

Nursing care for pneumonia patients with airway clearance care problems in the HCU room: case report

Reva Rigia Fajar Rini, Rosiana Nur Imallah

Nursing Study Program, Universitas Aisyiyah Yogyakarta, Indonesia
email: revarigiafajarrini@gmail.com

Abstract

Pneumonia is an acute infection of the lung parenchyma that frequently results in nursing problems associated with ineffective airway clearance, particularly in patients with a tracheostomy (TT). This condition may obstruct ventilation, increase the risk of subsequent infections, and extend the duration of hospitalization. Consequently, effective airway clearance care is essential to prevent more complications and accelerate patient recovery. This study aims to provide nursing care for airway clearing problems in pneumonia cases through the administration of nebulizers, chest physiotherapy, and suctioning. This research employed a case study methodology focusing on patients experiencing problems in nursing associated with ineffective airway clearing who underwent tracheostomy. Nursing interventions administered encompassed chest physiotherapy, nebulization, suctioning, semi-Fowler/Fowler positions, and education on adequate hydration and effective coughing techniques. Assessments were performed periodically over three days, focusing on respiratory patterns, sputum characteristics and volume, cough frequency, and patient comfort levels. This study was conducted on February 11, 2025, at RSUD (Regional General Hospital) Wates, Kulonprogo. The nursing care outcomes revealed a partial resolution of the airway clearing problem, demonstrated by a reduction in secretions. This suggests that nebulization, chest physiotherapy, and suctioning may reduce secretions. Therefore, it may be inferred that the combination of nursing interventions, including chest physiotherapy, nebulization, suctioning, and positioning, is effective in resolving the problem of ineffective airway clearance in pneumonia patients with tracheostomy. Implementing comprehensive treatment is essential to enhance patient quality of life and prevent complications.

Keywords: Pneumonia, Ineffective Airway Clearance, Chest Physiotherapy

1. Introduction

Pneumonia is an inflammation of the lungs caused by various microorganisms, This disease attacks the respiratory system, causing the air sacs in the lungs to fill with pus or fluid, resulting in ineffective airway clearance (Moy et al., 2024). Abnormal conditions resulting from the inability to cough can lead to excessive sputum production due to infectious diseases. Immobilization of sputum and ineffective coughing can be caused by neurological diseases such as cerebrovascular accident (CVA), or due to the consumption of other medications (Sari et al., 2023).

The respiratory system is a vital system for human life, absorbing oxygen and expelling carbon dioxide. The respiratory system extends from the nose to the bronchioles, with the lungs being the primary organ. Respiratory tract diseases are the leading cause of death and disability worldwide. Nearly 80% of all cases of respiratory tract infections occur in the community or in hospitals/treatment centers (Sari et al., 2023). Pneumonia is caused by the invasion and overgrowth of pathogens in the lung parenchyma. Produces intra-alveolar exudate. Pathogens can enter the lower respiratory tract through microaspiration. The inflammatory response causes the migration of phagocytic cells and the release of toxic substances from these cells into the infected area. This process can directly injure tissue and disrupt epithelial and endothelial integrity, vasomotor tone, intravascular hemostasis, and activate other inflammatory cells (Mulyadi et al., 2024). Signs and symptoms of pneumonia depend on several factors, including age, type of pathogen, and patient history. The most common symptoms of

community-acquired pneumonia are shortness of breath, cough with phlegm, and fever. Other symptoms include weakness, nausea, vomiting, and chest pain (Sari, R., Dewi, C., & Putra, 2023).

According to WHO, globally there are more than 1,400 cases of pneumonia per 100,000 people, or 1 case per 71 people per year, with the largest incidents occurring in South Asia (2,500 cases per 100,000 people), West and Central Africa (1,620 cases per 100,000 people). According to WHO data in 2019, Indonesia with pneumonia caused 14% of all deaths of children under 5 years old with a total of 740,180 deaths. Meanwhile, the prevalence of pneumonia in DI Yogyakarta was 13.8% (Sari, R., Dewi, C., & Putra, 2023).

Pneumonia is a lung infection that can show various clinical manifestations, Symptoms depend on the etiology, patient age, and disease severity. Common symptoms include fever, chills, a productive cough with purulent sputum, shortness of breath (dyspnea), pleuritic chest pain, and tachypnea (Sari et al., 2023). In more severe cases, cyanosis, decreased oxygen saturation, and additional breath sounds such as rhonchi or crepitations may be present on lung auscultation (Wulansari, & Putra, 2022).

Inflammation of the lungs often causes increased phlegm production and difficulty expelling it, thus disrupting airway clearance and can worsen the patient's respiratory condition (Putri., & Lestari, 2023).

Ineffective airway clearance is a condition in which an individual experiences an inability to clear mucus or other obstructions from their airways, thus interfering with gas exchange and optimal breathing (WHO, 2024). This can occur due to various factors, such as excess mucus production, ineffective coughing, or the presence of a foreign object. As a result, oxygen has difficulty entering the lungs and carbon dioxide has difficulty excreting, which can impact overall health (Sari et al., 2023).

