International Journal of Health Science (IJHS)

E-ISSN: 2827-9603
P-ISSN: 2827-9603

Research Article

The Application of Oxygen Theraphy in Patiens with Mild Head Injuries to Improve Oxygen Saturation in Cases of Ineffective Breathing Patterns at the Emergency Departement of Pelamonia Hospital Makassar

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Abstract: Background: Head injury is a global health issue with an increasing prevalence, primarily due to traffic accidents. This condition has the potential to cause hemodynamic disturbances, decreased oxygen saturation, and impaired cerebral perfusion, all of which impact patient clinical outcomes. In cases of mild head injury, decreased oxygenation can worsen neurological status and slow the recovery process. Oxygen therapy is a primary intervention in emergency care to maintain adequate oxygenation and prevent cerebral tissue hypoxia. **Objective:** To apply oxygen therapy to patients with mild head injuries to improve oxygen saturation in cases of ineffective breathing patterns. **Methods:** A case study was conducted through comprehensive nursing care, encompassing assessment, diagnosis, planning, implementation, and evaluation, using data collection techniques such as interviews, observations, physical examinations, and documentation. A literature review was conducted by reviewing relevant scientific literature. **Results:** The application of oxygen therapy demonstrated improved oxygen saturation, improved breathing patterns, hemodynamic stability, and increased patient consciousness. **Conclusion:** Oxygen therapy is effective as a nursing intervention in improving oxygenation status and clinical condition in patients with mild head injury and ineffective breathing patterns.

Keywords: Emergency Nursing Care, Head Injury, Oxygen Therapy, Oxygen Saturation, Ineffective Breathing Pattern

1. Introduction

As population mobility increases, the incidence of head injuries continues to rise. Accidents or impacts are the primary causes of head injuries (Maruli et al., 2025). Head injury is a traumatic condition that can cause brain damage leading to disability and various physical, intellectual, and social problems. Additionally, this condition has significant impacts on emotional, psychosocial, and economic aspects, as many emergency patients require long-term care. One of the primary factors causing head injuries is traffic accidents (Thalib et al., 2025). Traffic accidents are a major contributor to the high prevalence of head injuries. The increasing number of individuals sustaining head injuries has led to a rise in Deaths from head injuries continue to rise every year. One factor contributing to this increase is the number of individuals sustaining head injuries (Salasati et al., 2024)

Head injuries remain prevalent worldwide. Data from the World Health Organization (WHO) indicates that traffic accidents account for approximately 96 million cases of head injury occur worldwide each year, with the highest number of cases occurring in developing countries such as Indonesia (Kurniawan et al., 2023). More than two-thirds of countries worldwide experience head injuries, which constitute a significant public health problem. National data indicate that the incidence of head injuries in Indonesia reaches 500,000 cases. Of this total, 10% of patients die before reaching the hospital, 80% are classified as having mild head injuries, 10% fall into the moderate head injury category, and 10% are classified as having severe head injuries. In Indonesia, head injuries are one of the leading causes of death in traffic accidents. According to the Basic Health Research Survey, the prevalence of head

Received: November 14, 2025
Revised: January 02 2026
Accepted: March 13, 2026
Online Available: May 06, 2026
Curr. Ver.: May 06, 2026

injuries was recorded at 11,046 cases in 2018, with the highest prevalence found in South Sulawesi at 12.8%, while the distribution of head injury cases in Makassar City reached 12.78% (South Sulawesi Province Basic Health Research Survey, 2018).

Head injuries are classified into three categories: mild, moderate, and severe. Signs and symptoms of head injury include decreased level of consciousness, dizziness or severe headache, nausea and vomiting, memory impairment that may occur depending on the severity of the injury, and other symptoms. Severe head injury (SHI) is characterized by a GCS (Glasgow Coma Scale) score of ≤8; moderate head injury (MHI) has a GCS score of 9–12 with changes in mental status lasting from 30 minutes to 6 hours; while mild head injury (MHI) is characterized by a GCS score of 13–15 (Sianapar et al., 2025)

Although mild head injuries are less severe than moderate and severe injuries, they can still lead to serious complications, particularly if oxygenation decreases (Putra & Sari, 2023). A decrease in oxygen saturation can lead to hypoxia, which affects cerebral tissue perfusion and worsens the patient's neurological condition (Ferenddito & Rohmah, 2025). Therefore, monitoring oxygen saturation is crucial in the management of patients with head injuries to prevent further complications.

