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Chest physiotherapy to alleviate symptoms of bronchopneumonia

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Abstract
Bronchopneumonia is an acute infection in the lower respiratory tract, specifically affecting the lung lobules. It begins in the lung parenchyma and extends to the bronchi, often caused by Streptococcus pneumoniae bacteria. Bronchopneumonia increases mucus production, leading to clinical manifestations, one of which is ineffective airway clearance. Ineffective airway clearance occurs when a person is unable to clear secretions or airway obstructions effectively, thereby keeping the airway open. Nursing care can be provided to help clear mucus using non-pharmacological therapies, such as chest physiotherapy. The purpose of this study is to assess the effectiveness of chest physiotherapy in clearing mucus for cases of bronchopneumonia at Tidar District Hospital in Magelang. This case study is carried out through a systematic and structured nursing care approach. Based on the treatment provided using chest physiotherapy in bronchopneumonia cases, the results indicate an improvement in the symptoms of bronchopneumonia. It can be concluded that chest physiotherapy effectively aids in clearing mucus in children with ineffective airway clearance.

Keywords: Chest physiotherapy; symptoms management; hospital care; nursing care; medical care

Introduction
Bronchopneumonia is an acute infection of the lower respiratory tract, specifically involving the lung lobules, starting from the lung parenchyma and extending to the bronchial borders. This infection can be caused by various etiological factors, including bacteria, viruses, fungi, and foreign objects (Brina, Dwiarindi, & Naufal, 2022). In most cases, microorganisms such as fungi, bacteria, or viruses are the primary causes. These microorganisms often enter the respiratory tract through saliva droplets and trigger an immunological reaction in the body. This immune response leads to inflammation, which can result in symptoms like fever. Inflammation can also increase secretion production, which, when accumulated in the bronchi, narrows the airways and can cause a feeling of congestion for the patient (Rahmayani, Murniati, & Etika, 2023). According to Koswara (2022), common signs and symptoms of bronchopneumonia include high fever, restlessness, shortness of breath, rapid and shallow breathing with rhonchi sounds, vomiting, and both dry and productive cough. The infection in the respiratory tract causes an inflammatory reaction, which often leads to an excess production of secretions.

Standard care for bronchopneumonia centers on alleviating symptoms, improving respiratory function, and addressing the infection's cause (Indriyani, Destrika, & Eka, 2023). Key components include administering antibiotics if the infection is bacterial, selected based on the causative pathogen to ensure targeted and effective treatment (See, & Lau, 2023). Supportive care, such as oxygen therapy, may be provided to maintain optimal oxygen levels, especially in patients experiencing breathing difficulty or low oxygen saturation. Fluids and electrolytes are also essential to prevent dehydration and maintain fluid balance, as fever and rapid breathing can lead to increased fluid loss. Nutritional support is equally important, particularly for children, to strengthen the immune system and promote recovery. For patients with severe symptoms, hospitalization may be necessary to provide intensive monitoring and care (Mattila et al., 2023). In addition to medical interventions, nursing care focuses on airway management and symptom relief. Techniques such as chest physiotherapy help clear secretions from the lungs, improving oxygenation and reducing airway obstruction. This therapy includes chest percussion, vibration, postural drainage, and breathing exercises to help mobilize and eliminate secretions, preventing further complications like atelectasis (Patterson & Loebinger, 2012). Monitoring vital signs, including respiratory rate, oxygen saturation, and temperature, is essential to evaluate the patient's progress and response to treatment. Educating patients and caregivers about proper hand hygiene, respiratory hygiene, and measures to prevent reinfection is also crucial for recovery and reducing the risk of transmission (Sudirman, Modjo, & Isradianty, 2023).

Chest physiotherapy is a vital component of respiratory disease treatment, particularly for pediatric patients with respiratory illnesses. This therapy is performed using techniques like tapping and clapping, which involve rhythmic

flexion and extension movements of the hands. In children, these movements can be adapted with two or three fingers for comfort and effectiveness (Astuti & Dewi, 2020). Research by Syafiati & Alya (2021) supports that nursing management for airway clearance can be achieved with simple inhalation and chest physiotherapy. Chest physiotherapy includes a variety of techniques aimed at sputum clearance, either independently or in combination, to prevent sputum accumulation, airway blockage, and potential complications (Hanafi, Mas, & Arniyanti, 2020). These techniques consist of turning, postural drainage, chest percussion, chest vibration, deep breathing exercises, and effective coughing. Therefore, the study was proposed to evaluate the use chest physiotherapy in reducing symptoms in patient with bronchopneumonia.