Managing ineffective airway clearance is a primary focus in the care of patients with respiratory disorders. Common measures include chest physiotherapy, nebulization, and patient positioning, such as semi-Fowler's or Fowler's, to help maximize lung expansion and facilitate expectoration (Wahyuni, 2023). Furthermore, ensuring adequate hydration and encouraging effective coughing are also essential components of this management to help thin and remove secretions from the airways (Hanafi, P. C. M. M., & Arniyanti, 2020).

A common nursing problem in patients with pneumonia is ineffective airway clearance caused by foreign objects that originate from the accumulation of excess secretions. Airway obstruction is a condition in which an individual experiences a threat to their respiratory status related to the inability to cough effectively, which can be caused by: thick or excessive secretions due to infectious diseases, immobilization, secretions and ineffective coughing (Utari Ekowati, K., Budi Santoso, H., & Sumarni, 2022).

Interventions that can be carried out according to the Indonesian Nursing Intervention Standards (SIKI) guidelines to address the nursing problem of ineffective airway clearance in patients with pneumonia are various, including effective cough training, airway management, respiratory monitoring, administration of inhalation medication, chest physiotherapy, and so on (SIKI, 2018).

Ineffective airway clearance can be addressed through the collaborative administration of inhaled medications (SIKI, 2018). A nebulizer is a treatment device that administers medications by inhalation. The medications are first broken down into smaller particles through aerosol or humidification. The purpose of nebulizing is to relax bronchial spasms, thin secretions, clear the airways, and moisturize the respiratory tract (Putra, A. P., & Susanti, 2021). Chest physiotherapy is a series of therapeutic actions or procedures designed to help clear the airways of accumulated secretions (phlegm or mucus) that are thick, profuse, or difficult to expel independently. This procedure generally involves a combination of techniques such as postural drainage, clapping (chest percussion), vibration (vibrating the chest wall), as well as effective breathing and coughing exercises (Hanafi et al, 2020). The goal of chest physiotherapy is to loosen and mobilize phlegm adhering to the walls of the airways.

Based on this background, the researcher is interested in conducting a case study by applying nursing care to a patient diagnosed with pneumonia in order to meet the patient's needs holistically. The purpose of this study is to describe the basic concept of nursing care for Mr. S, who was diagnosed with pneumonia in the High Care Unit (HCU) of Wates Regional General Hospital, Kulonprogo.

2. Method

The research used is a qualitative research with a case study research design, namely a qualitative approach where researchers explore real life through in-depth data collection where the research unit is a single case. The research subjects were patients diagnosed with Pneumonia and received nursing care according to the nursing case experienced, namely airway clearance. The number of research subjects was one person. The focus of the study was providing nebulizer therapy, chest physiotherapy, suction. The study was conducted on February 11, 2025 in the High Care Unit Room of Wates Kulon Progo Regional General Hospital, Yogyakarta City. The instruments used were, an assessment format as well as tools and materials for conducting nebulizer and suction therapy. Data collection was directly from the results of interviews and physical assessments in the form of an assessment format. Researchers directly conducted interviews and conducted direct assessments. Researchers assessed the patient's airway clearance. The collected data were analyzed using nursing analysis and determined nursing diagnoses and interventions.

3. Results and Discussion

3.1. Result

The study was conducted on February 11, 2025 in the High Care Unit (HCU) of Wates Kulonprogo Regional General Hospital, on a patient named Mr. S, aged 57 years, male, Muslim, Javanese, and Indonesian citizen.

The patient presented with primary complaints of decreased consciousness, rapid breathing, and coughing with retained phlegm. The patient's current medical history revealed decreased consciousness, inadequate eye contact, weakness, and unresponsiveness to pain stimuli. The patient appeared short of breath and unable to cough, although his family reported that he occasionally attempted to cough but was unable to do so. A coughing sound was heard, and his breathing was rapid. A urinary catheter, a nasogastric tube (NGT), and an IV line were also present in his left arm. A review of the patient's previous medical history revealed that he was a laborer. He had been admitted to the ICU for seven days and then transferred to the HCU due to his improving condition. However, shortly after the transfer, the patient became very weak. During treatment, the patient exhibited decreased consciousness, along with a cough and fever that worsened over five days. This condition again led to decreased consciousness.

On physical examination, the results of the respiratory system were found to have a blockage in the form of accumulated sputum and could not be expelled, RR: 27x / minute, visible use of accessory respiratory muscles, regular respiratory rhythm, regular depth of breath, and there was white sputum with a thick consistency. There were additional wheezing breath sounds in both lungs, SPO₂: 88%. In the cardiovascular system, the results of the examination of the pulse were 91x / minute, blood pressure: 114/64 mmHg, temperature: 37.3°C, tan skin color and looked dry, regular heart rhythm, no chest pain was found. In the central nervous system, the results of the patient's consciousness were Eyes 4, Verbal 5, Motoric 6, composmentis. For muscle strength 2/3/2/3. In the gastrointestinal and urinary systems there were no problems. The musculoskeletal and integument system found elastic skin turgor, no wounds, no fractures, but there was difficulty

