1.6% (2013) to 2.0% (2018) (Ministry of Health RI, 2018).

The Indonesian Lung Doctors Association stated, 'Pneumonia is a disease that has a high Case Fatality Rate (CFR) which is around 7.6%, it becomes very worrying for people with pneumonia if it is not given proper therapy, especially if pneumonia affects the elderly. with decreased immunity and the presence of comorbidities' (PDPI, 2014).

According to the Pharmaceutical Care Network of Europe (PCNE) 2020, Drug Related Problems (DRPs) is an event or attitude condition that is associated with the actual or potential treatment of an expected health outcome. The incidence of DRPs usually occurs in inpatients which results in increased morbidity, mortality, and budget (PCNE, 2020). The causes of DRPs can be related to inappropriate drug selection, inappropriate dosage, taking medication for longer or shorter than recommended, incorrect drug use processes, or poor adherence, all resulting in decreased

treatment effectiveness and increased morbidity and mortality (Ivanova *et al.*, 2016).

In the United States, the annual incidence of Community-Acquired Pneumonia (CAP) is 248 cases per 100,000 people (Jain *et al.*, 2015). Inpatients diagnosed with pneumonia accounted for 19.9%, 6.4%, and 1.5% in the Philippines, Malaysia, and Indonesia, respectively. The greatest impact occurs on young people and the elderly (Azmi *et al.*, 2016). Research conducted in Spain mentions that all medical specialities are almost half (45.1%) of inpatients experiencing DRPs (Garin *et al.*, 2021).

With the increasing number of pneumonia cases, Drug Related Problems (DPRs) can occur, so health workers need to pay special attention when treating pneumonia patients, especially for problems that occur during treatment. Therefore, this study was conducted to identify Drug Related Problems (DPRs) for pneumonia patients in the inpatient installation of Jasa Kartini Hospital, Tasikmalaya City.

Methods

Design

This research was a descriptive non-experimental study. Data were collected retrospectively using the consecutive sampling method. Research data are taken from the period January to December 2021 in the form of secondary data, namely medical records of pneumonia patients at the Jasa Kartini Hospital, Tasikmalaya City. This Method has been through an ethical review by The Health Research Ethics Committee with Ethical clearance No.013/ec.01/kepk-bth/IV/2022.

Assessment

The data taken are the characteristics of pneumonia patients and the treatment therapy given. The data obtained were analyzed by descriptive, quantitative analysis and analysis of Drug Related Problems (DRPs) by researchers presented in the form of percentages and presented in tabular form.

Results

This study was conducted to examine Drug Related Problems (DRPs) in the treatment of pneumonia patients who were hospitalised through medical record data at the Jasa Kartini Hospital, Tasikmalaya City from January to December 2021, with 69 patients being studied.

Demographic data of patients can be seen in Table I, based on gender it is known that more women were

diagnosed with pneumonia (52.2%). Focusing on age, however, pneumonia is most commonly experienced by those >65 years old (seniors) (29.0% from this study).

Table I: Demographic of patients

Character		N	%*
Gender	Male	33	47.8
	Female	36	52.2
Age	Toddler (0 – 5yo†)	9	13.0
	Children (6 – 11yo†)	-	0
	Early teens (12 – 16yo†)	2	2.9
	Late teens (17 – 25yo†)	1	1.4
	Early adulthood (26 – 35yo†)	4	5.8
	Late adulthood (36 – 45yo†)	4	5.80
	Early seniors (46 – 55yo†)	15	21.7
	Late seniors (56 – 65yo†)	14	20.3
	Seniors (> 65yo†)	20	29.0
Status	BPJS insurance	29	42.0
	Kemenkes insurance	7	10.1
	private payment	30	43.5
	Others Insurance	3	4.4
Length of stay (days)	1 - 2	2	3.0
	3 - 4	23	33.3
	5 - 6	29	42.0
	> 7	15	21.7
Work	Self-employed	17	24.6
	Private employees	4	5.8
	Government employees	1	1.4
	Housewife	24	34.8
	Labourer	5	7.3
	Retired	5	7.3
	Student	4	5.8
	Under age	9	13.0
Diagnosis	Single Pneumonia	18	26.1
	Pneumonia with comorbidities	51	73.9

*The percentage is calculated from the number of patients to the total number of patients studied.
† yo: years old

Based on payment status, patients prefer private payment (43.5%) over insurance to cover their medical costs. Based on the length of treatment, pneumonia patients were treated for five to six days (42.0%). Patient demographics by occupation who experience pneumonia and its complications are more common among housewives, namely 34.8% due to low physical activity compared to those who work.

