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Application of Progressive Muscle Relaxation Therapy to Ineffective Breathing Patterns in Patients with Acute Pulmonary Edema: a case study

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ABSTRACT

Background: Acute pulmonary edema is an emergency condition that requires immediate treatment because it can be fatal and even lead to death due to disruption of gas exchange in the alveoli (Hayat, 2021). The prevalence of acute pulmonary edema in Indonesia is recorded at around 14% of 100,000 people/year, with a mortality rate of 40% for patients who do not seek prompt treatment (Hariyanto, 2020). **Objective**: To analyze the application of progressive muscle relaxation therapy to ineffective breathing patterns in patients with acute pulmonary edema. **Methods**: This study used a descriptive research design with a case study approach in one patient with acute pulmonary edema. **Results**: From the implementation results carried out for 3 days starting from Tuesday, December 23, 2025 to Thursday, December 25, 2025. After being given progressive muscle relaxation therapy, the shortness of breath experienced by the client decreased, the client's respiratory rate improved and the patient's oxygen saturation also improved so that the nursing problem of ineffective breathing patterns was said to be resolved. **Conclusion**: After implementing progressive muscle relaxation therapy for 3 days, the final result was that the ineffective breathing pattern was resolved, meaning that the provision of progressive muscle relaxation therapy was effective in reducing shortness of breath in patients.

Keywords: Acute Pulmonary Edema; Progressive Muscle Relaxation Therapy; Ineffective Breathing Patter

Introduction

Acute pulmonary edema is a condition in which fluid accumulates in the interstitial and alveolar spaces of the lungs due to increased capillary hydrostatic pressure and decreased colloid osmotic pressure, as well as damage to the capillary walls, which causes capillary leakage in the interstitial space (Wardhani, 2025). If this condition occurs for a long time, it can impact gas exchange disorders, causing increased respiratory rate and cyanosis due to lack of oxygen (Jufan et al, 2020). Acute pulmonary edema is a health problem that occurs in the respiratory system due to the shift of fluid from the pulmonary vasculature to the interstitial and alveolar spaces, causing excessive fluid accumulation in the interstitial and alveolar spaces of the lungs (Ariyani & Suparmanto, 2020).

According to the World Health Organization (WHO), in 2022, there were approximately 74.4 million people suffering from acute pulmonary edema worldwide. In the UK, approximately 2.1 million people were recorded as suffering from acute pulmonary edema and in the United States, an

estimated 5.5 million people suffered from acute pulmonary edema (WHO, 2022). Meanwhile, the prevalence of acute pulmonary edema in Indonesia was recorded at around 14% of 100,000 people/year with a mortality rate of 40% for patients who did not seek prompt treatment (Hariyanto, 2020). Based on initial data collection in the Melinjo Treatment Room of K.H. Hayyung Regional Hospital, the number of patients suffering from acute pulmonary edema in 2025 was 45 patients, where the most common complaints in acute pulmonary edema patients were shortness of breath accompanied by chest pain (K.H.Hayyung Regional Hospital, 2025).

Shortness of breath occurs due to bronchial obstruction and bronchospasm, but hyperinflammation is more likely to contribute to shortness of breath. Shortness of breath is a common symptom in patients with lung disease, which can limit physical activity and cause fatigue (Wangson et al, 2020). Common symptoms experienced by lung patients include shortness of breath, coughing, sore throat, chest pain, cold sweats, and restlessness. Shortness of breath is a common symptom in patients with respiratory disorders. Shortness of breath can lead to oxygen deprivation, respiratory failure, and fatigue, which can lead to decreased quality of life, decreased consciousness, and even death (Ministry of Health, 2023).

The causes of acute pulmonary edema are divided into two categories: cardiogenic pulmonary edema and non-cardiogenic pulmonary edema. Cardiogenic pulmonary edema is caused by disorders of the cardiovascular system, particularly the heart, leading to problems such as coronary artery disease, cardiomyopathy, heart valve disorders, and hypertension. Non-cardiogenic pulmonary edema, on the other hand, occurs not due to heart abnormalities but rather to problems with the lungs themselves. Non-cardiogenic pulmonary edema can also occur due to lung infections such as pulmonary embolism, smoke inhalation, and pulmonary infarction. Therefore, immediate treatment is necessary to prevent complications such as atelectasis, emphysema, lung abscess, systemic infection, endocarditis, and even death (Huldani, 2020).