in movement because the patient experienced weakness and decreased consciousness, with the results of the Morse scale measurement for the risk of falling, namely 25 (mild risk of falling). The patient's bed was installed with a handrail to prevent falls in patients. The patient's functional status was found that for current activities and mobilization the patient was fully assisted by family and nurses because the patient experienced decreased consciousness. In several supporting examinations, the results of Thorax DWS AP/PA dated 19-1-2025 Impression: Bronchitis, Susps, pneumonia sinistra, Pleural reaction in the fissure minor dextra, Large cor dbn. Mr. S's pharmacological treatment program includes infusion of 16 tpm, oxygen installed in the tracheostomy at 4 lpm, Bisoprolol 1 x 2.5 gr, spironolactone 1 x 2.5 gr, digoxin 1 x 0.25 gr, Furosemide 1 x 40 gr, citicoline 500 mg/12 hours, omeprazole 40 mg/12 hours, metoclopramide 1 ampoule/8 hours, paracetamol 1 gr, ambroxol 3 x 1, sucralfate 3 x 1, ciprofloxacin 500 mg/12 hours.

3.1.1. Nursing Diagnosis Analysis

After the assessment was conducted, data analysis was continued to determine the nursing diagnosis. The results of the data analysis obtained based on the assessment of Mr. S were Subjective Data: the family said the patient was short of breath and had mucus, the patient was unable to speak because of a tracheostomy. Objective Data: The patient was unable to cough, the mucus was white, thick consistency, oxygen attached to tracheostomy 4 lpm, RR: 27x/minute, SpO₂: 88%, Thorax DWS AP/PA examination dated 19-1-2025: Bronchitis, suspect, left pneumonia, pleural reaction in the right minor fissure, large cor dbn. From the data, the etiology of the infection process was raised with the nursing problem of ineffective airway clearance. From the results of data analysis, the nursing problem in Mr. S was determined based on the Indonesian Nursing Diagnosis Standards (SDKI) namely ineffective airway clearance related to retained secretions, characterized by ineffective cough, unable to cough, excessive sputum, audible rhonchi, RR 27x/minute, SPO₂: 88%; with diagnosis code D.0001.

3.1.2. Intervention

In general, the interventions carried out on patients are based on the Nursing Intervention Standards (SIKI), namely airway management with intervention code I.01011, namely for observation: monitoring breathing patterns, monitoring additional breath sounds, and monitoring sputum. In therapeutic actions: position semi-fowler, provide drinks, perform mucus suction, and provide oxygen. Collaboration: administer a Nebulizer according to the doctor's instructions. The Indonesian Nursing Outcome Standards (SLKI) that were raised were increased airway clearance with the output code (L.01001), with the following outcome criteria: Sputum production decreased sufficiently (4), Ronchi decreased (5), Breathing patterns improved sufficiently (4), and Breathing frequency improved sufficiently (4). The interventions given to Mr. S with a diagnosis of pneumonia were chest physiotherapy combined with suction to reduce secretions. Chest physiotherapy suction actions are also used to overcome the accumulation of secretions. Suction involves inserting a suction catheter or endotracheal tube (ETT) through the mouth or nose to reduce sputum retention, clear the airway, and prevent lung infection (Sinarti, 2021). Interventions for patients with ineffective airway clearance include monitoring additional breath sounds, monitoring sputum, suctioning mucus for <15 seconds, and collaborating with bronchodilator medication.

Oxygenation is a vital basic need for human life. In the body, oxygen plays a crucial role in cellular metabolism. Oxygen deficiency can have significant consequences, including death.

Therefore, various efforts must be made to ensure this basic need is met. Therefore, every nurse must understand the manifestations of oxygen levels in patients and be able to address various issues related to meeting these needs (Rahma Triana et al., 2022).

The author chose to use interventions in the case, namely using the NIC label Airway Management, namely airway facilitation, with the action plan to be carried out, namely positioning the patient comfortably, monitoring respiration and O₂ status, administering oxygen. Oxygen Therapy Label: set up oxygenation equipment, monitor oxygen flow, maintain the patient's position, observe for signs of hypoventilation. Vital Sign Monitoring Label: monitor blood pressure, pulse, temperature, and RR, monitor respiratory rate and rhythm, monitor lung sounds.

3.1.3. Implementasi

Nursing care for Mr. S was implemented for 3 days. On the first day, the patient was unable to cough, his sputum was white and thick, and he had oxygen installed in his tracheostomy at 4 lpm.

RR: 27x/minute, SpO₂: 88%, Thorax DWS AP/PA examination dated 19-1-2025: Bronchitis, suspect, left pneumonia, pleural reaction in the right minor fissure, large cor dbn. Nursing actions taken are: Monitoring the presence of secretions, dirty, moist dressings, or signs and symptoms of airway obstruction that require suction, providing oxygen in the tracheostomy 4 lpm, collaborating with chest physiotherapy, observing the position of the ETT tube, performing suction for less than 15 seconds. On the second day, observations were made on the patient's condition where the patient appeared short of breath, mucus was retained, there were still additional breath sounds of rhonchi, RR 36x/minute, SPO₂: 98%, and still had a nasal cannula attached 4 lpm. Nursing actions carried out were: maintaining a 30° semi-fowler head position, providing 180 ml of milk/NGT and rinsing with 10 ml of water/NGT, administering Meprovent Nebulizer therapy 1 respul/8 hours, performing mucus suction (suction) for less than 15 seconds, and maintaining oxygen administration per NASA cannula at 4 lpm. On the third day, muscle strength was assessed, right-left tilt mobilization was performed on the patient, nebulizer, chest physiotherapy, and suction were performed.

