TRIPOD POSITION AND PURSED LIP BREATHING TOWARDS IMPROVING OXYGEN SATURATION

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ABSTRACT

Background: Pleural effusion involves abnormal fluid accumulation in the pleural cavity, stemming from increased production or reduced lymphatic absorption. This buildup compresses the lungs, impairing expansion and causing symptoms like dyspnea, chest pain, and cough. Non-pharmacological interventions, such as the tripod position and pursed-lip breathing, enhance lung ventilation, oxygenation, and ease breathing effort.
Objective: This case report evaluates their application in nursing care for Mrs. S, a patient with pleural effusion, to boost oxygen saturation.
Methods: A descriptive case study design targeted one patient diagnosed with pleural effusion. Data were gathered via medical-surgical nursing assessments, including interviews, observations, and physical exams. Findings informed a tailored nursing care plan. Interventions comprised tripod positioning where the patient leans forward with arms supported on a surface to optimize the use of diaphragmatic breathing along with pursed-lip breathing, involving inhalation through the nose and prolonged exhalation through pursed lips to reduce air trapping and improve gas exchange. These were implemented daily for three consecutive days, with ongoing monitoring and evaluation of vital signs, particularly SpO2.
Result: Pre-intervention, Mrs. S exhibited SpO2 of 84%, marked dyspnea, and ineffective airway clearance. Post-intervention, SpO2 rose to 96%, with notable relief in shortness of breath and enhanced respiratory comfort. No adverse effects occurred, confirming intervention tolerability.
Conclusion: The use of the tripod position and pursed lip breathing technique has been shown to improve oxygen saturation in Mrs. S with a nursing diagnosis of impaired gas exchange.

Keywords: Pleural Efussion, Tripod Position, Pursed Lip Breathing

INTRODUCTION

Pleural effusion is a condition in which fluid accumulates in the pleural cavity. This can be triggered by various factors, including heart failure, pneumonia, malignancies such as lung cancer, and systemic inflammatory disorders such as lupus. This fluid buildup inhibits the lungs' ability to expand optimally due to the pressure exerted by the fluid in the pleural cavity. As a result, sufferers often experience symptoms such as shortness of breath, chest pain, and coughing (Krishna et al., 2024).

Pleural effusion is one of the most common pleural conditions, both in developed and developing countries. Globally, it is estimated that there are around 3,000 cases of pleural effusion per million people (Aini & Noveyani, 2023). According to a 2023 WHO report, hundreds of thousands of new cases of pleural effusion are recorded annually worldwide, with the greatest burden occurring in developing countries. In Indonesia, according to the 2023 Indonesian Health Survey, the prevalence of pleural effusion sufferers reached 2.7% of the total population, equivalent to approximately 1.39 million people (Kemenkes, 2023).

Management of pleural effusion is principally carried out through a structured evaluation and management of pleural fluid to differentiate the type of fluid, whether it is a transudate or an exudate, as a basis for determining further therapy. The examination stages include a pre-analytical phase,

which involves receiving and identifying specimens; an analytical phase, which includes the preparation of cytology slides using smear techniques and rapid staining; and a post-analytical phase, which involves interpretation of the results by an anatomical pathologist to establish a precise diagnosis and support clinical decision-making (Wahid & Jumriati, 2022).

In addition to medical approaches, non-pharmacological interventions also play a crucial role in supporting improved respiratory function. Lung expansion exercises such as pursed lip breathing and teypod positioning are known to increase lung expansion and help improve ventilation. Implementing these interventions can have a positive effect on increasing lung capacity and gas exchange efficiency in patients (Zunzunwala & Jaiswal, 2024; Astridina & Latifin, 2021).

Based on research conducted by Putri and Fadhani (2025) in the Jurnal Keperawatan Merdeka (JKM), the tripod position has been proven effective in increasing oxygen saturation. This effectiveness is related to the optimization of accessory respiratory muscles and increased chest cavity expansion. The results showed a significant increase in average oxygen saturation after 10 minutes of tripod position intervention. These findings indicate that the tripod position can improve pulmonary ventilation and increase the efficiency of physiological gas exchange.