One non-pharmacological therapy that can be performed to reduce shortness of breath in patients with acute pulmonary edema is progressive muscle relaxation techniques, which are a type of non-pharmacological therapy that aims to reduce muscle tension, reduce stress, activate the sympathetic nervous system, and reduce shortness of breath in patients with acute pulmonary edema (Sriwahyuni, 2021). Progressive muscle relaxation therapy is a non-pharmacological technique that is easy to perform, especially can be done independently by clients to help reduce shortness of breath experienced by patients with acute pulmonary edema, namely by progressive muscle relaxation therapy which is intended to provide a sense of comfort and help reduce complaints of shortness of breath (Silaban et al, 2024).. Progressive muscle relaxation therapy is a type of therapy that can be given to patients with respiratory disorders because it can stimulate the movement of respiratory muscles to improve the respiratory tract and reduce shortness of breath in patients (Nese & Baglama, 2022).

Research by Silaban et al., 2024, found that the provision of progressive muscle relaxation

therapy has an effect on reducing the response of shortness of breath in patients with lung disease, so that the provision of progressive muscle relaxation therapy can be recommended to patients or their families to carry out this non-pharmacological action and can be implemented at home so that the patient's quality of life improves (Silaban dkk., 2024). Other research that has been conducted related to rehabilitation therapy with progressive muscle relaxation techniques is considered effective in increasing the percentage of oxygen saturation so that it can reduce shortness of breath in patients with pulmonary edema with the title "Progressive Muscle Relaxation (PMR) Enhances Oxygen Saturation in Patients of Coronary Hearth Disease" states that patients after being given progressive muscle relaxation experienced an increase in oxygen saturation thereby reducing complaints of shortness of breath in patients with pulmonary edema (Cahyati et al, 2020).

Another finding obtained by Nese & Baglama (2022) entitled "The Effect of Progressive Muscle Relaxation and Deep Breathing Exercises on Dyspnea and Fatigue Symptoms of COPD Patients" states that within the scope of pulmonary rehabilitation programs, one method that can be implemented by nurses for COPD patient symptom management and can be easily used by patients at home is progressive muscle relaxation exercises. Progressive muscle relaxation exercises in COPD patients have been shown to positively affect oxygen saturation and heart rate and are effective in managing symptoms such as shortness of breath and fatigue (Nese & Baglama, 2022). Another study conducted by Herawati and Hapsari (2021) in bronchitis patients found that progressive muscle relaxation exercises were effective in reducing shortness of breath (Herawati & Hapsari, 2021).

Based on the results of initial data collection conducted on 1 patient with acute pulmonary edema in the Melinjo Treatment Room, K.H. Hayyung Regional Hospital, Selayar Islands Regency, the researcher is interested in conducting research related to "The Application of Progressive Muscle Relaxation Therapy to Ineffective Breathing Patterns of Acute Pulmonary Edema Patients in the Melinjo Treatment Room, K.H. Hayyung Regional Hospital, Selayar".

Case Illustration

Patient Description : The patient with the initials Mrs. T, 58 years old, female, was born on December 10, 1967, lives on Jl. Sultan Hasanuddin Selayar. The patient is Muslim and works as a housewife. Mrs. T complained of shortness of breath since 1 week ago accompanied by chest pain and vomiting. During the assessment, the client complained of shortness of breath. The patient was given oxygen at 4 lpm, had a rapid breathing pattern, a prolonged expiratory phase, and additional rhonchi were heard in the left upper lobe of the lung field. The results of the vital signs examination showed a blood pressure of 118/78 mmHg, a pulse of 78x/i, a body temperature of 36.3 degrees Celsius, a respiratory rate of 24x/i, and an oxygen saturation of 95%.

Table 1. Patient Characteristics

Name	Mrs. T
Age	58 years
Gender	Female
Medical Diagnosis	Acute Pulmonary Edema

Nursing Diagnosis	Ineffective Breathing Pattern related to respiratory effort obstruction (SDKI 2017)
Condition saat ini	Vital signs 118/78 mmHg Pulse rate: 78 beats/minute Respiratory rate: 24x/minute Temperature: 36.3°C
Current health history	Mrs. T complained of shortness of breath since 1 week ago accompanied by chest pain and vomiting. During the assessment, the client complained of shortness of breath.

