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Diagnosis Keperawatan pada Pasien Ventilator-Associated Pneumonia (VAP) di Unit Perawatan Intensif: Studi Retrospektif

Nursing Diagnoses in Patients with Ventilator-Associated Pneumonia in the Intensive Care Unit: A Retrospective Study

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ABSTRACT

Introduction: Pneumonia is an acute respiratory infection that often leads to respiratory failure and high mortality rates. It requires rapid and appropriate treatment to prevent fatal complications. Nurses are vital in early pneumonia detection and treatment, and an accurate nursing diagnosis ensures appropriate care. This study aims to identify signs, symptoms, and nursing diagnoses of pneumonia patients. Methods: This descriptive retrospective study used secondary medical record data of 178 pneumonia patients admitted to the ICU at Lamongan Muhammadiyah Hospital from January to December 2024. These patients were selected using consecutive sampling, resulting in a sample size of 58. Data were collected using a recapitulation sheet and were then analysed descriptively. Results: The results showed that 67.2%, 67.2%, and 50% of the patients experienced shortness of breath, cough and tachycardia, respectively. The most common nursing diagnoses for these patients are ineffective airway clearance (51.7%), ineffective breathing pattern (37.9%), and impaired gas exchange (29.3%). Conclusion: Pneumonia consistently has a clinical impact and requires a structured nursing response. Future researchers are expected to conduct real-time research to collect sufficient data. Future researchers are expected to conduct real-time research so that missing data can be identified at that time.

Keywords: Indonesian-Nursing-Diagnosis-Standards, nursing-diagnosis, pneumonia

ABSTRAK

Pneumonia merupakan infeksi saluran pernapasan akut yang sering menyebabkan gagal napas dan memiliki angka mortalitas yang tinggi. Kondisi ini memerlukan penanganan yang cepat dan tepat untuk mencegah komplikasi yang fatal. Perawat berperan penting dalam deteksi dini dan penatalaksanaan pneumonia, sedangkan diagnosis keperawatan yang akurat menjadi dasar pemberian asuhan keperawatan yang tepat. Penelitian ini bertujuan mengidentifikasi tanda dan gejala serta diagnosis keperawatan pada pasien pneumonia. Penelitian deskriptif retrospektif ini menggunakan data sekunder berupa rekam medis dari 178 pasien pneumonia yang dirawat di Unit Perawatan Intensif (ICU) Rumah Sakit Muhammadiyah Lamongan selama periode Januari–Desember 2024. Sampel dipilih dengan teknik consecutive sampling sehingga diperoleh 58 pasien. Data dikumpulkan menggunakan lembar rekapitulasi dan dianalisis secara deskriptif. Hasil penelitian menunjukkan bahwa 67,2% pasien mengalami sesak napas, 67,2% mengalami batuk, dan 50% mengalami takikardia. Diagnosis keperawatan yang paling sering ditemukan adalah bersihan jalan napas tidak efektif (51,7%), pola napas tidak efektif (37,9%), dan gangguan pertukaran gas (29,3%). Pneumonia secara konsisten memberikan dampak klinis yang signifikan sehingga memerlukan respons keperawatan yang terstruktur. Penelitian selanjutnya diharapkan menggunakan desain pengumpulan data secara real-time agar data yang belum terdokumentasi atau hilang dapat segera diidentifikasi dan diminimalkan.

Keywords: Standar Diagnosis Keperawatan Indonesia (SDKI), diagnosis keperawatan, pneumonia

INTRODUCTION

Pneumonia is a leading global cause of morbidity and mortality, particularly among critically ill patients admitted to intensive care units (ICUs) (Andi, 2024 ; WHO, 2023). Recent

global estimates indicate that lower respiratory infections, including clinically diagnosed pneumonia, remain a major health burden; in 2019, they accounted for 488.9 million incident cases and 2.4 million deaths worldwide [3]. In critical care, clinicians commonly identify hospital-acquired pneumonia, including ventilator-associated pneumonia (VAP), as the most frequent ICU infection and associate it with substantial mortality (Leone et al., 2018). It is a serious and life-threatening health problem if not treated immediately [2].