Oxygen therapy is one of the primary interventions in the management of patients with head injuries, as it plays a role in increasing oxygen supply to brain tissue and maintaining vital organ function (Dyanel & Manda, 2024). Adequate oxygen administration has been shown to improve patients' clinical condition and prevent secondary brain damage (Salasati & Afni, 2024).

2. Materials and Methods

This study employed a case study design using a comprehensive nursing care approach for a patient with a mild head injury who exhibited ineffective breathing patterns at the Emergency Department of Pelamonia Hospital Level II in Makassar. This approach was chosen to provide an in-depth understanding of the application of oxygen therapy in clinical practice and its impact on improving the patient's oxygen saturation. The subject of this study was one patient with a medical diagnosis of mild head injury, characterized by a Glasgow Coma Scale (GCS) score in the range of 13–15, and experiencing oxygenation impairment indicated by decreased oxygen saturation and ineffective breathing patterns. Subject selection was conducted using purposive sampling based on these criteria to align with the study's objectives.

Materials used in this study included oxygenation devices such as a nasal cannula or oxygen mask as needed by the patient, medical oxygen as the primary therapy, and monitoring devices such as a pulse oximeter to measure oxygen saturation, a sphygmomanometer to monitor blood pressure, and a stethoscope to examine the respiratory system. In addition, a nursing care plan was used as a tool for recording patient data.

Data collection was conducted using several techniques, including interviews with patients and their families to obtain subjective data, direct observation of the patient's condition to assess clinical responses, and a comprehensive physical examination encompassing inspection, palpation, auscultation, and percussion. Data was also obtained from the patient's medical records regarding clinical conditions and interventions administered. In addition, a literature review was conducted by examining various relevant scientific literature to support the analysis and discussion of the research.

The research procedure was conducted through the stages of the nursing process, which included an initial assessment of the patient's condition, the establishment of a nursing diagnosis—namely, ineffective breathing pattern—the development of a nursing care plan focused on the administration of oxygen therapy, the implementation of interventions according to the established plan, and an evaluation of the patient's response following the interventions. The evaluation was conducted by comparing the patient's condition before and after the administration of oxygen therapy, particularly regarding oxygen saturation levels, breathing patterns, hemodynamic status, and level of consciousness. The data obtained were analyzed descriptively by comparing changes in the patient's clinical condition before and after the intervention. The results of the analysis were then presented in narrative form to describe the effectiveness of oxygen therapy in improving oxygen saturation in patients with mild head injuries.

3. Results and Discussion

The study results indicate that patients with mild head injuries who exhibit ineffective breathing patterns experience significant changes in their clinical condition following oxygen therapy. At the initial assessment, patients exhibited signs of impaired oxygenation, characterized by oxygen saturation levels below the normal range, an irregularly increased respiratory rate, and signs of respiratory distress such as the use of accessory breathing muscles. Additionally, the patients' hemodynamic status was not yet fully stable, which could impact tissue perfusion, particularly in the brain (Budi & Rahayu, 2024).

This study demonstrates that following the implementation of nursing care involving the administration of adequate oxygen therapy, there was a gradual increase in oxygen saturation until it reached the normal range. This improvement was accompanied by a more regular breathing pattern, a return of respiratory rate to near-physiological levels, and a reduction in signs of respiratory distress (Ferenddito & Rohmah, 2025). Additionally, the patient's hemodynamic status showed greater stability, characterized by improved blood pressure and a more controlled pulse rate. The patient's level of consciousness also improved, indicating enhanced cerebral perfusion (Lestari et al., 2025).

Physiologically, oxygen therapy plays a role in increasing the partial pressure of oxygen in arterial blood, thereby improving the diffusion of oxygen to body tissues, including the brain. In patients with head injuries, the brain is an organ that is highly sensitive to oxygen deprivation. A decrease in oxygen supply can lead to hypoxia, which triggers secondary damage to brain tissue (Budi & Rahayu, 2024). Therefore, increasing oxygen saturation through oxygen therapy is a critical factor in preventing the worsening of neurological conditions.