The results of research by Mahanani, Khoiriyati, and Purwanti (2025) in the Jurnal Penelitian Perawat Profesional showed that the application of the pursed lip breathing technique had a positive impact on increasing oxygen saturation. This was evident from the increase in SpO_2 values after three days of breathing exercises, from 94% to 97%, followed by a decrease in respiratory rate. These findings reflect an improvement in the physiological response after the intervention. Therefore, the pursed lip breathing technique is considered effective in increasing the efficiency of gas exchange and supporting improvements in blood oxygenation status.

METHODS

This study used a descriptive design with a case report approach on one patient with a diagnosis of pleural effusion who was treated in the Pulmonary Ward of Ulin Banjarmasin Regional Hospital in July 2025. Patient selection was based on inclusion criteria, namely experiencing respiratory disorders with decreased oxygen saturation from mild to severe, in a conscious condition, able to maintain a sitting or semi-sitting position, adult to elderly age, and willing to be a respondent. Meanwhile, exclusion criteria included patients with decreased consciousness, unstable hemodynamic conditions, severe musculoskeletal disorders, severe chest pain or conditions that worsen when sitting, severe neurological disorders, use of mechanical ventilators, and refusal of research interventions.

Data collection was conducted through interviews, observations, and physical examinations using a medical-surgical nursing assessment sheet. Next, a nursing care plan was developed, followed by implementation and evaluation. The interventions provided included the use of the tripod position and pursed lip breathing exercises, which were carried out for 15 minutes over three days.

RESULTS

Based on the evaluation results conducted after implementing the tripod position and pursed lip breathing technique, the patient's shortness of breath decreased. The data in the table shows a gradual improvement in oxygen saturation from the first to the third day. On the first day, oxygen saturation increased from 84% to 90%, on the second day from 87% to 94%, and on the third day from 89% to 96%.

These results indicate that the intervention successfully helped improve the patient's oxygenation. Therefore, it can be concluded that the nursing problem of impaired gas exchange in the patient improved and was resolved after the tripod position and pursed lip breathing interventions.

Table 1. Before and after results of tripod position and pursed lip breathing

Days to	Oxygen Saturation	
	Before	After
	%	%
Day 1	84	90
Day 2	87	94
Day 3	89	96

DISCUSSION

Based on the results of the assessment conducted on Mrs. S, it was found that the patient had a cough with phlegm accompanied by shortness of breath. Furthermore, Mrs. S also had difficulty expelling phlegm. According to Bisri et al. (2025), pleural effusion is a condition characterized by the accumulation of fluid in the pleural cavity, which can cause dyspnea due to reduced lung expansion capacity, impaired ventilation mechanics, and increased respiratory effort. This condition often occurs as a complication or comorbidity in various lung diseases, such as pneumonia and tuberculosis, so it requires appropriate, systematic, and measured management (Kartika et al., 2021).

One intervention that can be performed to manage gas exchange disorders in patients with pleural effusion is the tripod position and pursed lip breathing. In line with research by Devia et al. (2023), these two therapies have been proven effective in helping improve gas exchange, indicated by increased oxygen saturation and decreased respiratory rate. In this study, before the tripod position and pursed lip breathing were implemented, the average oxygen saturation value in respondents was recorded at 96.72%. After being administered both therapies, there was an increase of 1.39%, reaching 98.11%. A similar finding was also demonstrated in research by Hilma et al. (2019) which showed that pursed lip breathing therapy with tripod positioning can help improve oxygen saturation. The results showed a difference in oxygen saturation before and after implementing these two interventions (from 94.47% to 94.76%), thus it can be concluded that the intervention of the tripod position and pursed lip breathing has an effect on increasing oxygen saturation in patients with pleural effusion (Cahyani et al., 2020).

The intervention of the tripod position and pursed lips breathing was carried out for 3 meetings in 3 days (one therapy session for one meeting). At the first intervention meeting on July 22, 2025, the client's breathing pattern, sputum, and breath sounds were first assessed and the results of SpO2 were 90%, there was white sputum, and rhonchi were heard. After the 3-day intervention ended on July 24, 2025, the client's progress was re-evaluated and the results were SpO2 96%, sputum was reduced and rhonchi were still heard. The client said that after this therapy the client felt better than before, the client admitted that he was more comfortable when breathing and no longer felt short of breath.