The analysis in this case is the application of Nebulizer inhalation in Pneumonia patients with ineffective airway clearance nursing problems. In the application of Nebulizer inhalation therapy to Mr. S, the author conducted monitoring for 3 days. Nebulization was carried out based on doctor's instructions with Meprovent 1 respul (2.5 mg) / 8 hours. Nebulization was carried out on the first day after being carried out at 10:00 WIB before the patient was served with NGT feeding. Nebulization was carried out with a time span of 15-20 minutes, and the results obtained were that the patient's respiratory status improved with a respiratory rate of 23x / minute, SPO₂: 95%, there was clear white mucus discharge, reduced rhonchi. Thorax examination DWS AP / PA dated 19-1-2025: Bronchitis, susps, pneumonia sinistra, pleural reaction in the dextra minor fissure, large cor dbn.

3.1.4. Evaluation

After nursing care was provided to Mr. S, a patient with pneumonia with the main nursing problem of ineffective airway clearance in the HCU room of Wates Regional Hospital, the intervention to be carried out related to the diagnosis was a combination of chest physiotherapy and suction. Then, chest physiotherapy and suction intervention, with the intervention given once a day with an intervention duration of 3 minutes, and the following results were obtained:

On the first day after chest physiotherapy intervention combined with suction with supporting data, rhonchi were still present in the right lung field, and the respiratory rate increased to 32x/minute. According to research conducted by chest physiotherapists, significant sputum removal helps increase patient respiratory saturation and clear the airway (Purnamiasih, 2021). The availability of percussion and vibration techniques facilitates sputum removal, which is removed with a combination of suction. Before and after the intervention, airway clearance was assessed, with data obtained showing sputum of ± 10 cc. Suction is the primary implementation for patients who are unable to remove secretions or mucus to clear the airway and meet oxygen needs. If suction is not performed due to impaired airway clearance, the patient will experience a lack of oxygen supply (hypoxemia) (Wulan, E. S., & Huda, 2022).

On the second day of implementation with chest physiotherapy intervention after the intervention was carried out Chest physiotherapy combined with suctioning with supporting data showed a change in breathing from 18x/minute to 15x/minute. Before and after the intervention, the patient's airway clearance was assessed, no additional breath sounds were heard, and there was no change in breathing pattern. However, after the intervention, sputum production decreased to ± 15 cc.

On the third day of implementation with chest physiotherapy intervention after the intervention was carried out Chest physiotherapy combined with suctioning with supporting data showed a change in breathing from 29x/minute to 18x/minute. Before and after the intervention, the patient's airway clearance was assessed, no additional breath sounds were heard, and there was no change in breathing pattern. However, after the intervention, sputum production decreased to ± 10 cc.

It is hoped that chest physiotherapy intervention combined with suction administration can be performed on patients with sputum retention, especially in patients with respiratory failure. It is hoped that ICU nurses can perform chest physiotherapy combined with suction to reduce sputum production in patients with respiratory failure in the HCU. Chest physiotherapy intervention combined with suction can be performed once a day while observing vital signs.

3.2. Discussion

From the results of the discussion, several points were obtained, such as assessment, analysis of nursing diagnoses, nursing care objectives, nursing interventions, nursing implementation, and evaluation:

3.2.1. Assessment

The assessment revealed a primary complaint of decreased consciousness, rapid breathing, and a cough with retained mucus. The patient's current medical history included decreased consciousness, inadequate eye contact, weakness, and an unresponsiveness to painful stimuli. The patient appeared short of breath and was unable to cough, although his family reported occasional attempts to cough but were unable to do so. A coughing sound was heard, and breathing was rapid. The inflammatory process of pneumonia results in increased secretion production, leading to ineffective airway clearance (Hidayatin, 2020).

Ineffective airway clearance is the inability to clear secretions or airway obstruction to maintain a patent airway with signs and symptoms such as ineffective coughing/inability to cough, excessive sputum, wheezing, dyspnea, restlessness, decreased breath sounds, changes in respiratory frequency. The impact of ineffective airway clearance in pneumonia patients is not immediately treated resulting in mucopurulent sputum secretion with hemoptysis causing blockage

and disrupting the oxygen transport system to the lungs, the lungs will experience a decrease in O₂ and CO₂ will increase resulting in hypoxemia (Sartiwi et al., 2019).

Physical examination found a blockage in the form of accumulated sputum that could not be expelled, RR: 27x/minute, use of accessory respiratory muscles was visible, respiratory rhythm was normal. Regular breathing, regular depth of breath, presence of thick, white sputum, wheezing in both lungs, SPO₂: 88%. Common symptoms of pneumonia include rapid breathing and shortness of breath, due to sudden lung inflammation. Lung inflammation occurs when the air sacs in the lungs, called alveoli, fill with pus and fluid, reducing their ability to absorb oxygen. Lack of oxygen prevents the body's cells from functioning. Because of this, in addition to the spread of infection throughout the body, pneumonia sufferers can die from lack of oxygen (Wulandari & Iskandar, 2021). According to Siti Khodijah, Wirda Syari, (2022) clinical manifestations of pneumonia start from upper respiratory tract infections, high fever, cough, rapid breathing, dyspnea, increased breath sounds, groaning, chest retraction, then appear weak and are at risk of experiencing ineffective breathing. This is caused by the accumulation of fluid in the lungs and airways.