Furthermore, the results of this study also indicate that improved oxygenation status is directly associated with enhanced neurological function in patients. This is evidenced by an increase in patients' level of consciousness following the administration of therapy. This finding aligns with the theory that adequate oxygenation significantly influences cerebral tissue perfusion and central nervous system function (Ferenddito & Rohmah, 2025). These findings are supported by previous research indicating that the appropriate administration of oxygen therapy can increase oxygen saturation and improve the clinical condition of patients with head injuries (Widodo, 2024). Oxygen therapy not only plays a role in improving blood oxygen levels, but also helps stabilize hemodynamic conditions and prevent further complications resulting from hypoxia. Thus, the application of oxygen therapy can be used as one of the primary interventions in the management of patients with mild head injuries in the emergency department who have ineffective breathing patterns, particularly in increasing oxygen saturation, improving breathing patterns, and enhancing the patient's overall neurological condition (Rahayu, 2025).

4. Comparison

Based on the results of nursing care provided to a patient with a mild head injury and ineffective breathing patterns on January 12, 2026, at At 6:00 a.m. WITA, prior to receiving oxygen therapy, the patient's condition indicated significant oxygenation impairment. This was marked by an oxygen saturation level of 88%, which was below the normal range, indicating hypoxemia. The patient's breathing pattern appeared ineffective, characterized by an increased respiratory rate of 32 breaths per minute but irregular, along with the use of accessory breathing muscles, indicating the body's compensatory effort against oxygen deficiency. Additionally, the patient exhibits signs of impaired consciousness with a GCS score of 13, indicating an apathetic level of consciousness, which is associated with insufficient oxygen supply to brain tissue. Hemodynamic conditions at this stage tend to be unstable, potentially worsening tissue perfusion (Putra & Sari, 2023).

Following the administration of oxygen therapy, there was a significant improvement in the patient's condition. The oxygen saturation level gradually increased until it reached the normal range, indicating that the patient's oxygen needs were adequately met. The patient's breathing pattern became more regular and effective, with a respiratory rate approaching normal levels and no longer showing excessive use of accessory breathing muscles. This indicates that the patient's ventilatory function has improved. managing post-cesarean section pain and supporting the patient's recovery process (Dyanel & Manda, 2024). Additionally, the patient's hemodynamic status shows increased stability, marked by more controlled blood pressure and pulse rate. Improved tissue perfusion, particularly in brain tissue, also contributes to an increase in the patient's level of consciousness. The patient becomes more responsive to stimuli, indicating improved neurological function (Sari et al., 2023).

The results of this study indicate that a comparison of conditions before and after the intervention shows that oxygen therapy plays a highly significant role in improving patients' oxygenation status. The changes observed were not limited to increased oxygen saturation but also included improvements in respiratory patterns, hemodynamic stability, and increased patient consciousness (Salasati & Afni, 2024). This indicates that the intervention provided was appropriate and aligned with the patients' needs.

5. Comparison

Based on the results of the case study conducted, it can be concluded that oxygen therapy is an effective nursing intervention for managing patients with mild head injuries who exhibit ineffective breathing patterns. The administration of oxygen therapy has been shown to significantly increase oxygen saturation to normal levels, indicating that the patient's oxygen needs are being met. Additionally, oxygen therapy plays a role in improving the patient's breathing pattern to become more effective, as evidenced by a regular respiratory rate and reduced use of accessory breathing muscles. This improvement indicates that the patient's ventilatory function has returned to near-normal physiological conditions. Other positive effects include improved hemodynamic stability and an increased level of consciousness. This suggests that oxygen therapy not only affects the respiratory system but also contributes to the improvement of tissue perfusion, particularly in the brain, thereby preventing secondary damage caused by hypoxia.

Thus, oxygen therapy can be recommended as a primary intervention in emergency nursing care for patients with mild head injuries. Optimizing the administration of oxygen therapy is expected to improve the quality.

Author Contributions: Conceptualization: FMPL and S; Methodology: FMPL and S.; Software: FMPL; Validation: F.M.P.L. and S.; Formal analysis: F.M.P.L. and S.; Investigation: FMPL and S.; Resources: FMPL and S.; Data curation: FMPL and S.; Writing—drafting the original manuscript: S.F.W.; Writing—reviewing and editing:F.M.P.L. and S.; Visualization: FMPL; Supervision: S; Project administration: FMPL; Funding acquisition: F.M.P.L. and S.

Funding: This research received no external funding

Data Availability Statement: The dataset used in this study can be accessed publicly at the link

Conflicts of Interest: The authors declare no conflict of interest

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