VAP is defined as pneumonia that develops more than 48 hours after endotracheal intubation and the initiation of mechanical ventilation (Lu et al., 2025 ; Koenig & Truwit, 2006). Pneumonia attacks the lung parenchyma, causing serious respiratory impairment [7]. It often develops suddenly, worsening rapidly, especially in ICU patients [8]. Symptoms of pneumonia in ICU patients can include high fever, productive cough with purulent sputum, shortness of breath, decreased oxygen saturation, tachycardia, and altered mental status due to hypoxia [9]. Common nursing diagnoses include impaired gas exchange, ineffective breathing patterns, and risk for infection due to a weakened immune system [10]. A previous study of pneumonia patients in the central ICU at Dr Ramelan Surabaya Hospital revealed that nursing diagnoses based on SDKI, such as ineffective airway clearance and nutritional deficits, were often found in patients with severe pneumonia in the ICU [11]. Another study on the development of clinical pathways based on SDKI, SLKI, and SIKI in the ICU at Jombang Hospital also found that patients with severe pneumonia in the ICU often had nursing diagnoses such as ineffective breathing patterns, ineffective airway clearance, decreased cardiac output, and risk of spontaneous circulation disorders and aspiration [12].

Pneumonia often carries a high risk of death. It occurs due to inflammation of the lung parenchyma caused by bacterial, viral, fungal, or parasitic microorganisms [13]. Risk factors for severe pneumonia include advanced age, smoking, chronic lung diseases (such as COPD and asthma), diabetes mellitus, renal failure, chronic liver disease, malnutrition, and immunosuppression due to diseases such as HIV/AIDS or immunosuppressant drug therapy [14]. Additionally, ICU-related factors such as mechanical ventilation, gastric fluid aspiration, long-term intubation, and cross-infection due to invasive procedures contribute to pneumonia development [15]. Pneumonia in the ICU can be divided into two main types: severe community-acquired pneumonia and hospital-acquired pneumonia, including ventilator-associated pneumonia (VAP) [16]. Without appropriate nursing care, pneumonia can lead to complications such as fever, rapid breathing, respiratory carcinoma, atelectasis, shock, respiratory failure, and pleural effusion [17]. This infection can be caused by mechanical ventilators, also known as ventilator-associated pneumonia (VAP). VAP occurs in patients who have used a mechanical ventilator for more than 48 hours. Additionally, patients on mechanical ventilators are, on average, severely ill with decreased consciousness [18].

Nurses play a crucial role in providing timely and accurate treatment for patients with pneumonia in the ICU. An accurate nursing diagnosis is key to helping patients achieve optimal health conditions during intensive care [19]. However, nurses in Indonesia often face various obstacles when implementing this practice. One of the main obstacles is the underutilization of standardised nursing diagnosis standards. This can result in inconsistent and inaccurate diagnoses, which may hinder the patient's recovery process [20]. A nursing diagnosis is essential for determining the appropriate nursing care required to help patients achieve optimal health. Therefore, there is a need for nursing diagnosis standards that can be applied nationally by referring to previously established, internationally recognised standards. The process of establishing a nursing diagnosis is systematic and consists of three stages: data analysis, problem identification, and diagnosis formulation [21]. Every hospital and health facility implements nursing diagnoses. However, standardised terminology and benchmarks are still needed to ensure that nursing diagnoses are uniformly accurate and unambiguous. Thus, the professional organisation of nurses in Indonesia created the SDKI (Indonesian Nursing Diagnosis Standards) to establish

uniform terminology. If this diagnosis standard (SDKI) is not used, however, the various objectives set by the Indonesian professional nursing organisation will not be achieved [21].

This study aims to identify the most common types of nursing diagnoses for pneumonia patients in the Intensive Care Unit (ICU) at the Muhammadiyah Lamongan Hospital, based on the Indonesian Nursing Diagnosis Standards (SDKI).

METHOD

This quantitative study used a retrospective descriptive approach to identify nursing diagnoses in pneumonia patients based on medical record data. Data were collected from the Lamongan Muhammadiyah Hospital from April to May, 2025, from medical records from January to December 2024.

The study population consisted of 178 pneumonia patients in the Intensive Care Unit (ICU) at the same hospital during the same period. Of these patients, 120 were excluded because they did not meet the inclusion and exclusion criteria due to the presence of concomitant medical diagnoses, such as diabetes mellitus, tuberculosis, chronic respiratory failure, and COPD, that could affect the study's results. Thus, 58 patients were included in the study sample. Inclusion criteria included adult patients who were admitted to the ICU with a pneumonia diagnosis, underwent ICU hospitalisation, were ventilated, and had complications such as ARDS or sepsis or without complications. Exclusion criteria included adult patients with comorbid diagnoses such as tuberculosis (TB), meningitis, chronic obstructive pulmonary disease (COPD), mild to severe head injury, diabetic ketoacidosis (DKA), diabetes mellitus, chronic renal failure, heart failure, and asthma.