Steps for Observation and Determination of Nursing Care

1. Preparation Stage

Prior to data collection, the researcher obtained ethical approval from the institution, namely STIKES Panrita Husada Bulukumba, as evidenced by the Health Research Ethics Committee approval letter Number: 000489/KEP Stikes Panrita Husada Bulukumba/2026. After obtaining ethical approval, the researcher approached the client and his family to explain the purpose, benefits, and procedures of the study. Next, written consent was obtained from the client and his family as a form of willingness to participate in the study. Thus, the entire research process was carried out in accordance with the principles of research ethics, namely respecting autonomy, maintaining confidentiality, and ensuring the safety of respondents.

2. Determination of Nursing Care

Based on the assessment results, a priority nursing diagnosis was determined based on the Indonesian Nursing Diagnosis Standards: Ineffective Breathing Pattern related to respiratory effort. This diagnosis was established based on data indicating the patient's condition, including shortness of breath, a prolonged expiratory phase, a rapid breathing pattern (RR: 24/min), and additional rales in the left upper lung field. The nursing care plan was developed based on the Indonesian Nursing Intervention Standards, focusing on reducing the patient's shortness of breath, improving respiratory rate, and improving oxygen saturation. The selected intervention was progressive muscle relaxation therapy as a non-pharmacological measure to help reduce shortness of breath. Progressive muscle relaxation therapy was chosen based on its ease of care, ability to be implemented independently by the patient and family, and its significant potential for reducing shortness of breath.

3. Nursing Implementation

Nursing actions are implemented according to the established plan. Before interventions are administered, the nurse revalidates the patient's condition to ensure they align with the client's actual needs. Implementation includes gradually administering progressive muscle relaxation therapy to the patient. All nursing actions are systematically documented to monitor the client's condition and the effectiveness of the interventions.

Progressive muscle relaxation therapy begins with identifying a quiet, comfortable location and arranging the environment to avoid distractions during therapy. The client is then encouraged to wear comfortable, loose-fitting clothing and to lean back in a chair or other comfortable position. During the procedure, the patient is encouraged to breathe deeply and slowly, relax the jaw muscles, and tense

the muscles for 5–10 seconds, then relax them for 20–30 seconds, repeating 8–16 times. For leg muscles, this is recommended to be held for no more than 5 seconds to avoid cramps. The patient is also instructed to focus on the sensation of tensing and relaxing the muscles. Throughout the process, regular monitoring is performed to ensure the muscles are relaxed and to observe any indicators of relaxation. After therapy is completed, the relaxation session is gradually stopped, and the patient is given the opportunity to express their feelings about the therapy and is encouraged to practice independently between regular sessions with a nurse.

Observation result

The results of this study describe the implementation of nursing care for Mrs. T (58 years old) with a medical diagnosis of acute pulmonary edema with nursing problems of ineffective breathing patterns. Nursing care was carried out for 3 consecutive days, starting on December 23, 2025 to December 25, 2025, through several stages of providing nursing care starting from assessment, formulation of nursing problems, planning of nursing actions, continued with the provision of nursing implementation and ending with the evaluation stage of the nursing actions that have been given and arranged sequentially.

Day 1 : Tuesday, December 23, 2025 (08:00-14:00 WITA). On the first day, the initial assessment was conducted at 09:30 WITA. The results of the subjective data assessment showed that Mrs. T complained of shortness of breath since one week ago. The results of the objective data assessment obtained, blood pressure 120/85 mmHg, N: 85x / i, S: 36.5 degrees and respiratory rate 24x / i, the client was attached to oxygen 4 lpm, rapid breathing pattern, prolonged expiratory phase, oxygen saturation 95%, on the results of lung auscultation additional breath sounds were heard rhonchi in the left lung field of the upper lobe. Based on the subjective data and objective data, a nursing diagnosis of ineffective breathing patterns related to respiratory effort obstruction can be established (PPNI, 2017). The nursing intervention provided was progressive muscle relaxation therapy with the aim of reducing the client's shortness of breath (PPNI, 2018). Implementation was carried out at 11:30 WITA, starting with monitoring the client's respiratory rate and positioning the client in the Fowler's position. Then continued with progressive muscle relaxation therapy. During the implementation of therapy, the client was able to follow all instructions given. After the procedure, the client still complained of shortness of breath but the respiratory rate decreased (RR: 23x/i), the expiratory phase was still prolonged, oxygen saturation was 96%, on lung auscultation results, additional breath sounds of rhonchi were still heard in the left upper lobe lung field. Evaluation on the first day showed that the ineffective breathing pattern had not been resolved, so implementation was continued the next day.