The majority of pneumonia patients (73.9%) had comorbidities. Complications of pneumonia can affect

the lungs, and other organs around the lungs and can have consequences throughout the body. Complications of pneumonia are often experienced by people who have weak immune systems and people who have chronic diseases.

Quantitative analysis

Based on quantitative analysis, the most widely used drugs were non-generic drugs (70.1%) and antibiotics (18.2%). Pneumonia is caused by bacterial, viral or fungal infections, therefore antibiotics are needed as pneumonia therapy to prevent complications and clear the infection. In addition to being given antibiotic therapy, pneumonia patients also receive supportive therapy which aims to support the therapeutic success of antibiotic therapy by reducing pneumonia symptoms that worsen the patient's condition.

Details of DRPs

Details of DRPs cases of pneumonia patients are presented in Table II. Drug Interaction was the most cases (n: 19, 38%). Table III provide analysis of DRPs indications without drugs. Most DRPs indication without drugs was about patients with a diagnosis of pulmonary tuberculosis (TB) but not receiving pulmonary TB therapy (n: 9; 81.82%).Table IV provides analysis of DRPs category -underdose of drugs. Two cases was about an inappropriate use of Analsix where it was given less than the dose instruction. Table V describes analysis of DRPs – overdose of drugs. Codipront and Furosemide tables were given above the dose instruction in 3 cases. Table VI describes the drug interaction. Azithromycin + moxifloxacin and MST (morphine) + codeine were found as 'major' according to severity.

Table II: Category Drug Related Problems (DRPs)

DRPs category	Number of cases	%
Indications without drugs	11	22
Drugs without indication	0	0
Underdose of Drugs	8	16
Overdose of Drugs	12	24
Wrong medicine	0	0
Drug interaction	19	38
Adverse drug reaction	0	0
Total	**50**	**100%**

Table III: Analysis of DRPs indications without drugs

Reason	Number of cases	%
Patients with a diagnosis of pulmonary tuberculosis (TB) but not receiving pulmonary TB therapy	9	81.8
Patients with diarrhoea but not receiving antidiarrheal therapy	1	9.1
Patients with hypertension but not receiving antihypertensive therapy	1	9.1
Total	11	100.0%

Table IV: Analysis of DRPs - underdose of drugs

Medicine name	Dose	Standard dose (MIMS)	Number of case(s)	Percentage (%)
Analsix	1 tab/12 hours	1 tab/6-8 hours	2	25.0
Largactil (chlorpromazine)	25mg/12 hours	10-25mg/4-6 hours	1	12.5
Alganax (alprazolam)	0.5mg/24 hours	0.25-0.5mg/8-12hours	1	12.5
Sanmol (paracetamol)	500mg/24 hours	500mg/6-8 hours	1	12.5
Ketorolac	10mg/24 hours	10mg/4-6 hours	1	12.5
Risperidone	1mg/24 hours	2-4mg/12 hours	1	12.5
Ranitidine	150mg/24 hours	150mg/12 hours	1	12.5
Total			**8**	**100%**

Table V: Analysis of DRPs – overdose of drugs

Medicine name	Dose	Standard Dose (MIMS)	Number of case(s)	Percentage (%)
Tracetate (megestrol)	10ml/8 hours	20ml/ 24 hours	2	16.7
Sanmol syrup	7.5ml/6 hours	5ml/6-8 hours	1	8.3
Codipront	1caps/8 hours	1caps/12 hours	3	25.0
Citicoline	1g/12 hours	500mg/12-24 hours	1	8.3
Lansoprazole	30mg/12 hours	30mg/24 hours	1	8.3
Lancid (lansoprazole)	1 tab/12 hours	1 tab/24 hours	1	8.3
Furosemide	40mg/8 hours	40mg/12 hours	3	25.0
Total			**12**	**100%**