The research instrument was a recapitulation sheet that identified nursing diagnoses according to the Indonesian Nursing Diagnosis Standards (SDKI). The assessment data included signs and symptoms, as well as supporting signs, which were recorded in the medical records. The researchers first applied for research permission from the hospital to collect data. After receiving approval, the researchers contacted the hospital's medical records department to begin collecting data. The researchers sent the necessary data, including the inclusion and exclusion criteria that had been established. The medical records department sent the total data collected, which included information on 58 patients admitted to the ICU with pneumonia between January and December 2024. The researchers entered the data sent by the medical records department into the recapitulation sheet and then tabulated and analysed it descriptively.

The Health Research Ethics Committee of Muhammadiyah Lamongan University declared this study ethically feasible on March 21, 2025, with number 121/EC/KEPK-S1/03/2025. To maintain client confidentiality, researchers did not include names or registration numbers on the recapitulation sheet.

RESULTS

The study data were sourced from the medical records of pneumonia patients from January to December 2024. Of those patients, 178 were selected based on inclusion and exclusion criteria, resulting in a final sample of 58 patients.

Variable	Characteristics	n	%
Gender	Male	31	53.4
	Female	27	46.6
	Total	**58**	**100**

Age (Years)	<30	4	6.9
	30-45	2	3.4
	46-60	28	48.3
	>60	24	41.4
	Total	**58**	**100**
Education	Elementary School	37	63.8
	Junior High School	8	13.8
	Senior High School	12	20.7
	Bachelor Degree	1	1.7
	Total	**58**	**100**
Occupation	Unemployment	20	34.4
	Self-employment	24	41.4
	Teacher	1	1.7
	Farmer	13	22.4
	Total	**58**	**100**

According to Table 1, 48.3% of the pneumonia patients were between 46 and 60 years old. Fifty-three percent were male. The majority (63.8%) had an elementary school education, and 65.8% were self-employed.

Table 2 Medical Diagnosis of Ventilator - Associated Pneumonia (n=58)

Medical Diagnosis	n	%
Pneumonia + Anaemia + ARDS + Pleural effusion	15	26
Pneumonia + Acidosis + ARDS	9	15.5
Pneumonia + Sepsis, Unspecified	6	10.3
Pneumonia + Acidosis + ARDS + Hypokalemia	5	8.6
Pneumonia + Anaemia + ALO + Pleural effusion + ARDS	4	6.8
Pneumonia + Sepsis, Unspecified + ARDS	4	6.8
Pneumonia + AMI	3	5
Pneumonia + Hyponatremia and Hypo-osmolality + Anemia + Acidosis	3	5
Pneumonia + Hyponatremia and Hypo-osmolality + ALO	3	5
Pneumonia + Hypertension Essential + Acidosis	2	3.4
Pneumonia + Hypokalemia + Respiratory infection	2	3.4
Pneumonia + Acidosis + Pleural effusion	2	3.4

Note: ARDS (Acute respiratory distress syndrome), ALO (Acute Lung Oedema), AMI (Acute myocardial infarction)

Table 2 shows that all of the pneumonia patients analysed in this study suffered from other comorbidities in addition to pneumonia, such as anaemia, acute respiratory distress syndrome, sepsis, acute lung oedema, acute myocardial infarction, acidosis, electrolyte disorders, hypertension, and pleural effusion.

Table 3 Signs and Symptoms of Ventilator - Associated Pneumonia Pneumonia (n = 58)

