

THE IMPLEMENTATION OF PURSED LIPS BREATHING AND PRONATION IN COPD PATIENTS TO IMPROVE INEFFECTIVE BREATHING PATTERNS

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Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) is a prevalent chronic respiratory condition characterized by irreversible airflow limitation. A common clinical manifestation among individuals with COPD is the presence of ineffective breathing patterns, which may precipitate significant complications such as hypoxemia and hypercapnia. **Purpose:** This case study aims to describe the nursing management of a COPD patient exhibiting dysfunctional breathing patterns who was given pursed lips breathing and pronation breathing exercises as part of their therapy regimen. **Method:** This investigation employed a descriptive methodology within a case study framework. The sample was COPD patients experiencing dyspnea (shortness of breath). The intervention group was given a combination of PLB and prone position intervention. **Result:** Data collection involved monitoring oxygen saturation levels (SpO₂) and respiratory rate. The findings revealed that administering pursed-lips breathing and positional pronation interventions over six hours, consisting of 15-minute pursed-lips breathing sessions and one-hour pronation, significantly improved respiratory function. Specifically, the SpO₂ level increased from 88% to 97%, while the respiratory rate decreased from 36 to 22 breaths per minute.

Keywords: COPD, Ineffective Breathing Patterns, Oxygen Saturation, Prone Positioning, Pursed Lips Breathing, Respiratory Rate

Background

The Urgency of Chronic Obstructive Pulmonary Disease (COPD). Chronic Obstructive Pulmonary Disease (COPD) stands as a critical global health challenge, recognized as a leading cause of chronic morbidity and mortality worldwide. Globally, COPD ranks as the fourth leading cause of morbidity, largely driven by significant airway resistance (Kim et al., 2019). The scale of this problem is particularly acute in developing nations. In Indonesia, the estimated number of people living with COPD is approximately 4.8 million, representing a prevalence rate of (PDPI, 2023). This number is projected to continue its ascent due to the growing population of smokers and persistently poor air quality in many regions, underscoring the pressing need for effective management strategies. Focusing on Ineffective Breathing Pattern, the central clinical issue in COPD patients is an ineffective breathing pattern. This pattern is characterized by airflow obstruction, especially during exhalation, in small airways leading to incomplete exhalation, air trapping, and subsequent lung hyperinflation (Kurniyanti, 2023). Clinically, this manifests as common respiratory distress signs, including coughing, increased sputum production, and most importantly, dyspnea (shortness of breath) and increased respiratory rate (RR).

If this ineffective breathing pattern is not properly managed, it rapidly leads to severe, life-threatening complications. These include hypoxia (low blood oxygen levels) and hypercapnia (excess carbon dioxide due to exhalation difficulty), which can cause confusion, respiratory muscle fatigue, and ultimately, respiratory failure (Agustina & Haryanti, 2023). Addressing this primary symptom is therefore crucial to prevent serious adverse outcomes and improve the quality of life for COPD patients.

Justification for Intervention: Pursed-Lips Breathing (PLB) and Prone Positioning. Management of impaired breathing patterns in COPD encompasses both pharmacological treatments (bronchodilators, oxygen therapy) and non-pharmacological interventions. Among the non-pharmacological methods, this study focuses on two highly effective, simple, and non-invasive nursing techniques: pursed-lips breathing (PLB) and prone positioning.

These two techniques were chosen primarily for their simplicity and feasibility, as they require no assistive devices and can be implemented immediately with minimal instruction. Mechanistically, both PLB (inhaling through the nose and exhaling through pursed lips) and prone positioning (lying on the stomach) work to improve airflow and reduce airway resistance. Prone positioning specifically aids by increasing intra-abdominal pressure, which pushes the diaphragm upward,

effectively reducing air trapping in the lungs (Gelok & Mukin, 2024).

Multiple studies support the efficacy of this combination. Research indicates that the application of PLB and prone positioning significantly improves respiratory rate (RR) and oxygen saturation, enhances peak expiratory flow rate (PEFR), and ultimately allows COPD patients to feel more comfortable while breathing (Yari et al., 2022; Endrian et al., 2019). Given the high prevalence of COPD and the urgency of managing ineffective breathing patterns, these simple, inexpensive, and evidence-based nursing interventions present a vital solution.

Based on the critical need to improve respiratory outcomes and the strong evidence supporting these methods, this study aims to investigate the comprehensive application of these interventions in the context of: "Nursing Care for Patients with Chronic Obstructive Pulmonary Disease (COPD): Ineffective Breathing Pattern with Pursed Lips Breathing and Prone Positioning Interventions."