According to Sumiarty, C., & Sulisty, (2020) stated that the normal respiratory rate in adults is 16-20x/minute, so it is concluded that Mr. S has an abnormal respiratory rate which is usually called tachypnea, rapid and shallow breathing >20x/minute. SpO₂ or oxygen saturation is the percentage of hemoglobin (Hb) that is saturated with oxygen. Normal saturation in humans is 95-100% normal, so it is concluded that in Mr. S's case, saturation is abnormal because it has a saturation <95%. Ronchi breath sounds come from the larger bronchi or trachea and have a sound that peaks in patients who are due to secretions that block the airway, so that when the patient expires there is a noisy sound so that they are unable to maintain airway clearance (Mahmud, 2020).

3.2.2. Nursing diagnosis analysis

Based on the data in this case, it was found that the patient on the first day experienced a buildup of phlegm sputum and shortness of breath. From the results of the examination, it was found that the patient appeared short of breath, the patient was unable to cough because of a tracheostomy, the sputum was thick white, the patient appeared to be lying in bed, oxygen was installed in the tracheostomy at 4 lpm, rhonchi breath sounds were heard in the left inferior lobe in the anterior (front) part with, breathing 27x/minute, and saturation 88%, with blood pressure 114/64 mmHg.

The primary nursing diagnosis in this case study is ineffective airway clearance. D.0001) bd airway hypersecretion is characterized by complaints of shortness of breath, secretions that are difficult to remove according to research from Tarigan, J., & Pangaribuan, (2024) ineffective airway clearance is caused by excessive secretion production and secretions accumulate in the bronchi so that the patient's airway is disturbed which ultimately makes the patient experience problems in getting oxygen. Accumulated sputum can interfere with the airway, the inability to clear secretions so that obstruction occurs in the airway (Cahya Mutiara Mas Hanafi & Arniyanti, 2020).

3.2.3. Objective of nursing care

The nursing diagnosis of airway clearance due to airway hypersecretion provides an outcome of airway clearance (L.01001) in accordance with the SIKI book. The goals and nursing care plans provided to TN. S are that after 3x8 hours of nursing actions, airway capacity will increase with

the outcome criteria being that sputum production will decrease sufficiently (4). Ronchi decreased (5), breathing patterns improved moderately (4), and breathing frequency improved moderately (4). This study is in line with research by (Prasetyo & Wulan, 2023) which stated that researchers provided nursing interventions to patients with chronic obstructive pulmonary disease (COPD) and found that these interventions significantly reduced sputum production and improved complaints of shortness of breath. This study also reported improvements in the patient's breathing frequency and breathing pattern after the intervention. The focus of the intervention in this study, which was determined for the diagnosis of ineffective airway clearance, was airway management (I.01011) with the main intervention being airway management.

3.2.4. Nursing interventions

In general, interventions carried out on patients with ineffective airway clearance problems based on Nursing Intervention Standards (SIKI) namely airway management with intervention code I.01011, with actions carried out namely observation: 1) Monitor breathing patterns, 2) Monitor additional breath sounds, and monitor sputum. In therapeutic actions: 1) Position semi-fowler, 2) Give drinks, 3) Suction mucus, and 4) Give oxygen. Collaboration: 1) Collaboration in administering bronchodilators, expectorants, mucolytics, if necessary, so that Nebulizer action is chosen according to doctor's instructions. Therapeutic is done by adjusting the patient's position semi-fowler. While education is done by teaching the family to do chest physiotherapy. It is hoped that after the patient is given chest physiotherapy, nebulizer, and suction, shortness of breath will decrease, can remove mucus, respiratory frequency decreases, and be calmer.

In this case, the procedures analyzed included the application of a nebulizer, chest physiotherapy, and suctioning to a patient with pneumonia. A nebulizer is a rapid treatment that reduces the viscosity of secretions and improves airway patency. The nebulization therapy process converts the drug mixture into smaller, vapor-like particles, facilitating its inhalation into the lungs and reducing the concentration of secretions or phlegm. Dilution easily removes these secretions or phlegm (Karuniawati, S. Y., Khayati, F. N., & Nurhidayati, 2022).

Chest physiotherapy is a therapy used in the treatment of most respiratory diseases in children, where the technique involves indirectly removing mucus or secretions from the respiratory tract (Viona et al., 2024). Some chest physiotherapy techniques include postural drainage, clapping, and vibration. Chest physiotherapy is an effective treatment for removing secretions from the respiratory tract, with several signs of success including thickened secretions, improved respiratory rate, and the patient no longer complaining of shortness of breath (Dewi, A. T., Yunitasari, P., & Qudsiyah, 2022).

