

The Effectiveness of Balloon-Blowing Therapy in Improving Oxygen Saturation in Patients with Chronic Obstructive Pulmonary Disease (COPD): A Case Study

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ABSTRACT

Background & Objective: Chronic Obstructive Pulmonary Disease (COPD) is a progressive lung disease characterized by airflow limitation and impaired gas exchange, which leads to decreased oxygen saturation and dyspnea, requiring effective non-pharmacological nursing interventions to improve pulmonary ventilation. This study aimed to determine the effectiveness of balloon blowing therapy in increasing oxygen saturation in patients with COPD. **Method:** This study employed a case study design involving one COPD patient treated in the Marwah 2 Ward of RS Islam Jakarta Cempaka Putih, with nursing care provided for 3×24 hours, including subjective and objective assessment, determination of nursing diagnoses, planning, implementation of balloon blowing therapy, and evaluation. **Result:** The results showed an improvement in the patient's respiratory condition, as indicated by reduced dyspnea, decreased respiratory rate, and increased oxygen saturation from 90–91% to 95–97% without supplemental oxygen. **Conclusion:** It can be concluded that balloon blowing therapy is an effective non-pharmacological nursing intervention to improve oxygen saturation and respiratory status in patients with COPD. It is recommended that balloon blowing therapy be routinely implemented as part of independent nursing care and considered an alternative non-pharmacological intervention to enhance oxygenation in patients with COPD in healthcare settings.

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Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a condition characterized by airflow limitation that is typically progressive and associated with an abnormal pulmonary inflammatory response to harmful particles or gases, leading to airway narrowing, excessive mucus secretion, and changes in the circulatory system (Brunner & Suddarth, 2010). This condition results in impaired alveolar ventilation, which disrupts gas exchange and leads to hypoxemia, characterized by symptoms such as shortness of breath, decreased oxygen saturation, increased respiratory rate, and the use of accessory breathing muscles—which, if prolonged, can cause fatigue and worsen the patient's condition (Niningsasih & Yuswanatoro, 2025).

COPD is the fourth leading cause of death worldwide, accounting for 3.5 million deaths in 2021. Nearly 90% of COPD-related deaths occur in people under the age of 70 in low- and middle-income countries. In line with the high global burden of COPD, respiratory diseases dominate health issues in Indonesia, with high incidence and mortality rates. Among the diseases with the highest number of cases per 100,000 people, four are respiratory diseases, including COPD with 145 cases and 78,300 deaths, lung cancer with 18 cases and 28,600 deaths, pneumonia with 5,900 cases and 52,500 deaths, and asthma with 504 cases and 27,600 deaths. (Ministry of Health, 2023)

The high incidence and mortality rates due to COPD demonstrate that COPD is a serious health issue characterized by impaired lung function in the form of airway obstruction, leading to reduced alveolar ventilation and resulting in hypoxemia. If left untreated, this can worsen the patient's condition and increase the risk of complications and death; therefore, a comprehensive management approach is required—specifically, nursing care involving nonpharmacological interventions aimed at improving oxygenation, one of which is the implementation of balloon-blowing exercises. Balloon-blowing therapy is considered a simple, safe, and easy-to-implement intervention by nurses and can be performed independently by patients with proper guidance. Additionally, this intervention has the potential to increase oxygen saturation, improve breathing patterns, and reduce shortness of breath, thereby supporting the success of comprehensive nursing care. (Niningsasih & Yuswanatoro, 2025).

Various studies have demonstrated that breathing relaxation exercises using the balloon-blowing technique are an effective intervention for increasing oxygen saturation and reducing shortness of breath symptoms in COPD patients. (Elisa Putri et al., 2025; Niningsasih & Yuswanatoro, 2025). However, based on initial observations in the ward, it was found that in the management of respiratory disorders—such as shortness of breath and rapid breathing without airway hypersecretion—nurses still primarily provide collaborative care without implementing independent nursing interventions. Given this situation, a case study is needed to describe the application of balloon-blowing therapy in clinical nursing practice and to evaluate patients' responses to the intervention provided.

Objective

The purpose of this case study is to determine the effectiveness of balloon blowing therapy in improving oxygen saturation in patients with chronic obstructive pulmonary disease (COPD).

Method

This study employed a descriptive case study design with a pre-post test approach involving a single patient. The study aimed to evaluate changes in oxygen saturation before and after balloon-blowing therapy in a patient with COPD. The study subject was one patient with a medical diagnosis of Chronic Obstructive Pulmonary Disease (COPD) who experienced impaired gas exchange and decreased oxygen saturation. The study was conducted at the inpatient ward of Jakarta Islamic Hospital. Data collection involved direct observation, measurement of oxygen saturation before and after therapy, and documentation of the measurement results in an observation sheet. Data analysis was performed using a descriptive-comparative approach, which involved comparing oxygen saturation values before and after the intervention, and the results were presented in tables and narrative form.