Method

This study used a descriptive case study design with a pre- and post-test observational approach to evaluate the immediate effects of pursed lips breathing (PLB) and prone positioning on patient respiratory status. The study subject was a single patient (Mrs. U, 71

years old) diagnosed with COPD who met the inclusion criteria (experiencing shortness of breath, age >40 years, and able to follow breathing instructions).

The single-subject design was chosen to provide an in-depth clinical description (in-depth analysis) of the effects of the combined intervention in the acute emergency department (ED) setting. The interventions were conducted sequentially on February 4, 2025, in the emergency department of Gemolong Regional Hospital, Sragen. Objective data collection instruments were pulse oximetry to measure oxygen saturation (SpO₂) and manual observation for respiratory rate (RR). Quantitative data were collected repeatedly three times: before the procedure, after the PLB phase, and after the prone phase, to enhance internal validity.

The intervention procedure begins with a 15-minute PLB in the Semi-Fowler/Fowler position (4-second inspiration, 2-second hold, 4-second expiration through pursed lips), followed immediately by a 1-hour prone position with appropriate pillow support under the head and abdomen. Short-term follow-up is performed immediately after each intervention phase.

Results and Discussion

Results of the Ineffective breathing pattern with pursed lips breathing and prone positions interventions

The assessment of Mrs. U was conducted on February 4, 2025, at the

Emergency Room of Gemolong Sragen

The combined intervention of Pursed Lips Breathing (PLB) and Prone Positioning resulted in a significant improvement in the patient's respiratory status. Prior to the procedure, baseline SpO₂ was 88% and Respiratory Rate (RR) was 36x/min. Following PLB alone, SpO₂ increased to 91% and RR decreased to 25x/min. The most dramatic change occurred after the implementation of Prone Positioning, where SpO₂ peaked at 97% and RR stabilized at 22x/min. Overall, the intervention achieved a 9% increase in SpO₂ and a reduction of 14 breaths/min in RR after the invention.

The substantial improvement in both oxygenation and breathing rate confirms the efficacy of this combined approach for managing acute dyspnea in COPD. The initial phase (PLB) effectively prolonged exhalation and mitigated *air trapping*, leading to a significant 29% reduction in RR. The subsequent Prone Positioning phase was crucial for maximizing oxygen saturation, likely by promoting the recruitment of previously collapsed dorsal lung units and optimizing ventilation-perfusion matching. This synergistic effect restored the patient's oxygenation status from severe hypoxemia (SpO₂ 88%) to a normal range (SpO₂ 97%) and corrected the tachypnea.

Comparison Before and After Performing Pursed lips breathing and prone positions

Table 1.1 Observation of Actions Pursed Lips Breathing and Prone Positions

Action Observati on	Pre Action	Post Interventi on Pursed Lips Breathing	Post Intervention Prone Positions
SpO ₂	88%	91%	97%
RR	36x/min	25x/min	22x/min

Based on Table 1.1 above, it can be concluded that before the procedure, the patient experienced a decrease in oxygen saturation and respiratory rate. After pursed-lip breathing and pronation, the patient's oxygen saturation and respiratory rate improved from 88% to 91% after pursed-lip breathing and 97% after prone positioning. The respiratory rate also decreased from 36 breaths per minute to 25 breaths per minute after pursed-lip breathing and 22 breaths per minute after prone positioning.

In addition to the increase in oxygen saturation and respiratory rate, Mrs. U reported reduced shortness of breath, decreased use of accessory muscles, improved respiratory rate, and decreased expiratory phase prolongation. Vital signs included blood pressure of 120/74 mmHg, pulse of 97 beats per minute, respiratory rate of 22 breaths per minute, and SpO₂ of 97 breaths per minute.

Discussion

Results of the Assessment Before Performing Pursued Lips Breathing and Prone Positions

The results of the study obtained data from Mrs. U, aged 71 years, female, female gender has a higher risk of developing COPD because factors such as smaller airway size, hormonal influences, and exposure to indoor air pollution contribute to an increased risk of COPD in women (Ramadhani et al., 2022).

In terms of age, a patient aged 71 years in a study MacNee, (2016) explained that women have a higher risk of developing COPD due to the natural aging process in the lungs and the accumulation of exposure to risk factors throughout life.

In the observation data, the patient appeared short of breath, there were retained secretions, there was an abnormal breathing pattern (tachypnea) with a respiratory rate of 36x/minute, there were additional breath sounds of rhonchi in the left upper lobe, there was use of accessory respiratory muscles, oxygen saturation was 88x/minute, and the expiratory phase was prolonged.

