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Dyspnea management in patients with pneumonia and coronary artery disease: A case study

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Abstract

Background: Cardiovascular disease, particularly Coronary Artery Disease (CAD), is strongly linked to pneumonia. Patients suffering from both pneumonia and CAD frequently experience dyspnea as a symptom. Dyspnea, caused by both conditions, can significantly impact the patient's quality of life. Consequently, it is crucial to address and manage dyspnea in individuals with pneumonia and CAD.
Purpose: To provide a thorough overview of managing dyspnea in patients with pneumonia and CAD in public hospitals in West Java, Indonesia.
Method: Employing a case study methodology using a nursing care approach, encompassing nursing assessment, data analysis, diagnosis, intervention, implementation, evaluation, and documentation. The assessment indicated that the patient experienced shortness of breath, with a blood pressure of 145/86 mmHg, a respiratory rate of 24 breaths per minute, a pulse rate of 95 beats per minute, and an oxygen saturation level of 88%. The patient received 5 liters per minute of oxygen via a nasal cannula, and their body temperature measured 36.4ºC.
Results: In this case study, dyspnea management involved positioning the patient, administering oxygen therapy in stages, and providing pharmacological treatments, including diuretics and antibiotics. Additional therapies included respiratory muscle training and effective cough exercises. These interventions successfully reduced the patient's respiratory rate to 18 breaths per minute and increased their oxygen saturation to 97% with a nasal cannula. Additionally, the patient's Medical Research Council (MRC) dyspnea scale score decreased to 1 out of 5.
Conclusion: Nursing care management that includes positioning the patient in a semi-Fowler's position while resting and a Fowler's position when awake, administering oxygen therapy in stages, providing pharmacological treatments such as diuretics and antibiotics, and conducting respiratory muscle training, can lower the breathing rate and alleviate symptoms of shortness of breath in patients with pneumonia and coronary artery disease.

Keywords: Coronary Artery Disease; Dyspnea; Pneumonia.

INTRODUCTION

Pneumonia is a prevalent condition associated with significant morbidity and mortality across all age groups. It is caused by infection or inflammation of the lung tissue due to microorganisms such as bacteria, viruses, parasites, fungi, as well as exposure to chemicals and physical lung damage (Grief & Loza, 2018). Pneumonia can be classified into three types: community-acquired pneumonia, which originates from infections in the community; hospital-acquired pneumonia, which originates from infections in the hospital environment; and ventilator-associated pneumonia, which results from the use of a ventilator (Jain, Vashisht, Yilmaz, & Bhardwaj, 2023).

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Pneumonia is associated with an increased short-term and long-term risk of cardiovascular events such as myocardial infarction, CAD, and stroke. Since the early 20th century, a link has been observed between pneumonia and plaque-related cardiovascular events (Stotts, Corrales-Medina, & Rayner, 2023). Pneumonia-related infections can cause inflammation of the coronary blood vessels. Acute infections often lead to macrophage infiltration in atherosclerotic plaques, which can result in atherosclerosis and endothelial dysfunction. This can lead to plaque rupture, thrombus formation, and an imbalance between arterial perfusion and myocardial oxygen supply (Hu, Sun, Yu, Guo, Pei, Yang, & Lv, 2023). When an arterial plaque ruptures, its lipid-rich core, which is prone to forming clots, is exposed. This can result in thrombus formation at the rupture site, leading to vascular occlusion. Platelets become activated and aggregate on the ruptured plaque due to pro-inflammatory cytokines or bacterial products from pneumonia. This process, from plaque rupture to thrombus formation, can worsen during pneumonia, causing further imbalance in arterial perfusion and myocardial oxygen supply, ultimately contributing to cardiovascular disease (Stotts et al., 2023).

In 2014 the prevalence of pneumonia was around 2% with the number of pneumonia sufferers in Indonesia ranging from 23% to 27%, and around 1.19% of deaths were caused by pneumonia. The death rate caused by pneumonia is 7.6% of the total number of cases (Ministry of Health of the Republic of Indonesia, 2019). Meanwhile, cardiovascular disease has a prevalence of 34.1% in people living with hypertension and 1.5% in people with CAD during the 2013-2018 period (Ministry of Health of the Republic of Indonesia, 2018).