Inclusion criteria:

- a) Patients diagnosed with COPD
- b) Experiencing a decrease in oxygen saturation (<95% without supplemental oxygen or as clinically indicated)
- c) Cooperative and able to follow instructions
- d) Willing to participate (informed consent)

Research Variables

- a) Independent variable: Balloon-blowing therapy
- b) Dependent variable: Oxygen saturation (SpO₂)

Research Instruments

- a) Pulse oximeter: to measure oxygen saturation (SpO₂)
- b) Two balloons
- c) Observation sheet to record measurement results before and after the intervention

Research Procedure

- 1) Measure oxygen saturation (pre-intervention) using a pulse oximeter.
- 2) Position the patient in a semi-sitting position, with the body relaxed
- 3) Hold the balloon with both hands
- 4) Take a deep breath through the nose for 3–4 seconds, hold it for 2–3 seconds, then blow into the balloon as hard as possible for 5–8 seconds
- 5) Seal the balloon with your fingers
- 6) Take another deep breath and exhale fully into the balloon again.
- 7) Repeat this 3 times per exercise set.
- 8) Rest for 1 minute to prevent muscle fatigue.
- 9) Stop the exercise if dizziness or chest pain occurs.
- 10) Measure oxygen saturation again after the intervention (post-intervention).
- 11) Document any changes observed in the patient.

Results

A 71-year-old male patient with a history of Chronic Obstructive Pulmonary Disease (COPD) presented to the emergency department complaining of fever, a productive cough, and shortness of breath that had persisted for three days. The patient has a history of heavy smoking. Physical examination findings indicate a smoking history of approximately 55 years at a rate of approximately 12 cigarettes per day. During the assessment, the patient complained of shortness of breath, dizziness,

and weakness when going to the bathroom; he also experienced labored breathing while lying down and reported a cough without phlegm.

Mr. Z's physical examination revealed tachypnea (28 breaths/minute), use of accessory breathing muscles, blood pressure of 125/80 mmHg, pulse rate of 123 beats/minute, respiratory rate of 28 breaths/minute, and SpO₂ of 90%; both expiratory and inspiratory pressures were decreased. Auscultation of the lungs revealed no abnormal breath sounds. Laboratory tests showed a white blood cell count of $10.36 \times 10^3/\mu\text{L}$ and a platelet count of $56 \times 10^3/\mu\text{L}$. The white blood cell count was at the upper limit of normal, indicating an infectious process. Sputum analysis identified *Klebsiella pneumoniae*, suggesting bacterial pneumonia as the trigger for COPD. In addition, a diagnostic chest ultrasound revealed the following findings: an isohyperechoic lesion with signs of hepatization of the left lung; suggestive opacity in the left lung; no visible pleural effusion; a white area in the left lung; and pneumonia without abnormal fluid accumulation.

The established nursing diagnosis was ineffective breathing pattern related to limited lung expansion. Interventions focused on airway management to improve ventilation, including monitoring breathing patterns, the semi-Fowler's position, administering oxygen as needed, administering bronchodilators, and nonpharmacological therapy in the form of balloon blowing.

Balloon blowing therapy was selected as a nonpharmacological intervention aimed at training the respiratory muscles, improving diaphragmatic and intercostal muscle function, and helping to improve alveolar ventilation. The therapy was administered for three consecutive days. The patient was instructed to inhale through the nose for 2–4 seconds, hold their breath for 2–3 seconds, and then exhale as fully as possible into a balloon for 5–8 seconds until the balloon inflated. The procedure was repeated up to three times per set with a one-minute rest period to prevent respiratory muscle fatigue. Family members were involved in providing support and helping to remind the patient during the intervention.

On the first day of the intervention, the patient still complained of worsening shortness of breath during light activities such as walking to the bathroom. Examination findings included a respiratory rate of 28 breaths per minute, oxygen saturation of 91% without supplemental oxygen, rapid breathing, use of accessory breathing muscles, and prolonged inspiratory and expiratory phases. Following the therapy, oxygen saturation improved to 93%, although the exercise was temporarily paused for 1 minute because the patient experienced a coughing episode. On the second day, the patient reported reduced shortness of breath; respiratory rate was 24 breaths per minute; the breathing pattern appeared to have improved; and both the inspiratory and expiratory phases had improved. Oxygen saturation increased from 93% to 95%. The patient was able to complete the exercises without difficulty. On the third day, the patient reported no longer experiencing shortness of breath. Respiratory rate improved to 22 breaths per minute, the breathing pattern became more stable, the inspiratory and expiratory phases improved, and oxygen saturation increased from 95% to 97% following the therapy. The patient was able to complete the exercise without any complaints. Based on these data, the nursing issue of ineffective breathing pattern was resolved.

The intervention in this case study focused on increasing oxygen saturation. The results of the intervention, conducted over 3x24 hours, showed that the patient's condition improved. Oxygen saturation increased from 90% to 97% by the third day.

This improvement was also reflected in the respiratory rate, which was 2 breaths per minute on the first day and increased to 22 breaths per minute by the third day.