Pursed lip breathing and the tripod position are breathing exercises and positional interventions that can help relieve shortness of breath. Pursed lip breathing is a breathing exercise performed by exhaling through pursed lips, creating resistance during expiration. This technique plays a role in helping improve gas exchange, as evidenced by increased blood oxygen saturation. Furthermore, this exercise can help stabilize breathing patterns and increase tidal volume. Pursed lip breathing not only provides

physiological benefits but also has subjective effects on patients, such as reducing the sensation of shortness of breath and reducing anxiety and tension caused by respiratory disorders (Cahyani et al., 2020). The tripod position, on the other hand, involves positioning the patient sitting on a bed with the body slightly leaning forward. In this position, the patient rests on both hands, either on the bed or on an overbed table, adjusted to their comfort, while both legs are bent inward (Manurung & Zuriati, 2021 in Devia et al., 2023).

In Mrs. S's case, after administering non-pharmacological interventions such as the tripod position and pursed-lip breathing, along with oxygen administration, her oxygen saturation increased from 90% to 96%. However, the client's respiratory rate remained above normal (>20 breaths/minute). This indicates that improved oxygen saturation does not necessarily mean ventilation has returned to normal.

This is consistent with the findings of Aulia et al. (2024), who showed that although breathing exercises and positioning can increase oxygen saturation, changes in respiratory rate may occur more slowly or not always in line with changes in oxygen saturation. For example, a literature review on the effects of breathing exercises on patients with dyspnea stated that breathing techniques can aid ventilation, but their effect on respiratory rate (RR) can vary depending on the body's adaptation and the patient's respiratory workload.

In addition, another study by Sofia (2023) regarding the application of the pursed lips breathing method in patients with chronic obstructive pulmonary disease (COPD) in Indonesia showed that this technique is effective in increasing SpO_2 and reducing respiratory rate, but changes in respiratory rate are not always immediate and require consistent practice to achieve optimal normalization of breathing patterns.

This can be explained physiologically as oxygen saturation reflects the ability of peripheral blood to oxygenate, while respiratory rate reflects the mechanics of ventilation and the work of breathing. In conditions of pleural effusion or other respiratory disorders, mechanical pressure from pleural fluid or airway resistance can still force the body to maintain a higher respiratory rate as a compensatory mechanism, even though blood oxygenation is adequate. In other words, the body tries to ensure adequate gas exchange, especially in removing CO_2, even though blood oxygenation appears to be improving.

Furthermore, discontinuation of positional and breathing technique training after three days may also be a factor in why the respiratory rate has not returned to normal. Techniques such as the tripod position and pursed lip breathing have been shown to reduce the work of breathing, but their success depends heavily on consistent implementation. Without repeated and sustained training, full ventilation adaptation cannot be achieved optimally. Therefore, a condition where SpO_2 improves while the respiratory rate remains high is a possible finding in patients with respiratory disorders such as pleural effusion, especially if breathing exercise interventions are not consistently continued.

Limitation

In the implementation of nursing care for Mrs. S, there was a limitation in the form of the client's refusal to continue the non-pharmacological intervention of the tripod position and pursed lip breathing after three days of implementation. The client felt her condition was worsening and complained of fatigue during the exercises, so the intervention could not be carried out consistently. In fact, both techniques require repeated practice to reduce the work of breathing and stabilize the respiratory rate. Although oxygen saturation improved, the client's respiratory rate remained above the normal range, which was

likely influenced by the failure to continue optimal breathing exercises. This limitation indicates that the success of the intervention is also influenced by the client's cooperation and acceptance of the therapy provided.

CONCLUSIONS

The use of the tripod position and pursed lip breathing technique, performed for three days for 5-10 minutes, has been shown to be effective in improving oxygen saturation in patients with pleural effusion. This was evident in the increase in oxygen saturation values from 84% to 96% within three days. This intervention also helped reduce the patient's shortness of breath. Therefore, the tripod position and pursed lip breathing technique can be recommended as adjunctive therapy in the care of patients with pleural effusions experiencing impaired gas exchange.

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