The likelihood of recovery decreases when complications accompany the primary health condition (Desai, Aliberti, Amati, Stainer, & Voza, 2022). Several factors contribute to the link between pneumonia and cardiovascular disease (Kruckow, Zhao, Bowdish, & Orihuela, 2023). Pneumonia can lead to hypoperfusion and multi-organ failure due to systemic inflammation. It is marked by the buildup of exudate in the alveoli, resulting in acute hypoxemia (Bajantri, Venkatram, & Diaz-Fuentes, 2018). Persistent hypoxemia from alveolar consolidation disrupts normal ventilation and perfusion balance, which can raise pulmonary resistance, pulmonary artery pressure, and right ventricular afterload (Dumas, Lemiale, Demoule, & Azoulay, 2019). Additionally, ongoing hypoxemia causes symptoms such as dyspnea in the patient.

Persistent hypoxemia resulting from the acute inflammatory reactions of pneumonia can lead to organ dysfunction in diffusion, arrhythmias, and heart failure. The mismatch of ventilation and perfusion or shunting during pneumonia episodes causes myocardial dysfunction, decreased myocardial contractility, reduced oxygen supply, and increased myocardial oxygen demand, which can result in heart failure (Njoroge & Teerlink, 2021; Ong, 2020). The strong connection between pneumonia and cardiovascular disease can produce similar symptoms, such as dyspnea. In patients with CAD, dyspnea can arise from various mechanisms (Powell-Wiley, Poirier, Burke, Després, Gordon-Larsen, Lavie, & St-Onge, 2021). A primary cause is myocardial ischemia, where inadequate oxygen intake leads to insufficient blood supply to the heart muscle, impairing its ability to pump blood effectively. This insufficient blood supply can also cause symptoms like chest pain radiating to the back (Maddury, 2018).

According to the World Health Organization, common clinical signs of pneumonia and CAD include dyspnea, cough, rapid breathing (tachypnea), and abnormal breath sounds (rhonchi) upon examination. Dyspnea represents a subjective sensation of breathing discomfort, characterized by varying intensities of different sensations. Dyspnea experienced by patients with pneumonia and CAD can significantly impact their overall quality of life, affecting physical, psychological, emotional, and social aspects. A reduced quality of life can impede the recovery process, limit daily activities, increase hospital admissions, and elevate the risk of complications and mortality. Therefore, it is crucial to intervene in managing dyspnea in patients with pneumonia and CAD (Aljabery, Saifan, AbuRuz, Masa'Deh, & Hayeah, 2017; Imam & Jitpanya, 2022).

Current strategies for managing dyspnea involve monitoring the patient's breathing pattern, positioning them in semi-Fowler or Fowler positions,

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administering oxygen therapy, and implementing pharmacological interventions. Nebulization is commonly used as part of pharmacological therapy to help break up mucus. However, there are disparities in dyspnea management between academic literature and actual hospital practices. Therefore, additional therapies such as respiratory muscle training and effective cough exercises are often employed for patients. This study aims to provide a comprehensive overview of dyspnea management in patients with pneumonia and CAD within the public hospital settings of West Java, Indonesia, based on the interventions already implemented.

RESEARCH METHOD

This study presents a case analysis focusing on the care provided to patients diagnosed with both pneumonia and coronary artery disease. The subject of this case is a 41-year-old woman diagnosed with pneumonia and coronary artery disease in the Internal Medicine Inpatient Room of a General Hospital in West Java, Indonesia. Nursing care management involves identifying diagnoses, planning treatment strategies, executing treatment actions, and assessing outcomes. Diagnosis identification of the patients entails collecting biodata, recording main complaints, documenting medical history, and conducting physical examinations. Subsequently, a plan is devised to conduct care-related research activities over a period of 3 x 24 hours. This includes gathering data through patient and family interviews, continuous patient monitoring, and comprehensive physical health assessments. Nursing assessments involve monitoring vital signs and evaluating the overall condition of the patient.

Next, the nurse in charge verifies the data by cross-referencing it with the patient's medical records. Subsequently, the collected data undergoes analysis to assess and determine nursing diagnoses, guiding intervention strategies, which include positioning, oxygen therapy, respiratory muscle training, and effective cough exercises. Pharmacological interventions involve the administration of diuretics such as Furosemide (40 mg IV twice daily), Lasix (2 mg IV three times daily), and Spironolactone (25 mg orally once daily). Additionally, patients are prescribed Angiotensin-Converting Enzyme (ACE) inhibitors, specifically Ramipril (2.5 mg orally once daily), and potassium electrolytes via KSR (600 mg orally twice daily). Furthermore, antibiotic therapy is initiated with Cefixime (100 mg twice daily).