Suction can help remove secretions or fluids from the affected area. Nurses with less than 5 years of experience will sometimes receive different lessons during their education or college years, as they are tailored to the patient's circumstances (Trifianingsih et al., 2024).

This proves that there is no gap between theory and fact, where the collaboration of providing Nebulizer inhalation is carried out based on the patient's needs in overcoming complaints of shortness of breath due to the accumulation of secretions experienced by the patient so that it is hoped that with this therapy Nebulization can thin secretions and provide space in the patient's airways so that the patient's oxygenation needs can be met.

3.2.5. Nursing implementation

Implementation of nursing care for Mr. S for 3 days, namely the patient was unable to cough, white sludge, thick consistency, oxygen was attached to the tracheostomy at 4 lpm, RR:

27x/minute, SpO₂: 88%, Thorax examination DWS AP/PA: Bronchitis, suspect, left pneumonia, pleural reaction in the right minor fissure, large cor dbn. Nursing actions carried out were: Monitoring the presence of secretions, dirty, moist dressings, or signs and symptoms of airway obstruction that require suction, providing oxygen in the tracheostomy at 4 lpm, collaborating with chest physiotherapy, observing the position of the ETT tube, performing suction for less than 15 seconds. On the second day, observations were made on the patient's condition where the patient appeared short of breath, retained mucus, there were still additional breath sounds, ronchi, RR 36x/minute, SpO₂: 98%, and still had a nasal cannula at 4 lpm. Nursing actions carried out were: maintaining a 30° semi-fowler head position, serving 180 ml of milk/NGT and rinsing 10 ml of water/NGT, performing 1 respul/8 hours of Meprovent Nebulizer therapy, performing mucus suction (suction) for less than 15 seconds, and maintaining oxygen administration per nasal cannula 4 lpm. On the third day, muscle strength was assessed, right- left tilt mobilization was performed on the patient, performing nebulizer, chest physiotherapy, and suction, chest physiotherapy interventions were performed combined with suction with supporting data showing changes in breathing from RR 29x/minute to 18x/minute. Before and after the intervention, an assessment of the patient's airway clearance was carried out, no additional breath sounds were heard, there were no changes in breathing patterns, after the intervention, sputum production became ± 10 cc.

In this case, the application of Nebulizer inhalation was chosen because of the accumulation of secretions in the patient that blocked the patient's airway, causing difficulty breathing, characterized by RR 27x/minute and SPO₂: 88%. In the application of nebulizer therapy, chest physiotherapy, and suction on Mr. S, the author conducted monitoring for 3 days.

The stages in the nebulizer procedure are re-checking the doctor's instructions, preparing the Nebulizer and the required medication, namely 1 ampoule of Meprovent 2.5 mg + 0.5 mg of distilled water in a 3 cc dispo, 1 set of adult masks, clean handsoon, drug storage tray, and hand sanitizer. Nebulization is carried out for 15-20 minutes until the medication in the mask tube runs out or no longer emits steam. The results of the nursing documentation of the application of Nebulizer inhalation therapy are obtained RR: 20x / minute, SPO₂: 95%, there is a clear white mucus discharge, wheezing is reduced.

Evidence-Based Nursing, which aligns with this theory, is the research results (Sitorus, 2021) which state that the combination of nebulization therapy with chest physiotherapy is more effective in treating airway obstruction than nebulization therapy alone.

The results of a similar study by (Supriyatno & Nataprawira, 2016) showed that single nebulization was less effective in clearing the airways compared to the control group that received chest physiotherapy after nebulization, indicating the importance of a combination of interventions for adequate airway clearance.

This is in line with research by Syafrinanda & Tiala, (2025) which has been proven effective in overcoming the problem of ineffective breathing patterns, including monitoring breathing patterns regularly, positioning clients in a semi-Fowler or Fowler position to maximize lung expansion, and encouraging warm drinks to help thin secretions and facilitate effective coughing.

3.2.6. Evaluation

Nursing evaluation in this case is that after nursing actions for 3x8 hours, the nursing problem of ineffective airway clearance has not been resolved. This is because several outcome criteria indicators have not been achieved, sputum production from scale 2 increased to scale 5, shortness of breath from scale 2 increased to scale 5, respiratory frequency from scale 2 increased to scale 5, breathing pattern from scale 2 increased to scale 5. Obtained from the current objective

data, shortness of breath has decreased to scale 5. Phlegm that accumulates in the airways of patients with tracheostomy tubes (TT) can be removed effectively through a combination of suctioning, chest physiotherapy, and nebulizers. Suctioning directly clears secretions from the trachea and bronchi. Chest physiotherapy (including percussion, vibration, and postural drainage) helps loosen secretions attached to the walls of the airways. Meanwhile, the nebulizer provides moisture and medications (eg, mucolytics) in the form of inhaled aerosols, helping to thin the secretions so they are easier to remove. These three interventions are often implemented simultaneously as part of a comprehensive strategy to maintain airway patency, prevent accumulation of secretions, and optimize gas exchange in patients with TT.

Evidence Based Nursing which is in line with this theory is the result of research (Afifah et al., 2023) which states that the combination of nebulization therapy with chest physiotherapy is more effective in treating airway obstruction than nebulization therapy alone. Similar research by Goussev, (2022) found that the group receiving only nebulization was less effective, while the control group receiving chest physiotherapy after nebulization had adequate airway clearance.