Signs and Symptoms	n	%
Major		
Cough	39	67.2

Signs and Symptoms	n	%
Dyspnea	39	67.2
Excessive sputum	28	48.2
Use of respiratory muscles	22	37.9
Body temperature above normal	17	29.3
Dizziness	16	27.5
Restlessness Sleep	14	24.1
Lessness	13	22.4
Pain	13	22.4
Bradycardia	10	17.2
Headache	10	17.2
Decreased level of consciousness	9	15.5
Ronchi	9	15.5
Increased blood pressure with widened pulse pressure	8	13.7
Wheezing	6	10.3
Tired	5	8.6
Complaining of nausea	4	6.8
Feeling like vomiting	4	6.8
Increased PCO2	3	5.1
Decreased Body Weight 10%	1	1.7
Airway hypersecretion	1	1.7
Hypothermia	1	1.7
Decreased skin turgor	1	1.7
Defecation more than 3 times in 24 hours	1	1.7
Soft or liquid stool	1	1.7
PO2 increased	1	1.7
Minor		
Tachycardia	29	50
Breathing frequency changes	28	48..2
Vital capacity decreases	22	37.9
Tachypnea	17	29.3
Skin feels warm	17	29.3
Breathing pattern changes	12	20.6
Blood pressure rises	11	18.9
Pale skin color	7	12
Pallor	6	10.3
Weak	5	8.6
Decreased appetite/no appetite	5	8.6
Decreased blood pressure	3	5.1
Palpable cold acral	1	1.7
Peristalsis frequency increased	1	1.7
Muscle strength decreased	1	1.7
Physical weakness	1	1.7
Feeling confused	1	1.7
Dry mouth	1	1.7

According to Table 3, the most common signs and symptoms in patients with pneumonia include dyspnea and cough (67.2%), tachycardia (50%), increased sputum production and altered breathing frequency (48.2%), respiratory muscle use and decreased vital capacity (37.9%), elevated body temperature, tachypnea, and warm skin (29.3%).

Table 4 Nursing Diagnosis in Pneumonia Patients (n = 58)

Nursing Diagnosis	n	%
Ineffective airway clearance	30	51.7
Ineffective breathing pattern	22	37.9
Impaired gas exchange	17	29.3
Hyperthermia	16	27.5
Acute pain	13	22.4
Decreased intracranial adaptive capacity	10	17.2
Activity intolerance	10	17.2
Nutritional deficits	8	13.7
Risk of fluid imbalance	2	3.4
Risk of falls	2	3.4
Diarrhea	1	1.7
Risk of shock	1	1.7
Risk of spontaneous circulation disorders	1	1.7

Based on Table 4, the most common nursing diagnoses found in pneumonia patients include ineffective airway clearance (51.7%), followed by ineffective breathing patterns (37.9%), impaired gas exchange (29.3%), hypothermia (27.5%), and acute pain (22.4%).

DISCUSSION

Consistent with international guidance, suspected HAP/VAP in the ICU is typically considered when fever, impaired oxygenation, and purulent respiratory secretions are present, together with new or progressive infiltrates on chest imaging (Leone et al., 2018 ; Lu et al., 2025). However, these clinical signs are not specific to VAP and may overlap with other critical illness conditions, highlighting the need for careful nursing assessment and multidisciplinary confirmation [6]. Based on the results of the study, 67.2% of pneumonia patients exhibited signs and symptoms such as dyspnea, coughing, ineffective breathing pattern (37.9%), rhonchi (15.5%), wheezing (10.3%), and others. Previous research indicated that some signs and symptoms often experienced by pneumonia patients include fever, productive cough with purulent sputum, shortness of breath, rapid breathing (tachypnea), and use of respiratory muscles [22]. Additional signs and symptoms include the presence of breath sounds such as rhonchi or wheezing on auscultation, decreased oxygen saturation, peripheral cyanosis, intercostal retraction, general weakness, fatigue, decreased appetite, impaired consciousness in severe cases, increased leukocytes (leukocytosis), increased body temperature, and signs of sepsis such as hypotension and impaired tissue perfusion. Often, irregular breathing patterns, shallow breathing, and decreased breath sounds are found on the affected lung side [23].

Shortness of breath and cough were common complaints among pneumonia patients. This condition is the result of a complex pathological process involving infection and inflammation of the lung tissue (Masseng, 2023). Pneumonia triggers an inflammatory reaction in the alveoli and bronchioles, causing fluid accumulation, infiltration of immune cells, and tissue oedema. This results in impaired gas exchange, leading to decreased blood oxygenation (hypoxemia) and carbon dioxide buildup. This process directly triggers symptoms of shortness of breath, or dyspnea, which patients perceive as rapid, heavy breathing or a lack of relief. In more severe stages, shortness of breath may be accompanied by respiratory muscle use, chest wall retraction, and tachypnea. These symptoms reflect the body's compensatory efforts to maintain tissue

oxygenation [25]. Diagnostic-accuracy evidence in ICU populations indicates that specific clinical indicators (e.g., altered respiratory rate and altered respiratory pattern) can be used to improve identification of ineffective airway clearance, supporting standardized nursing diagnostic reasoning and early prevention of respiratory complications (Dantas et al., 2023).