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RESEARCH RESULTS

Table 1. Characteristics of the Subject

Variable	Value/Note
Biodata	
Age	41 years
Gender	Female
Education	Junior High School
Occupation	Housewife
Medical diagnosis	Pneumonia and CAD
Physical Examination	
Consciousness	Compos mentis GCS=15 ($E_4M_5V_6$)
Blood pressure	145/86 mmHg
Pulse	95^X/minutes
Height	149 cm
Weight	47 Kg
Nursing Diagnosis Identification	
Subjective	Fatigue, respiratory obstruction (shortness of breath), abdominal pain.
Objective	Oxygen nasal cannula 5, RR=24^X/minute, SpO2=88%, blood sugar=143 mg/dL, IWL=570 cc/day, Intake–Output 1500–1070=588 cc/day, Hemoglobin=8.2 gr/dL, Platelet 235.000/uL, Body temperature=36.4ºC, Cardiomegaly with bilateral pneumonia and pulmonary edema.

Table 1 presents the subject's demographic information, indicating a 41-year-old female with education up to junior high school level, employed as a housewife, and diagnosed with pneumonia and coronary artery disease. The physical examination revealed a GCS (Glasgow Coma Scale) score of 15 (E4M5V6), blood pressure of 145/86 mmHg, pulse rate of 95 beats per minute, height of 149 cm, and weight of 47 kg. Subjective diagnostic identification data included complaints of fatigue, respiratory obstruction (shortness of breath), and abdominal pain. Objective diagnostic identification data indicated the use of a 5-liter nasal cannula for oxygen, presence of cardiomegaly with pulmonary edema and bilateral pneumonia, respiratory rate of 24 breaths per minute, oxygen saturation of 88%, daily water loss of 570 cc, intake-output imbalance of 588 cc/day, hemoglobin level of 8.2 g/dl, platelet count of 235,000/uL, and body temperature of 36.4ºC.

Table 2. Respiratory Rate, Oxygen Saturation, and MRC Dyspnea Scale

Variable	First Day	Second Day	Third-Day
Respiratory Rate	24^X/minute	22^X/minute	18^X/minute
Oxygen Saturation	96% (NRM 15 liters/minute)	97% (Simple Mask 15 liters/minute)	98% (Nasal Cannula 5 liters/minute)
MRC Dyspnea Scale	5	4	1

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Table 2 illustrates the respiratory parameters over three days. On the initial day, the Respiratory Rate was 24 breaths per minute, Oxygen Saturation was 96% (administered via a non-rebreather mask at 15 liters per minute), and the MRC Dyspnea Scale score was 5. Subsequently, on the following day, the Respiratory Rate decreased to 22 breaths per minute, Oxygen Saturation increased to 97% (provided with a simple mask at 15 liters per minute), and the MRC Dyspnea Scale score improved to 4. Finally, on the third day, the Respiratory Rate further decreased to 18 breaths per minute, Oxygen Saturation remained at 97% (delivered via a nasal cannula at 5 liters per minute), and the MRC Dyspnea Scale score notably decreased to 1.

DISCUSSION

Following a comprehensive assessment, an analysis was conducted, indicating impaired gas exchange. The diagnosis aligns with the assessment findings, including dyspnea, intercostal retractions, persistent cough with excessive sputum, orthopnea, wet crackles, rales at the lung base, a respiratory rate of 24 breaths per minute, and oxygen saturation of 88% with a nasal cannula and 96% with a non-rebreathing mask. The patient experienced significant discomfort due to dyspnea, leading to restlessness. Therefore, nursing interventions are crucial to address the condition and enhance the patient's quality of life.

Once the nursing diagnosis is determined, attention turns to addressing ineffective airway clearance. Nurses observe the patient's breathing patterns, evaluate for additional breath sounds, ensure proper patient positioning, administer oxygen therapy, and collaborate on pharmacological treatments. In this particular case, nebulization was not part of the pharmacological regimen. To address this, the nurse implemented additional measures such as effective coughing techniques and respiratory muscle training to alleviate dyspnea. Effective coughing methods assist in clearing the airway and reducing shortness of breath by expelling secretions. Respiratory muscle training aims to enhance respiratory muscle strength, enhance lung function, and mitigate complications.