Low educational background significantly influences COPD through various mechanisms, including limited health knowledge, as well as associations with adverse socioeconomic factors (Adiana & Maha Putra, 2023).

COPD can cause rhonchi caused by thickening of bronchial sounds due to mucus that causes blockage or narrowing of the airways. Accumulation of secretions in the upper airways and coughing in COPD are caused by chronic inflammation of the airways and increased mucus due to irritation, such as from cigarette smoke or pollution. Based on the theory above, there is a match between theory and facts where rhonchi are found in COPD patients due to airway obstruction (Setijaningsih et al., 2019).

Abnormal breathing patterns in COPD patients are caused by smooth muscle spasms that cause narrowing or obstruction of the airway so that breathing becomes inadequate and causes shortness of breath (dyspnea), and the use of accessory respiratory muscles is found, which is caused by increased work of breathing due to airway obstruction, according to research by (Novitasari et al., 2024). Decreased oxygen saturation in COPD is caused by chronic inflammation and excess mucus production, which causes air to be unable to enter or exit smoothly. Meanwhile, the use of accessory respiratory muscles in COPD patients is a sign that COPD patients are experiencing respiratory distress and body compensation to maintain oxygenation; this often indicates that the patient is experiencing a worsening condition or exacerbation and may require immediate treatment.

The results of the assessment showed that the patient did not have allergies, allergies can worsen COPD symptoms and progression, especially if accompanied by dyspnea or allergic inflammatory responses Jin & Sun, (2017). The patient did not take medication; this could affect COPD because without treatment, lung damage will progress more quickly and worsen the quality of life of patients with a history of previous illnesses such as tuberculosis (Sin, 2010).

The patient stated that he had been diagnosed with tuberculosis, which can affect COPD because it can cause lung tissue damage, chronic inflammation, and decreased pulmonary reserve Sheetu Singh et al., (2018). Lab results showed that low hemoglobin can also affect COPD due to decreased oxygen-carrying capacity. Hb is the main carrier of oxygen. If Hb is low (anemia), even though oxygen reaches the tissues, it is still reduced, which can lead to hypoxemia (Imas Saraswati, 2021).

Comparison Before and After Performing Pursued Lips Breathing And Prone Positions

Comparison of the results before and after pursed-lips breathing on Mrs. U with a time of 15 minutes as many as 3 times with a 1-minute break showed an increase in oxygen saturation, namely from 88% to 91%, and a decrease in respiratory rate from 36x/minute to 25x/minute. And for the

prone position, from oxygen saturation 88x/minute to 97x/minute and respiratory rate from 25x/minute to 22x/minute.

This is in accordance with the research of Yari et al., (2022) the effect of pursed-lips breathing and pronation is recommended to be applied to COPD patients. The provision of pursed-lips breathing and pronation has an effect on increasing respiratory frequency, where SPO2 and RR have significant improvements. This is very much in line with research by Endrian et al., (2019) after being given the pursed lips breathing and pronation technique in COPD patients, there is an effect on increasing PEFR and oxygen saturation. The statement is the same as that made by Hariyono et al., (2017) with the results of the study that pursed lips breathing and pronation are easy and inexpensive therapies that are very possible to be done in patients with respiratory system problems.

Conclusion

"PLB and pronation techniques have been shown to be effective in increasing oxygen saturation and reducing respiratory rate in COPD patients and can be recommended as easy-to-implement non-pharmacological nursing interventions."

Suggestion

The results of this case study indicate that the combined non-pharmacological intervention of Pursed Lip Breathing (PLB) and Prone

Positioning is an effective and recommended approach for COPD patients presenting with Ineffective Breathing Patterns in the Emergency Department. This intervention substantially increased Oxygen Saturation (SpO₂) and significantly decreased Respiratory Rate (RR), making it a valuable reference in nursing practice for stabilizing acute respiratory status.

Recommendations for Further Research, to strengthen the validity of these findings and support their implementation as standard clinical procedures, further research is strongly recommended to utilize designs with a higher hierarchy of evidence. Specifically, future research should adopt quasi-experimental (pre-post test with control group) or Purely Experimental (Randomized Controlled Trial) designs to: Testing Causality: Ensuring that improvements in respiratory status are truly due to the combined intervention and not to chance factors or other variables. Determining Comparative Effectiveness: Comparing the effectiveness of a combined intervention (PLB + Pronation) with a single intervention (PLB alone) or standard therapy. Expanding Generalizability: Using a larger sample size to generalize the study results to a broader population of COPD patients.

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