Day 2: Wednesday, December 24, 2025 (2:00 PM - 8:30 PM WITA). On the second day, a re-assessment was conducted at 2:00 PM WITA, the client stated that his shortness of breath had decreased. The examination results found objective data, blood pressure 110/80 mmHg, pulse 79x/i, temperature 36.5 degrees, respiratory rate 23x/i, and oxygen saturation 96%. The client had a nasal

cannula installed at 4 lpm. On lung auscultation, additional breath sounds of rhonchi were still heard but the intensity of the sound began to decrease. The nursing problem of ineffective breathing patterns had not been resolved. The implementation of progressive muscle relaxation therapy was carried out again at 2:10 PM WITA, the client was positioned in the Fowler's position followed by the administration of progressive muscle relaxation therapy. After the procedure, the client still complained of shortness of breath but the respiratory rate decreased (RR: 22x/i), the expiratory phase was still prolonged, oxygen saturation was 97%, and additional rhonchi were still heard in the left upper lobe of the lung auscultation. Evaluation on the second day showed that the ineffective breathing pattern had not been resolved, so implementation was continued the following day.

Day 3: Thursday, December 25, 2025 (08:00-14:00 WITA). On the third day, a re-assessment was conducted at 09:00 WITA, the client stated that she was still a little short of breath. The examination results found objective data, blood pressure 115/85 mmHg, pulse 84x/i, temperature 36.5 degrees, respiratory rate 22x/i, oxygen saturation 98%, the client was no longer connected to oxygen. On lung auscultation, additional breath sounds of rhonchi were still heard but the intensity of the sound was faint. The nursing problem of ineffective breathing patterns was still maintained. The implementation of progressive muscle relaxation therapy was carried out again at 09:30 WITA. After the procedure, the client stated that she felt relaxed and no longer felt short of breath (RR: 20x/i). The evaluation showed that the ineffective breathing pattern had improved, marked by the absence of shortness of breath, improved breathing pattern, the expiratory and inspiratory phases were of equal length, increased oxygen saturation and reduced additional breath sounds. This indicates that progressive muscle relaxation therapy has an effect on reducing shortness of breath in Mrs. T with nursing problems of ineffective breathing patterns.

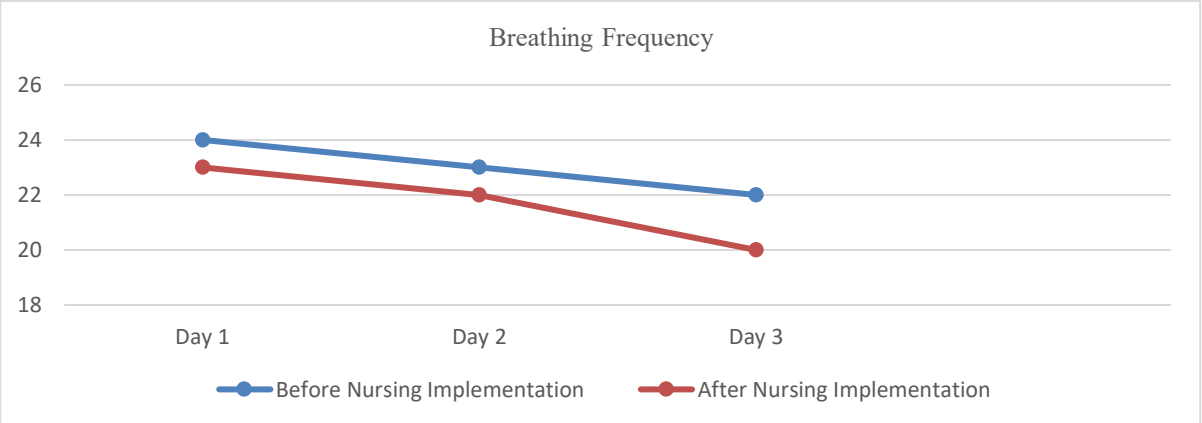

Figure 1. Changes in respiratory rate after administration of progressive muscle relaxation therapy