Another study by Lesti & , Ayu Yuliani S., (2022) also stated that administering nebulization for 15-20 minutes showed an effect on respiratory frequency values before and after nebulization in patients with respiratory tract disorders.

Evaluation of nursing interventions in bronchopneumonia patients with ineffective airway clearance showed positive results after nebulization. The nursing problem was partially resolved, indicated by an effective cough, a fairly regular breathing pattern, reduced sputum production, and a calmer appearance (Setiawan, R., & Susanti, 2024).

Similar results were found in a study (Wardiyah et al., 2022) where nebulization therapy for 3 days was able to overcome ineffective airway clearance in pneumonia patients, showing that the patient's cough and runny nose were reduced, secretions were able to come out and secretion production was reduced, the patient also looked calmer and did not cough as often.

4. Conclusion

Based on the results of the assessment conducted up to the nursing diagnosis stage, it can be concluded that the patient experienced airway clearance related to airway hypersecretion. After chest physiotherapy combined with suction was applied to reduce secretions in a patient with pneumonia, the evaluation results showed a decrease in secretions in the patient, which can occur if the patient is given a nebulizer, chest physiotherapy, and suction in accordance with the correct standard operating procedures (SOP). The success of this therapy also depends greatly on the patient's consistency and perseverance in carrying out the therapy exercises.

Acknowledgement

The researcher would like to express her deepest gratitude to the lecturers at Aisyiyah University Yogyakarta who provided the opportunity, guidance, and assistance in completing this Nursing Final Scientific Paper (KIAN). Furthermore, she would like to thank the respondents who provided invaluable information and data to facilitate this research.

Reference

- Cahya Mutiara Mas Hanafi, P., & Arniyanti, A. (2020). Application of Chest Physiotherapy for Application of Chest Physiotherapy to Remove Sputum in Children Experiencing Ineffective Airway. *Journal of Professional Nursing*, 1(1), 44–50.
- Goussev, S. (2022). Rahim, HM (2023). Application of Chest Physiotherapy to Cleansing Problems

- Ineffective Airway in Children with Pneumonia in the Emergency Room of Dr. Soeradji Tirtonegoro Hospital, Klaten. *Gravity and Magnetic Encyclopedic Dictionary*, 24–33. <https://doi.org/10.1190/1.9781560803874.chb>
- Hanaf, PCMM, & Arniyanti, A. (2020). Application of Chest Physiotherapy to Expel Phlegm in Children Who Experience Ineffective Airway. *Stella Maris Makassar Journal* 2024, 1(1), 44–50.
- Hidayatin, T. (2020). The Effect of Chest Physiotherapy and Pursed Lips Breathing (Blowing Tongue) on Airway Clearance in Toddlers with Pneumonia. *Surya Journal*, 11(01), 15–21. <https://doi.org/10.38040/js.v11i01.78>
- Karuniawati, SY, Khayati, FN, & Nurhidayati, I. (2022). Application of Nebulizer Therapy for Overcoming Muhammadiyah University of Klaten. *Empowering Society Journal*, 3(3), 66–71.
- Lesti, A., & Ayu Yuliani S., Z. (2022). Application of Chest Physiotherapy in Children with Bronchopneumonia at Arjawinangun Regional Hospital. *Indonesian Journal of Health and Medical*, 02(No. 04), 321–356.
- Mahmud, R. (2020). Implementation of Nursing Care in Patients with Bronchopneumonia in Fulfillment of Oxygenation Needs. *Nursing Media Journal: Makassar Health Polytechnic*, 11(2), 2087–2122.
- Moy, JM, Santoso, SDRP, & Paju, W. (2024). Implementation of Chest Physiotherapy for Chest Problems Ineffective Airway Clearance in Pneumonia Patients. *Sumba Nursing Journal (JKS)*, 2(2), 58–69. <https://doi.org/10.31965/jks.v2i2.1440>
- Mulyadi, R., Rahmawati, Arief, E., Syahril, E., & Natsir, B. (2024). Radiological Image of Chest X-ray in Hospitalized Patients Diagnosed with Community-Acquired Pneumonia. *Journal of Public Health*, 8(2), 2916–2928.
- Wardiyah, AW, Wandini, RW, & Rahmawati, RP (2022). Implementation of Chest Physiotherapy for Patients with Airway Clearance Problems in Mulyojati Village, Metro City. *Journal of Creativity in Community Service (PKM)*, 5(8), 2348–2362. <https://doi.org/10.33024/jkpm.v5i8.7084>
- Wahyuni, S. (2023). Effectiveness of Chest Physiotherapy and Nebulization on Airway Clearance in COPD patients. *Journal of Pulmonary Nursing*, 8(2), 15–22.
- Wulansari, D., & Putra, K. (2022). Characteristics of Pneumonia Patients at Hospital X: A Study Descriptive. *Journal of Medicine and Health*, 8(2), 45–55.
- Wulandari, E., & Iskandar, S. (2021). Nursing Care for Needs Fulfillment Disorders Oxygen with Postural Drainage in Toddlers with Pneumonia in the Working Area of the Sawah Lebar Health Center, Bengkulu City. *Journal of Nursing and Public Health*, 9(2), 30–37. <https://doi.org/10.37676/jnph.v9i2.1794>
- Wulan, ES, & Huda, NN (2022). The Effect of Suction on Oxygen Saturation in Patients Being Treated in the Intensive Care Unit (ICU) of RAA Soewondo Pati Regional Hospital. *Journal of Nursing Profession*, 9(1), 22–33.
- WHO. (2024). *Respiratory Health: A Global Perspective*. World Health Organization.
- Purnamiasih, DPK (2020). The Effect of Chest Physiotherapy on Clinical Improvement in Children With Pneumonia. *Syntax Literate; Indonesian Scientific Journal*, 5(10), 1053–1064.
- Putra, AP, & Susanti, N. (2021). Nursing Care for Pneumonia Patients with Problems Ineffective Airway Clearance: A Case Study. *Sriwijaya Nursing Journal*, 8(1), 1–8.
- Rahma Triana, W., Adrian, R., Junika, S., Faloq, E., Nurindah Pratiwi, T., & Fort De Kock, U. (2022). Demonstration of How to Install Oxygen in English to Members of Pmr Mtsn 2 Bukittinggi. *Empowering Society Journal*, 3(3), 306–312.
- Sari, R., Dewi, C., & Putra, H. (2023). Comparison of the Effectiveness of Nebulization Alone with a Combination Nebulization and Chest Physiotherapy for Airway Clearance. *Journal of Nursing and Health*, 10(1), 237.
- Setiawan, R., & Susanti, D. (2024). The Effect of Nebulization on Airway Clearance in Patients Bronchopneumonia. *Journal of Medical Surgical Nursing*.
- Sumiarty, C., & Sulisty, FA (2020). Relationship between Respiratory Rate (RR) and Oxygen Saturation (SpO₂) in Head Injury Patients. *Wijaya Scientific Journal*, 12(1), 2301–4113.
- Siti Khodijah, Wirda Syari, & FR (2022). Analysis of the Implementation of Discovery and