TABLE 1. Oxygen Saturation During the Intervention

No	Measurement Time	Results	
		Spo2	RR
1.	Day 1	Pre-implementation	27breaths/minute
		Post-implementation	
2.	Day 2	Pre-implementation	24breaths/minute
		Post-implementation	
3.	Day 3	Pre-implementation	22breaths/minute
		Post-implementation	

Discussion

Mr. Z, a 71-year-old man with a history of COPD dating back to 2019 and a history of heavy smoking for 10 years (he quit in 2019), has a Brinkman index of 660 and is classified as high-risk. He is currently medically diagnosed with Chronic Obstructive Pulmonary Disease (COPD). Smoking is one of the risk factors that cause COPD, whether active or passive (LeMone et al., 2014). A study conducted by Ekaputri (2023) states that the majority of COPD patients are elderly men (52.10%) and that the condition is closely linked to a history of smoking. Physiologically, the aging process causes a decrease in lung elasticity, vital capacity, and ventilatory efficiency, thereby accelerating the onset of respiratory disorders, especially when accompanied by long-term exposure to cigarette smoke and pollution.

During the assessment, Mr. Z complained of shortness of breath that worsened when walking to the bathroom and while lying down; he also reported a cough but no sputum. Objective findings revealed rapid and shallow breathing (RR 28 breaths/minute) accompanied by the use of accessory breathing muscles. SpO₂: 90%; both exhalation and inhalation were diminished; no additional sounds were heard on auscultation. This is consistent with Gold's 2025 study, which found that in COPD patients, coughing is not always accompanied by sputum, particularly in patients with predominant lung parenchymal damage and narrowing of the small airways due to chronic inflammation. This is evidenced by isoechoic lesions with signs of hepatization and opacity in the left lung; this condition indicates that the lung has lost its elasticity and is filled with inflammatory tissue, preventing it from expanding properly. This leads to a reduction in alveoli, resulting in decreased alveolar ventilation and causing the patient to experience shortness of breath and a drop in oxygen levels (LeMone et al., 2014).

Based on these findings, the nursing diagnosis was established as ineffective breathing pattern related to impaired breathing effort due to respiratory muscle weakness and activity intolerance related to an imbalance between oxygen supply and demand. The diagnosis used by the researcher differs from several COPD studies that emphasize ineffective airway clearance due to hypersecretion (Alfi Alwi et al., 2025) because, in Mr. Z's case, no sputum or additional breath sounds were found.

Nursing interventions serve as a benchmark for providing safe, ethical, and effective nursing care (Wardani et al., 2023). The interventions focused on airway

management. The novelty of this case lies in the application of balloon-blowing therapy as part of airway management for COPD patients without hypersecretion. This therapy was selected because it aims to train the respiratory muscles, improve diaphragmatic and intercostal muscle function, and enhance alveolar ventilation, making it more appropriate for the patient's clinical issues. The intervention was administered for 3×24 hours.

After 3×24 hours of balloon blowing therapy, an improvement in respiratory status was observed, characterized by a reduction in shortness of breath, a decrease in respiratory rate from 28 breaths/minute to 22 breaths/minute on the third day, and an increase in oxygen saturation from 90% to 97% without supplemental oxygen. This is consistent with the study by Elisa Putri et al. (2025), which demonstrated that balloon blowing effectively increases oxygen saturation regardless of the presence of secretions in the airways. However, this contrasts with the study by Tunik & Ningsih Rahayu (2020), which, although showing a reduction in shortness of breath and coughing, noted that patients still exhibited signs and respiratory disturbances such as a respiratory rate that had not yet normalized and the continued presence of wheezing sounds.

This case study demonstrates that the application of balloon blowing therapy as a nonpharmacological intervention provides clinical improvement in COPD patients without hypersecretion, characterized by reduced shortness of breath, improved breathing patterns, and increased oxygen saturation without the need for supplemental oxygen. These findings confirm that interventions focused on improving ventilation and respiratory muscle function can be an appropriate approach for COPD patients. This case study has a limitation in that it involved only one patient; therefore, the results cannot be generalized to all COPD patients. Further research with a larger sample size and a stronger study design is needed to strengthen the scientific evidence regarding the effectiveness of balloon-blowing therapy in COPD patients.

Conclusion

The COPD patient in this case study presented with an primary nursing problem characterized by ineffective breathing patterns, as evidenced by shortness of breath, increased respiratory rate, use of accessory breathing muscles, and decreased oxygen saturation. Appropriate nursing care was provided through airway management and a nonpharmacological intervention known as balloon-blowing therapy. Balloon blowing therapy is a simple, safe, and easy-to-administer intervention for nurses. Furthermore, this therapy can help reduce patients' dependence on oxygen therapy and lower the risk of respiratory complications, making it a potential addition to nursing practice as part of airway management for COPD patients. This therapy has been shown to play a role in improving breathing patterns and enhancing patients' oxygenation. The evaluation results showed a reduction in shortness of breath complaints, improvements in respiratory rate and depth, and an increase in oxygen saturation without supplemental oxygen. These findings indicate that balloon blowing therapy has the potential to become part of respiratory nursing Standard Operating Procedures (SOPs), particularly for COPD patients with the nursing diagnosis of ineffective breathing pattern without hypersecretion.

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