Discussion

The study results showed that three days of nursing intervention had a positive impact on reducing patients' shortness of breath. This reduction occurred gradually, indicating a physiological response to the intervention. After the implementation of progressive muscle relaxation therapy nursing for 3 days, starting from December 23, 2025, to December 25, 2025, the final evaluation

results showed that the client's shortness of breath had been resolved. The results of this study indicate that progressive muscle relaxation therapy can reduce the degree of shortness of breath in patients with acute pulmonary edema with nursing problems of ineffective breathing patterns. This finding is supported by research conducted by Affandi (2021), by comparing two groups, namely the intervention and control groups. The results showed that after being given progressive muscle relaxation, all respondents in the intervention group experienced improvement in shortness of breath symptoms to a mild level, while the control group still experienced recurrence of shortness of breath in the severe category. This finding strengthens the assumption that progressive muscle relaxation therapy can reduce the severity and frequency of shortness of breath recurrence if applied consistently (Affandi, 2021).

Acute pulmonary edema is a condition characterized by the sudden accumulation of fluid in the interstitial space and alveoli of the lungs (Amadita dkk., 2021). Patients with COPD, particularly those with acute pulmonary edema, generally complain of shortness of breath and fatigue (Wangson et al., 2020). Therefore, the shortness of breath experienced by sufferers requires special attention. One form of treatment for shortness of breath recommended by GOLD in 2023 is health education, self-management, and pulmonary rehabilitation (GOLD, 2023). Pulmonary rehabilitation commonly used to address symptoms of shortness of breath includes deep breathing exercises and progressive muscle relaxation (Silaban et al., 2024).

According to Tousaint & Nguyen (2021), progressive muscle relaxation therapy is a form of intervention that utilizes techniques that utilize the principles of "top-down" and "bottom-up" neuronal processing to achieve results. Top-down processing in the nervous system, such as the cerebral cortex and small muscles, contracts the muscles and gradually releases body tension, generating proprioception from peripheral muscles that ascends to the brain via the spinal cord and brainstem (Tousaint & Nguyen, 2021). Progressive muscle relaxation therapy can be administered by a nurse or performed independently, with the patient in the Fowler's position or lying down, and requires no special equipment. Through its implementation, progressive muscle relaxation therapy has been shown to reduce muscle tension, heart rate, and respiratory rate, as well as increase ventilation and oxygenation, thus having a positive effect on reducing symptoms of shortness of breath (Ajul et al., 2020).

The results of this study are in line with research conducted by Sugiyono et al., 2023 entitled "The Effect of Progressive Muscle Relaxation Therapy on the Degree of Shortness of Breath in Tuberculosis Patients at Jember Lung Hospital", which showed that the average degree of shortness of breath in tuberculosis patients at Jember Lung Hospital decreased after being given progressive muscle relaxation therapy. The results of the study showed that there was a significant difference in the degree of shortness of breath before and after being given progressive muscle relaxation therapy intervention (p-value: 0.000). This indicates that progressive muscle relaxation therapy has an effect on reducing the degree of shortness of breath (Sugiyono et al., 2023).

According to research conducted by Ambarwati & Supriyanti (2020), it was also confirmed that this progressive muscle relaxation technique works through the activity of the parasympathetic nervous system which can provide a calming effect, can lower blood pressure, reduce anxiety and psychological stressors and can reduce breathing frequency (Ambarwati & Supriyanti, 2020).

Conclusion

Based on the research results and discussion presented above, it can be concluded that progressive muscle relaxation therapy has a positive impact on improving ineffective breathing patterns in patients with acute pulmonary edema. Improvement occurred gradually over three days of nursing intervention. On the first day, no significant changes were observed, while on the second day, shortness of breath began to decrease, respiratory rate improved, and oxygen saturation increased. On the third day, the patient showed optimal improvement, indicated by the disappearance of shortness of breath, a normal respiratory rate, reduced adventitious breath sounds, and oxygen saturation within the normal range.

These results indicate that progressive muscle relaxation therapy is an effective non-pharmacological intervention in helping to reduce shortness of breath. Therefore, this intervention can be recommended as part of nursing care for patients with acute pulmonary edema with ineffective breathing patterns, especially if implemented routinely if shortness of breath recurs.

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