Conversely, coughing is a protective symptom that is common in patients with pneumonia. It occurs as a physiological reflex due to the stimulation of cough receptors in the respiratory tract, which is triggered by the accumulation of cellular debris, secretions, or foreign particles resulting from the infectious process [27]. Inflammation of the airway mucosa increases sensitivity, causing coughing to occur more easily. In the case of pneumonia, the cough is usually productive and accompanied by the discharge of sputum containing mucus, inflammatory cells, and microorganisms (Purwantoro, 2022). Coughing can also play an important role in helping to clear the airway and prevent further aspiration [29].

In this study, the most frequently diagnosed nursing diagnosis in pneumonia patients was ineffective airway clearance. Pneumonia patients may be unable to clear secretions or obstructions from their airways, which can be caused by excess secretion accumulation, airway inflammation, respiratory muscle weakness, and mechanical ventilators that interfere with effective coughing and airway clearance mechanisms [30]. Previous studies also recorded this diagnosis in pneumonia patients in various hospitals, such as Dr Ramelan Surabaya Naval Hospital (Megawati, 2021) and Jombang Regional Hospital, which recorded an additional diagnosis of aspiration risk [12]. According to the Indonesian Nursing Diagnosis Standards (SDKI), the diagnosis of ineffective airway clearance is based on a physical examination showing additional breath sounds, such as wet rales, and increased breathing frequency, accompanied by clinical manifestations, such as a productive cough, shortness of breath, and excessive sputum production, which are typical of pneumonia. The signs and symptoms of ineffective airway clearance include ineffective coughing, the inability to cough, excessive sputum production, wheezing, dry rales, meconium in the airway (in neonates), dyspnea, difficulty speaking, orthopnea, restlessness, cyanosis, decreased breath sounds, and altered breathing frequency and patterns [21].

Additionally, the SDKI book lists other diagnoses found in pneumonia patients, including ineffective breathing patterns, gas exchange disorders, hyperthermia, acute pain, decreased intracranial adaptive capacity, activity intolerance, nutritional deficits, risk of fluid imbalance, risk of falls, diarrhoea, and risk of spontaneous circulation disorders [21]. The researchers assumed that Ineffective Airway Clearance was more common than Impaired Gas Exchange because the sample consisted of ventilated patients, who are more prone to airway secretion retention, and not all pneumonia patients experience gas exchange impairment. In addition, the nursing diagnoses were derived from hospital nurses' documentation and the data provided to the researchers, which did not consistently include arterial blood gas results.

Hospitals should standardize ICU VAP screening and nursing assessment using a structured checklist for key respiratory and systemic signs (e.g., dyspnea, tachypnea, fever, sputum changes) and implement diagnosis-linked care bundles that prioritize airway clearance, breathing support, gas exchange optimization, and temperature/pain management, while also addressing safety and complication risks (fluid imbalance, falls, shock). In addition, hospitals should strengthen documentation continuity by integrating ER–ICU–ward nursing records to enable timely recognition of diagnosis changes across care transitions, and improve clinical decision-making and quality monitoring.

This study has several limitations. First, the data used was secondary in nature and sourced from medical record recapitulation data. This means that researchers could not access medical records directly, which limited their access, especially if they needed data beyond what could be predicted. Additionally, this study only examined the nursing diagnoses of pneumonia patients while they were being treated in the ICU. Therefore, it is possible that the nursing diagnoses would change in the emergency room or when moving to an inpatient room.

CONCLUSION

The most common signs and symptoms of ventilator-associated pneumonia in patients in the intensive care unit (ICU) included dyspnea, coughing, tachycardia, excessive sputum production, altered breathing frequency, respiratory muscle use, decreased vital capacity, elevated body temperature, tachypnea, and warm skin. Common nursing diagnoses in patients with pneumonia include ineffective airway clearance, ineffective breathing patterns, impaired gas exchange, hyperthermia, acute pain, decreased intracranial adaptive capacity, activity intolerance, nutritional deficits, risk of fluid imbalance, risk of falls, diarrhoea, and risk of shock and spontaneous circulation disorders. Future researchers are advised to collect complete data from the emergency room through the ICU and inpatient care transfer to fully analyse differences in nursing diagnoses at different time points and different conditions.

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