Diagnostic tests are employed to assist in identifying a patient's medical concerns. One such test is an electrocardiogram (ECG), which can detect alterations in the ST segment and Q waves. These alterations signal heart issues related to ventricular depolarization and the onset of repolarization. The analysis of the ECG findings for this patient revealed a normal sinus rhythm with a heart rate of 100 beats per minute. However, there were also abnormal Q and ST elevations in leads II, III, and aVF, indicating an inferior STEMI and a normal axis. Based on this assessment, it can be inferred that the patient has an infarction in the post-descending artery, a branch of the right coronary artery. This impedes the heart's ability to pump blood adequately to the lungs, leading to blood backflow (Damluji, van Diepen, Katz, Menon, Tamis-Holland, Bakitas, & Chikwe, 2021). In cases where there is a mismatch between ventilation and perfusion or the presence of a shunt due to pneumonia, various adverse effects on the heart may occur, including reduced myocardial contractility, diminished oxygen supply, and heightened oxygen demand. Consequently, the patient may manifest cardiomegaly, abnormal Q and ST elevation in the lower portion of the heart, as well as symptoms such as pulmonary and extremity swelling, lower lung crackles, shortness of breath, and fatigue during exertion, which alleviates with rest.

The patient presented with pneumonia and CAD, with dyspnea being one of the symptoms. Pneumonia can induce respiratory muscle dysfunction due to tightness, impacting ventilation and lung volume. Conversely, cardiomegaly can impair optimal blood pumping by the heart, leading to blood backing up towards the heart. This backflow elevates pressure in the heart's atrium and can cause capillary membrane tension failure in the alveoli, resulting in reduced membrane conductance and increased capillary volume, which interferes with diffusion capacity, ultimately resulting in inadequate oxygen intake.

The patient's dyspnea was assessed using the MRC dyspnea scale. This scale has long been used to gauge the impact of breathlessness on daily activities. It is user-friendly, allowing patients to indicate how breathlessness affects their mobility (Bestall, Paul, Garrod, Garnham, Jones, & Wedzicha, 1999). The MRC dyspnea scale comprises five levels as follows: Level 1:

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experiencing breathlessness during vigorous physical activities, particularly during sports; Level 2: encountering breathlessness when ascending or walking uphill; Level 3: experiencing breathlessness to the extent that walking speed is slower than peers of the same age or having to stop walking due to breathlessness; Level 4: suffering from breathlessness after walking a distance of 100 meters or for a few minutes; Level 5: grappling with breathlessness even when leaving the house (Williams, 2017).

On the initial day, the patient experienced severe breathlessness when leaving the house, scoring a 5 on the dyspnea scale. The respiratory rate was recorded at 24 breaths per minute, and additional breath sounds, specifically rhonchi, were detected upon lung auscultation at the lung bases. However, by the second day, the severity of breathlessness had lessened, scoring a 3. The patient's family noted a decrease in restlessness, and the patient was able to sleep comfortably at night. Oxygen therapy was tapered on the second day, with the patient transitioning to a simple mask at a flow rate of 15 liters per minute. Additionally, the patient demonstrated improved mobility in bed on the second day of treatment.

Following nursing intervention, the patient's condition notably improved, particularly in managing the dyspnea. Each day, there was a gradual reduction in the severity of dyspnea, with the primary measure being a decrease in the MRC dyspnea scale to level one by the third day of intervention. Oxygen saturation increased to 97% with a nasal cannula, and the respiratory rate decreased to 18 breaths per minute. By the third day, the patient's family reported that the patient could sleep comfortably both at night and during the day, although awakening occasionally due to coughing. Furthermore, the patient demonstrated effective coughing by the third day.

Positioning

To alleviate the patient's dyspnea, the nurse strategically positions them in a high Fowler's stance while awake, transitioning to a semi-Fowler's position during sleep. This repositioning enhances venous return to the thoracic compartment when supine, leading to heightened venous and pulmonary capillary pressure (Katz, Arish, Rokach, Zaltzman, & Marcus, 2018). An increase in pulmonary venous and capillary pressure can cause pulmonary edema, increased airway resistance, and dyspnea (Akpinar & Topacoglu, 2021). Thus, patients in the Fowler or semi-Fowler position can minimize venous return and help reduce dyspnea in patients with pneumonia and CAD. Studies show that lung function improves in patients with complaints of lung and heart diseases in high Fowler and semi-Fowler positions.

Oxygen Therapy

Oxygen supplementation serves as a crucial intervention for patients experiencing shortness of breath and respiratory distress. The aim of providing oxygen therapy is to address hypoxemia and hypoxia conditions in patients (Zhang, Fang, Dong, Wu, & Deng, 2012). For individuals with low blood oxygen levels (hypoxemia), the standard treatment involves administering oxygen therapy. Mild cases often utilize a nasal cannula with oxygen flow rates ranging from 2 to 6 liters per minute or a simple mask with flow rates of 5 to 10 liters per minute. However, if oxygen saturation drops below 85%, especially with a risk of hypercapnia, a reservoir mask is recommended. The target oxygen saturation level for hypoxemic patients should typically fall within the range of 94-98%. The primary cause of hypoxemia is often insufficient oxygen transport capacity, even when hemoglobin levels are within normal limits. This can be attributed to issues in the lung region or abnormalities in gas exchange, such as those seen in pneumonia (O'driscoll, Howard, & Davison, 2008).