Table VI: Drug Interaction DRPs Analysis

Drug Interaction	Case Number	Severity	Number of cases	Percentage (%)
Azithromycin + moxifloxacin	14	Major	1	5.3
MST (morphine) + codeine	69	Major	1	5.3
Loperamide + codeine	1	Moderate	1	5.3
Codeine + ondansetron	6	Moderate	1	5.3
Furosemide + pantoprazole	10	Moderate	1	5.3
Furosemide + braxidine	36	Moderate	1	5.3
Ondansetron + levofloxacin	66	Moderate	1	5.3
Erythromicin + methylprednisolone	41	Moderate	1	5.3
Codeine + dexamethasone	17,49,67	Moderate	3	15.8
Codeine + furosemide	67	Moderate	1	5.3
Ceftriaxone + furosemide	10.67	Moderate	2	10.5
Furosemide + dexamethasone	67	Moderate	1	5.3
Erythromycin + ampicillin	2.9	Minor	2	10.5
Ranitidine + paracetamol	37	Minor	1	5.3
Paracetamol + braxidine	37	Minor	1	5.3
Total			**19**	**100%**

Discussion

Drug Related Problems (DRPs) are an event or a form of attitude that relates to actual treatment or can affect a desired health outcome (PCNE, 2020). Pneumonia patients who were hospitalised at RSJK Tasikmalaya who met the inclusion criteria (n = 69) were studied for Drug Related Problems (DRPs).

More women were diagnosed with paneumonia. Pneumonia that occurs in women can be caused by inhaling cigarette smoke too often, having a history of heart disease and diabetes, weak respiratory organ structures, weak immune systems and a decreased level of consciousness. According to research Viegi (2006) which discusses the epidemiology of community pneumonia in Naples, Italy, found that women were 53.1% more than men 46.7%. However, from all research

data, Vila-Corcoles (2009) stated that there was no significant relationship between pneumonia patients with gender patients.

Age is an important factor in its influence on the prevalence of pneumonia. With age, various changes occur in the respiratory system, namely a decrease in lung elasticity, increased chest wall stiffness, and decreased chest muscle strength. In addition, there is a decrease in ciliary movement in the respiratory system, a decrease in the cough reflex, and other physiological reflexes that can increase the risk of infection in the lower respiratory tract (Martono, 2011).

The duration of pneumonia treatment found in this study was varied, which could be because the treatment was personalised based on the response to treatment and the comorbidities suffered by the patient (PDPI, 2014). This study found that pneumonia

were more common among housewives. The amount of oxygen taken in by respiration depends on the need and is usually influenced by the type of work, body size, and the amount and type of food eaten. Someone who is physically active like an athlete will need more energy than someone who is low on activity, therefore the respiratory rate of that person is also higher. The movement and frequency of breathing are controlled by the respiratory centre in the brain. In addition, the respiratory rate is stimulated by the concentration of carbon dioxide in the blood. Physical exercise will cause the muscles to become strong, improving the function of these muscles, especially the respiratory muscles causing more efficient breathing. For people who do a lot of physical activity, their cardiorespiratory endurance increases higher (Majumder, 2015).

Indications without drugs

Indications without drugs are medical conditions of patients that require additional healing, conditions requiring continuation of drug therapy, conditions requiring a combination of drugs, and conditions with certain risks that can be prevented by using prophylactic drugs (Table III).

Pulmonary tuberculosis (TB) is a disease caused by the bacterium *Mycobacterium tuberculosis* which attacks the lung tissue (parenchyma) excluding the pleura (lung membranes) and glands at the hilum. If pulmonary TB is not treated, it can be fatal. *Mycobacterium tuberculosis* bacteria can spread to other parts of the body through the bloodstream. The purpose of administering antituberculosis drug therapy is to cure, prevent death, prevent a recurrence, break the chain of transmission and prevent bacterial resistance to OAT (Ministry of Health RI, 2009).