Case Description

This case study uses a case study approach by providing gradual nursing care over 3x24 hours. Data for assessment were gathered through patient and family interviews, information from room nurses, the patient's medical records, and direct observation. This study focuses on a 3-year-old male patient with bronchopneumonia. Care was provided over a 3-day period, with chest physiotherapy administered once daily by the author. After each session of chest physiotherapy, an evaluation was conducted to assess secretion clearance before and after therapy. During the initial assessment, the patient, referred to as An.A, presented with a persistent cough and fever for the past six days. The child exhibited difficulty clearing secretions, which led to breathing difficulties, fast breathing (RR: 40x/minute), and fussiness. Auscultation revealed rhonchi sounds. The patient had experienced fever for four days, with a temperature of 38°C. Laboratory results showed elevated leukocytes (18.8) and lymphocytes (67.9), while X-ray findings indicated perihilar and pericardial infiltrates consistent with bronchopneumonia. The patient's mother shared that she had provided over-the-counter medication and eucalyptus oil for relief and had attempted to offer food, though her child frequently vomited and appeared restless due to the congestion and cough.

Vital signs indicate that the patient is experiencing significant distress, with a pulse rate of 135 beats per minute, suggesting tachycardia. The body temperature is elevated at 39.8°C, indicating a fever, which is often associated with infection or inflammation. Additionally, the respiration rate is markedly increased at 40 breaths per minute, reflecting possible respiratory distress or an underlying pulmonary condition. Upon conducting a lung examination, several notable findings were observed. Inspection revealed an increased respiratory frequency, accompanied by visible chest retraction, which may indicate the use of accessory muscles during breathing, suggesting the patient is struggling to ventilate effectively. During palpation, fremitus was assessed; the right side showed normal fremitus, while the left side exhibited similar findings, indicating no significant differences in lung density between the two sides at this stage. Percussion of the chest produced a dull sound, which could indicate fluid accumulation or consolidation within the lung tissue. Auscultation revealed the presence of rhonchi, a type of abnormal lung sound often associated with airway obstruction or secretions in the bronchi. Imaging results further elucidate the condition, showing perihilar and pericardial infiltrates, which are indicative of inflammation or infection in those regions. Notably, there is no evidence of bilateral pleural space thickening, suggesting that while there may be some lung involvement, there is no significant pleural effusion at this time. The second diaphragm appears slippery and not thickened, which can be a reassuring sign that there is no significant underlying pathology affecting the diaphragm. In summary, the clinical impression points towards a leading picture of bronchopneumonia, characterized by the combination of fever, increased respiratory rate, abnormal lung sounds, and imaging findings. The configuration indicates that any previous obstructions or casts in the airways have been resolved, allowing for a clearer assessment of the lungs. Overall, these findings suggest a need for prompt medical intervention to address the bronchopneumonia and support the patient’s respiratory function.

The data collected aligns with both the primary and secondary indicators of bronchopneumonia. After establishing this diagnosis, the author developed a plan of nursing interventions to address the patient's needs. Among the planned interventions, chest physiotherapy is included as it is supported by evidence indicating its effectiveness in facilitating secretion clearance. This approach is consistent with theoretical findings that suggest chest physiotherapy helps to expel phlegm, which can improve respiratory function and alleviate symptoms in bronchopneumonia cases.

Discussion

Based on the author’s findings from the study above, many of the signs, symptoms, and causes observed in the case are consistent with theoretical descriptions of bronchopneumonia. This assessment, conducted on February 27, 2024, in the Aster 6 room at Tidar Hospital in Magelang, gathered data from the patient, the patient’s parents, the attending nurse, the patient’s medical record, and direct observations. According to a journal by Maidartati (2022), bronchopneumonia is a prevalent health issue among children worldwide, who are particularly vulnerable due to the immaturity of their organ systems. Bronchopneumonia, an inflammatory lung disease, can affect one or more lobes and is often characterized by infiltrate spots in affected areas (Indriani, Gusgus, & Siti, 2024). Its etiology includes bacteria, viruses, parasites, and fungi. After reviewing theory, journal findings, and case data, the author identified key similarities between the literature and this case, specifically in terms of the causes and typical symptoms seen in bronchopneumonia. Through initial assessment, data grouping, problem identification, and the formulation of a