During the initial assessment, the patient's oxygen saturation was recorded at 88% while using a nasal cannula. Following oxygenation guidelines, oxygen supplementation was administered incrementally, with continuous monitoring of the patient's oxygen saturation levels at each stage. However, despite administering 5 liters/minute of oxygen via the nasal cannula, the patient's oxygen saturation did not reach the desired target level. Consequently, the attending nurse promptly switched to oxygen supplementation through a non-rebreathing mask, deviating from the initial recommendation to begin with a simple mask.

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Blood gas analysis tests are deemed necessary under specific circumstances, such as when patients are critically ill, experience unexpected hypoxemia (SpO2 < 94%), or have a history of hypoxemia (such as in COPD) and exhibit decreased oxygen saturation or increased dyspnea. These tests are also warranted when previously stable patients exhibit a deterioration in their condition and necessitate assessment of FiO2 requirements, or when patients are at risk of hypercapnic respiratory failure, showcasing acute dyspnea, decreased oxygen saturation, or signs of carbon dioxide retention. Additionally, blood gas analysis tests are essential for patients suspected of metabolic conditions experiencing dyspnea and those with compromised peripheral circulation (O'Driscoll et al., 2008). Despite the patient's initial oxygen saturation of 88%, blood gas analysis was not performed at this hospital to evaluate lung function and ascertain acid-base balance, which could potentially indicate underlying respiratory or metabolic disorders.

Respiratory Muscle Training and Effective Cough Exercise

The next non-pharmacological intervention administered to the patient was pulmonary rehabilitation. This intervention is recommended for individuals with lung disease to enhance their physical, mental, emotional, and social well-being and to promote long-term adherence to health-promoting behaviors. According to the American Thoracic Society (ATS) and the European Respiratory Society (ERS), pulmonary rehabilitation involves patient assessment followed by therapies such as physical exercise, education, and behavior modification (Holland, Cox, Houchen-Wolloff, Rochester, Garvey, ZuWallack, & Singh, 2021).

One component of pulmonary rehabilitation is Respiratory Muscle Training (RMT). RMT involves breathing exercises that restrict airflow during inhalation to retrain the respiratory muscles, leading to a hypertrophic response. This training can improve muscle strength and endurance, reduce dyspnea, enhance daily exercise capacity, and improve the quality of life for patients with lung disease (Thunström & Faager, 2016).

To perform RMT, the patient is positioned in Fowler's or semi-Fowler's position. The patient is instructed to hold their breath for a few seconds before exhaling to relax their muscles. Next, the patient closes their nostrils and exhales fully through their mouth, then inhales deeply to expand their chest. This process is repeated with slow, relaxed exhalation and minimal effort while keeping the shoulder muscles relaxed (Charususin, Gosselink, Decramer, McConnell, Saey, Maltais, & Langer, 2013). RMT sessions typically last between 15 and 30 minutes, depending on the patient's ability and comfort (American Association of Respiratory Care, 2002; Nici, Donner, Wouters, Zuwallack, Ambrosino, Bourbeau, & Troosters, 2006).

Administering RMT to the patient significantly reduced their dyspnea, as indicated by the MRC dyspnea scale decreasing from 5 (shortness of breath even when leaving the house) to 1 (shortness of breath only during exercise). Additionally, the patient's SpO2 level improved to 97% with the use of a nasal cannula.

Coughing is a physiological response that is important in protecting the respiratory tract. This response arises due to the body's complexity and ability to adapt, triggered by physical and chemical stimuli. (Kardos, 2010). Signals of impulses are active in various body parts such as the airways, pleura, pericardium, and esophagus. These signals are then transmitted to the brainstem (truncus cerebri) via the vagus nerve. Cough, a symptom, is associated with specific disease conditions and is categorized into two types - acute cough, which lasts less than eight weeks, and chronic cough, which lasts more than eight weeks (Francesco, Marina, Giuseppina, Ernesto, & Alfredo, 2018). Managing cough can involve either pharmacological or non-pharmacological therapy. One of the pharmacological therapy options is using mucolytics, which helps reduce sputum viscosity. Mucolytics can be administered through nebulization therapy with hypertonic fluid (NaCl). This therapy attracts fluid to reduce respiratory tract edema, suppress inflammatory mediators, reduce mucus viscosity, and increase mucociliary clearance (Ehre, Rushton, Wang, Hothem, Morrison, Fontana, & Boucher, 2019; Safdar, Shelburne, Evans, & Dickey, 2009).