- Management Pneumonia. *PROMOTOR Public Health Student Journal*, 5(5), 75–93.
- Sinarti. (2021). Analysis of Nursing Clinical Practice in Patients on Mechanical Ventilation with the Innovation Intervention of Combination of Chest Physiotherapy and Head Elevation 60 with Hyperoxygenation in the Close Suction Process on Changes in Saturation in the Intensive Care Room of Un.East Kalimantan Health Polytechnic, 1–98.
- Sartiwi, W., Nofia, VR, & Sari, IK (2019). Effective coughing exercises for pneumonia patients at RSUD Sawahlunto. *Journal of Scientific Community Service*, 3(1), 1–8.
- Sitorus, J. (2021). The Effect of Pursed Lips Breathing and Positioning on Oxygen Saturation Patients with COPD at HKBP BALIGE Hospital. *HKBP Balige Nursing Journal*, 2(1), 15–25.
- Supriyatno, B., & Nataprawira, HMD (2016). Inhalation Therapy for Childhood Asthma. *Pediatric Essence*, 4(2), 67. <https://doi.org/10.14238/sp4.2.2002.67-73>
- Syafrinanda, V., & Tiala, NH (2025). Nursing Care Management with Problems Oxygenation Disorders in Chronic Kidney Disease Patients. *Muhammadiyah Nursing Journal*, 10(1), 200–204. <https://doi.org/10.30651/jkm.v10i1.25781>
- Trifianingsih, D., Ivana, T., & Hawini, Z. (2024). Knowledge of the Nursing Team on Ventilator-Associated Pneumonia (Vap) Prevention Strategies in the Intensive Care Unit of Ulin Hospital Banjarmasin. *Journal of Nursing Suaka Insan (Jksi)*, 9(1), 61–69. <https://doi.org/10.51143/jksi.v9i1.615>
- Tarigan, J., & Pangaribuan, R. (2024). Emergency Nursing Care for Pneumonia Patients with Ineffective Airway Clearance at Putri Hijau Class II Hospital, Medan. *PubHealth Journal of Public Health*, 2(3), 97–104. <https://doi.org/10.1190/1.9781560803874.chb>
- Utari Ekowati, K., Budi Santoso, H., & Sumarni, T. (2022). Case Study of Inadequate Airway Clearance Effective in Pneumonia Patients at Ajibarang Hospital Case Study of in Effective Airway Cleaning on Pneumonia Patients in Ajibarang Hospital. *A Case Study of Ineffective Airway Clearance in Pneumonia Patients at Ajibarang Regional Hospital*, 10(1), 1–10.
- Viona, Fracellia Citra, Zikran, Sigit, P., & Khoirul, L. (2024). Implementation of effective cough Interventions in pulmonary tuberculosis patients with ineffective respiratory problems. *National Nursing Proceedings*.
- Dewi, AT, Yunitasari, P., & Qudsiyah, A. (2022). Efforts to improve airway clearance with chest physiotherapy in pediatric pneumonia patients. *Karya Husada Yogyakarta Health Polytechnic*, 1 (1), 465–473