The next cause of non-drug indication DRPs was that the patient did not receive antidiarrheal therapy in one case (9.1%) (Table III). Diarrhoea is a disease caused by viruses, bacteria, parasites, and protozoa which is characterised by defecating three or more times a day, the stool looks soft or watery. If diarrhoea is left unchecked it will cause other dangerous digestive disorders such as malnutrition, dehydration, bleeding and irritation, and septicemia. Diarrhoea therapy can be given ORS, zinc drugs, probiotics, and antidiarrheals (Ministry of Health RI, 2011).

DRPs indicated without other drugs, namely the patient did not receive antihypertensive therapy in one case (9.1%). According to the International Society of Global Hypertension (ISH) (2020) the normal value of systolic < 130 mmHg and/or diastolic < 85 mmHg (Unger *et al.*, 2020). Continuously increasing blood pressure in patients can cause the heart's workload to increase.

Hypertension can trigger coronary artery atherosclerosis, so the heart can experience further disruption due to decreased blood flow to the myocardium, resulting in angina pectoris or myocardial infarction. Hypertension can also cause damage to blood vessels which further accelerates the process of atherosclerosis and damage to vital organs such as stroke, kidney failure, aneurysm, and retinal injury (Kowalak, 2011).

Drugs without indication

Drug without indication is a condition in which the patient gets the drug for the wrong symptom. The number of incidents of Drug Related Problems (DRPs) in the category of drugs without indication is 0 cases. The negative impact of drugs without indications is very broad, namely the possibility of drug side effects, drug interactions, increased mortality and morbidity of certain diseases and the cost of treatment services becomes a waste both from the patient side and the service system.

Underdose of drugs

Underdose is a condition where the treatment used is difficult to cure the patient, the dose used is not sufficient to cause a response, the drug concentration in the patient's serum is below the expected therapeutic range, the dose is not sufficient for the patient, the frequency, duration and method of administration of the drug to the patient. The occurrence of underdose can cause the expected therapeutic effect is not achieved (Table IV).

Overdose of drugs

Table V shows the analysis of overdose drugs in this study. Overdose of drugs is a condition in which the patient is given the right drug with a dose that is too high, the drug concentration in the patient's serum exceeds the expected treatment range, and the frequency, duration, and mode of administration of the drug to the patient is inadequate. The action of a drug can last several hours, days, weeks, or months. The duration of action of the drug depends on the half-life of the drug to determine the dosing interval of the drug. If a drug with a long half-life is given twice or more a day, there will be an accumulation of the drug in the body and the possibility of drug toxicity (Nuryanti, 2017).

Wrong medicine

Incorrect medication or medication inaccuracy, namely the condition of the patient receiving the wrong medication safe, inefficient, allergic, or contraindicated

with the patient's condition. Based on observations, the number of DRPs in the wrong drug category was 0 cases.

Drug interaction

Table VI shows the analysis of drug interaction in this study. Drug interaction is a condition in which one substance has an impact on the action of the drug, namely increasing or decreasing its effect, or creating a new effect that was not expected or planned. The existence of drug interactions can cause a decrease or increase in drug effects so that the desired therapeutic result is not achieved maximally. Drug interactions based on severity were divided into major, moderate and minor interactions. Major interactions have major effects that can be life-threatening or cause permanent damage. Moderate interactions can cause changes in the patient's clinical status, while minor interactions have a smaller disturbing effect and therefore do not require additional therapy. Prevention of drug interactions can be done by giving drugs separately or at intervals of administration and also monitoring drug therapy (Hendera & Rahayu, 2018).

Adverse drug reactions

Adverse drug reactions are unwanted and dangerous reactions to a given drug. The number of incidents of Drug Related Problems (DRPs) in the category of adverse drug reactions is 0 cases. Adverse drug reactions could not be observed actually because the study was conducted retrospectively because data collection comes from medical records and the patient is no longer in the hospital

Conclusion

Based on this research, several treatments for pneumonia patients at the Tasikmalaya City Hospital for the period January - December 2021 experienced DRPs. Of all of the cases analysed, 22.0% had indications without medication, 16.0% of cases were of underdosing of medication, 24.0% were overdose cases, and 38.0% were placed in the drug interaction category.

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