In this case study, the patient did not receive mucolytic therapy. Instead, the nurse implemented effective cough exercises. These exercises involve

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maximizing inspiration and initiating a strong cough from the expiratory phase. The patient is positioned in a semi-Fowler's position, leans forward with hands clasped, takes 3-5 deep breaths, and then coughs spontaneously with an open respiratory cavity. Additionally, the patient performs huffing, a cough control technique where they expel all the air from their lungs, hold their breath for 3 seconds, lift their chin, and exhale forcefully through their abdominal muscles to create a huff sound. This technique helps in controlling breath until mucus is felt in the throat, allowing effective expulsion of mucus (National Health Service, 2023).

By the second day, the patient reported a productive cough with thick brown phlegm. By the third day, phlegm production had slightly decreased.

Pharmacological Therapy

Pharmacological interventions for the patient included collaborative diuretic therapy with Furosemide, Lasix, and Spironolactone. The patient, suffering from pneumonia and CAD with right ventricular failure at the heart's apex, exhibited signs such as rhonchi breath sounds at the lung bases and edema in the lungs and extremities (+2). Furosemide and Lasix, both loop diuretics, aim to reduce fluid levels or edema by inhibiting the reabsorption of sodium, potassium, and chloride, thereby increasing the excretion of water, sodium, chloride, magnesium, and calcium. Spironolactone, a potassium-sparing diuretic, also formed part of the therapy. While diuretics can alleviate pulmonary congestion in the short term, they do not significantly reduce hospitalization time or mortality (Food and Drug Administration, 2020). It's crucial to monitor for dehydration and reduced blood volume, which can lead to circulatory collapse and blood clots. Additionally, Lasix can cause hypokalemia, necessitating potassium supplementation twice daily, each dose containing 600 mg.

The patient also received Ramipril (2.5 mg orally once daily), an ACE inhibitor beneficial for managing cardiovascular diseases like heart failure, myocardial infarction, and hypertension. Ramipril affects the renin-angiotensin-aldosterone system, promoting systemic vasodilation and reducing intravascular fluid volume by preventing sodium and water retention (Food and Drug Administration, 2011). Combining ACE inhibitors with diuretics can enhance the hypotensive effect, while concurrent use with potassium-sparing diuretics can increase the risk of hyperkalemia (McEvoy, Snow, & American Society of Health System Pharmacists, 2018).

For the pneumonia infection caused by Streptococcus pneumoniae, the patient was prescribed Cefixime (2 x 100 mg), a third-generation cephalosporin antibiotic with broad-spectrum bactericidal properties that inhibit bacterial cell wall formation (Food and Drug Administration, 2017). Cefixime's stability against beta-lactamase enzymes addresses penicillin resistance in many organisms. Both in vitro and clinical studies have shown its effectiveness against various organisms, including gram-positive bacteria like Streptococcus pneumoniae (Food and Drug Administration, 2006).

CONCLUSION

Nursing care management by positioning the patient in a semi-Fowler's position when resting and a Fowler's position when awake, providing oxygen therapy in stages, providing pharmacological therapy in the form of diuretics and antibiotics, and respiratory muscle training, can reduce the rate of breathing and be able to overcome symptoms of shortness of breath in patients with pneumonia and coronary artery disease

REFERENCES

Akpinar, G., & Topacoglu, H. (2021). Evaluation of the effect of patient position in the management of chronic heart failure patients presenting with dyspnea. *Journal of Surgery and Medicine, 5*(3), 284-288.

Aljabery, M. A., Saifan, A. R., AbuRuz, M. E., Masa'Deh, R., & Hayeah, H. M. A. (2017). Quality of Life among Patients with Acute Coronary Syndrome. *IOSR Journal of Nursing and Health Science, 06*(02), 23–30. Retrieved from: https://doi.org/10.9790/1959-0602072330

American Association of Respiratory Care. (2002). AARC Clinical Practice Guideline. Pulmonary Rehabilitation. Retrieved from:

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https://www.aarc.org/wp-content/uploads/2014/08/05.02.617.pdf

Bajantri, B., Venkatram, S., & Diaz-Fuentes, G. (2018). Mycoplasma pneumoniae: a potentially severe infection. *Journal of clinical medicine research, 10*(7), 535.