nursing diagnosis, the author determined the diagnosis of Ineffective Airway Clearance (D.0001) related to the infection process. Addressing this diagnosis aims to resolve the patient's respiratory complaints. At assessment, the patient presented with a respiratory rate of 40 breaths per minute, rhonchi on auscultation, a six-day history of fever at 39°C, chest retraction, and a coarse, congested cough. Laboratory results showed leukocytes at 18.8, lymphocytes at 67.9, and an X-ray indicating perihilar and pericardial infiltrates typical of bronchopneumonia. The author's care plan focused on prioritized interventions tailored to the patient's symptoms. Interventions for airway clearance related to infection management included respiratory pattern monitoring, breath sound monitoring, sputum assessment, semi-Fowler positioning, drainage positioning to facilitate secretion clearance, warm fluids, chest physiotherapy, and bronchodilator administration if needed.

Nursing care was implemented over three days (February 27-29) to monitor and address the patient's airway clearance. Day 1 interventions included assessing respiratory patterns (frequency, depth, and effort), checking for additional breath sounds (e.g., crackles, wheezing), observing sputum characteristics, positioning for optimal drainage, and applying chest physiotherapy per standardized procedures. The patient's mother was taught proper chest physiotherapy techniques, which included handwashing, positioning, chest percussion for 1-2 minutes, deep breathing exercises, and effective coughing to encourage secretion clearance. Collaboration with the family was emphasized to ensure adherence and support. After three days, evaluation revealed notable improvements: the father reported a reduction in nasal secretions, respiratory rate decreased to 25 breaths per minute, breath sounds normalized, and the patient appeared more comfortable. These outcomes indicate successful management of Ineffective Airway Clearance, validating the intervention plan and demonstrating the effectiveness of chest physiotherapy in improving airway clearance in pediatric bronchopneumonia. Nurses play a critical role in administering chest physiotherapy to patients with bronchopneumonia, facilitating effective airway clearance to alleviate respiratory distress (Hanafi, Mas, & Arniyanti, 2020). Their responsibilities include assessing respiratory status, identifying signs of secretion buildup, and implementing chest physiotherapy techniques such as percussion, vibration, and postural drainage. Nurses educate caregivers and patients on proper techniques, ensuring patient comfort, promoting safety, and monitoring for therapeutic efficacy. They also collaborate with interdisciplinary teams to tailor interventions based on patient-specific needs, adjusting care plans as necessary to support effective breathing patterns, improve oxygenation, and prevent respiratory complications. Through these actions, nurses enhance pulmonary function, support recovery, and contribute to patient education for long-term respiratory health (Yustiawan, Erwan, Immawati, & Nia, 2022).

Implementing chest physiotherapy for patients with bronchopneumonia faces barriers such as patient discomfort, lack of cooperation (especially in children), limited caregiver knowledge, and potential physical limitations due to patient weakness or respiratory distress (Hanafi, Mas, & Arniyanti, 2020). Additionally, inadequate training or experience among healthcare providers may hinder the correct application of techniques like percussion and postural drainage. To overcome these challenges, providing patient and family education on the importance and techniques of chest physiotherapy can foster cooperation. Nurses can also ensure patient comfort by using gentle, patient-centered approaches and by adjusting therapy timing and techniques to accommodate individual tolerance levels. Enhanced training programs for healthcare providers on chest physiotherapy skills, coupled with collaboration within the healthcare team, further ensure that interventions are applied safely and effectively, optimizing respiratory outcomes for bronchopneumonia patients.

Conclusion

Based on the case analysis carried out on An. A, two nursing diagnoses were confirmed by the author: Ineffective Airway Clearance related to the infection process and Hyperthermia related to the disease process. From the interventions implemented, the results for An. A included chest physiotherapy, which helped maximize secretion clearance, allowing the child to breathe within normal limits, as well as a reduction in fever and a return of appetite. The intervention performed on An. A for secretion removal followed the standard procedure (SOP) for chest physiotherapy, including hand washing, chest auscultation, positioning the client for drainage, performing percussion/clapping on the chest wall for 1-2 minutes, instructing the client to take slow, deep breaths, and applying vibration as the client exhales.

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