Bestall, J. C., Paul, E. A., Garrod, R., Garnham, R., Jones, P. W., & Wedzicha, J. (1999). Usefulness of the Medical Research Council (MRC) dyspnoea scale as a measure of disability in patients with chronic obstructive pulmonary disease. *Thorax, 54*(7), 581-586.

Boswell-Ruys, C. L., Lewis, C. R., Wijeysuriya, N. S., McBain, R. A., Lee, B. B., McKenzie, D. K., & Butler, J. E. (2020). Impact of respiratory muscle training on respiratory muscle strength, respiratory function and quality of life in individuals with tetraplegia: a randomised clinical trial. *Thorax, 75*(3), 279-288.

Charususin, N., Gosselink, R., Decramer, M., McConnell, A., Saey, D., Maltais, F., & Langer, D. (2013). Inspiratory muscle training protocol for patients with chronic obstructive pulmonary disease (IMTCO study): a multicentre randomised controlled trial. *BMJ open, 3*(8), e003101.

Damluji, A. A., van Diepen, S., Katz, J. N., Menon, V., Tamis-Holland, J. E., Bakitas, M., & Chikwe, J. (2021). Mechanical Complications of Acute Myocardial Infarction: A Scientific Statement from the American Heart Association. *Circulation, 144*(2), e16-e35.

de Bliek, E. C. (2018). ST elevation: Differential diagnosis and caveats. A comprehensive review to help distinguish ST elevation myocardial infarction from nonischemic etiologies of ST elevation. *Turkish journal of emergency medicine, 18*(1), 1-10.

Desai, A., Aliberti, S., Amati, F., Stainer, A., & Voza, A. (2022). Cardiovascular complications in community-acquired pneumonia. *Microorganisms, 10*(11), 2177.

Dumas, G., Lemiale, V., Demoule, A., & Azoulay, E. (2019). Improving survival in immunocompromised patients with hypoxemic acute respiratory failure. *Annals of translational medicine, 7*(Suppl 8).

Ehre, C., Rushton, Z. L., Wang, B., Hothem, L. N., Morrison, C. B., Fontana, N. C., & Boucher, R. C. (2019). An improved inhaled mucolytic to treat airway muco-obstructive diseases. *American journal of respiratory and critical care medicine, 199*(2), 171-180.

Food and Drug Administration. (2006). Product Monograph: SUPRAX. Cefixime ORAL. Retrieved from: https://www.accessdata.fda.gov/drugsatfda_docs/label/2004/50621slr023,50622slr017_suprax_lbl.pdf

Food and Drug Administration. (2011). Altace ® Tablets (Ramipril). US Food and Drug Administration Label Information, 1–18. Retrieved from: http://www.accessdata.fda.gov/drugsatfda_docs/label/2011/022021s007lbl.pdf

Food and Drug Administration. (2017). Highlights of Prescribing Information: SUPRAX. 1–18. Retrieved from: https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/202091s005,203195s006lbl.pdf

Food and Drug Administration. (2020). FDA Approved Drug Products: Furosemide Injection, for intravenous or intramuscular use. 1–10. Retrieved from: https://www.accessdata.fda.gov/drugsatfda_docs/label/2011/018579s029lbl.pdf

Francesco, A., Marina, A., Giuseppina, B., Ernesto, C., & Alfredo, C. (2018). Cough, a vital reflex. mechanisms, determinants and measurements. *Acta Bio Medica: Atenei Parmensis, 89*(4), 477.

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Grief, S. N., & Loza, J. K. (2018). Guidelines for the Evaluation and Treatment of Pneumonia. Primary Care: Clinics in Office Practice, 45(3), 485-503.

Hakansson, A. P., Orihuela, C. J., & Bogaert, D. (2018). Bacterial-host interactions: physiology and pathophysiology of respiratory infection. *Physiological reviews, 98*(2), 781-811.

Heale, R., & Twycross, A. (2018). What is a case study? Evidence-based nursing, 21(1), 7-8.

Holland, A. E., Cox, N. S., Houchen-Wolloff, L., Rochester, C. L., Garvey, C., ZuWallack, R., & Singh, S. J. (2021). Defining modern pulmonary rehabilitation. An official American Thoracic Society workshop report. *Annals of the American Thoracic Society, 18*(5), e12-e29.

Hu, Y., Sun, Z., Yu, C., Guo, Y., Pei, P., Yang, L., & Lv, J. (2023). Association between pneumonia hospitalisation and long-term risk of cardiovascular disease in Chinese adults: a prospective cohort study. *EClinicalMedicine, 55*.

Imam, H., & Jitpanya, C. (2022). Factors related to health-related quality of life in patients with acute coronary syndrome in West Java, Indonesia: A correlational study. *Belitung Nursing Journal, 8*(4), 349.

Jain, V., Vashisht, R., Yilmaz, G., & Bhardwaj, A. (2023). Pneumonia Pathology. StatPearls. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK526116/

Kardos, P. (2010). Management of cough in adults. Breathe, 7(2), 122-133.

Katz, S., Arish, N., Rokach, A., Zaltzman, Y., & Marcus, E. L. (2018). The effect of body position on pulmonary function: a systematic review. *BMC pulmonary medicine, 18*, 1-16.

Kruckow, K. L., Zhao, K., Bowdish, D. M., & Orihuela, C. J. (2023). Acute organ injury and long-term sequelae of severe pneumococcal infections. Pneumonia, 15(1), 5.

Maddury, J. (2018). Cardinal Symptoms of Cardiovascular Diseases: Dyspnea. Indian Journal of Cardiovascular Disease in Women-WINCARS, 3(01), 039-048.

McEvoy, G., Snow, E. K., & Pharmacists, A. S. of H.-S. (2018). AHFS drug information 2018. In TA - TT -. American Society of Health System Pharmacists Bethesda, MD. Retrieved from: https://search.worldcat.org/title/ahfs-drug-information-2018/oclc/964919758

Ministry of Health of the Republic of Indonesia (2018). Laporan Riskesdas 2018 Nasional.pdf. In Lembaga Penerbit Balitbangkes. Retrieved from: https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan%20Riskesdas%202018%20Nasional.pdf

Ministry of Health of the Republic of Indonesia (2019). Rencana Aksi Program Pencegahan Dan Pengendalian Penyakit. Rencana AKSI Program P2P, 2019, 86. Retrieved from: https://p2p.kemkes.go.id/wp-content/uploads/2017/01/RAP-2015-2019.pdf

National Health Service. (2023). Guide to cough management. University Hospitals Dorset. Retrieved from: https://www.uhd.nhs.uk/uploads/about/docs/our_publications/patient_information_leaflets/Respiratory_therapy/Guide-to-cough-control.pdf

Nici, L., Donner, C., Wouters, E., Zuwallack, R., Ambrosino, N., Bourbeau, J., & Troosters, T. (2006). American thoracic society/European respiratory society statement on pulmonary rehabilitation. *American journal of respiratory and critical care medicine, 173*(12), 1390-1413.

Njoroge, J. N., & Teerlink, J. R. (2021). Pathophysiology and therapeutic approaches to acute decompensated heart failure. *Circulation Research, 128*(10), 1468-1486.

O'driscoll, B. R., Howard, L. S., & Davison, A. G. (2008). BTS guideline for emergency oxygen use in adult patients. *Thorax, 63*(Suppl 6), vi1-vi68.

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DOI: https://doi.org/10.33024/minh.v7i3.132

Ong, L. T. (2020). The association between pneumonia and heart failure. *Clinical Pulmonary Medicine, 27*(5), 125-130.

Powell-Wiley, T. M., Poirier, P., Burke, L. E., Després, J. P., Gordon-Larsen, P., Lavie, C. J., & St-Onge, M. P. (2021). Obesity and Cardiovascular Disease. *Circulation, 143*, 00-00.

Safdar, A., Shelburne, S. A., Evans, S. E., & Dickey, B. F. (2009). Inhaled therapeutics for prevention and treatment of pneumonia. Expert opinion on drug safety, 8(4), 435-449.

Stotts, C., Corrales-Medina, V. F., & Rayner, K. J. (2023). Pneumonia-induced inflammation, resolution and cardiovascular disease: causes, consequences and clinical opportunities. *Circulation Research, 132*(6), 751-774.

Strini, V., Schiavolin, R., & Prendin, A. (2021). The Role of the Nurse in Informed Consent to Treatments: An Observational-Descriptive Study in the Padua Hospital. *Clinics and practice, 11*(3), 472-483.

Thunström, U., & Faager, G. (2016). Effects of home-based inspiratory muscle training on symptoms in adults hospitalized for community-acquired pneumonia.

Williams, N. (2017). The MRC breathlessness scale. Occupational medicine, 67(6), 496-497.

Zhang, Y., Fang, C., Dong, B. R., Wu, T., & Deng, J. L. (2012). Oxygen therapy for pneumonia in adults. Cochrane Database of Systematic Reviews, (3).

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