

Section: General Nursing

The use of suctioning to manage ineffective airway clearance in patients with stroke

Yohanes Lugas Wedhatama , Pugu Widiyanto, Priyo, Sigit Priyanto

Authors information

Department of Nursing, Universitas Muhammadiyah Magelang, Indonesia



Contactable email: lugaswedhatama312417@gmail.com / Article DOI: *On process*

Abstract

Stroke is a cerebrovascular disease that profoundly affects the brain, presenting a critical medical challenge because the brain is a vital organ controlling all bodily functions. A stroke often causes motor organ dysfunction and can lead to a decreased level of consciousness. This reduction in consciousness impairs the patient's ability to cough effectively, preventing the independent expulsion of saliva and leading to a significant build-up of secretions in the respiratory tract. Consequently, a primary and severe nursing diagnosis that arises in stroke patients is ineffective airway clearance. To address this, suctioning is utilized as a vital clinical intervention to maintain airway patency, thereby facilitating adequate gas exchange by mechanically removing secretions from patients who are unable to clear them independently. This study aims to demonstrate the practical application of airway suctioning in stroke patients presenting with ineffective airway clearance. A case study utilizing a descriptive approach was conducted on a single patient (Mr. K) who experienced severe airway compromise following a stroke. Data were comprehensively collected through clinical interviews, direct observations, and medical documentation. The suctioning intervention was consistently administered over a three-day period. Following these three days of targeted intervention, Mr. K showed significant clinical improvement, characterized by reduced shortness of breath, stabilized and improved respiratory rates, and enhanced oxygen saturation levels, with no adverse side effects reported. Ultimately, this case study confirms that suctioning is a highly effective intervention to overcome ineffective airway clearance in stroke patients and should be standardly integrated into clinical nursing practice

Keywords: Hospital care, ineffective airway clearance, nursing care, stroke, suctioning

Introduction

Stroke is a leading cause of disability and mortality worldwide, often resulting in neurological deficits that directly impair airway protection mechanisms (Barnett et al., 2022; Patrizz et al., 2023). Patients with acute stroke frequently experience dysphagia, reduced level of consciousness, and weakened or absent cough reflex due to damage to the brainstem and cerebral cortex (Félix et al., 2025; Lee et al., 2020). These impairments significantly increase the risk of ineffective airway clearance, as patients are unable to voluntarily mobilize and expectorate secretions. According to the Indonesian Nursing Diagnosis Standards (SDKI), ineffective airway clearance is characterized by the inability to clear secretions or obstructions from the respiratory tract, evidenced by ineffective cough, adventitious breath sounds, and dyspnoea. In stroke patients, retained secretions are particularly dangerous because they can lead to partial or complete airway obstruction, hypoxemia, and subsequent cerebral hypoxia, which may worsen neurological outcomes (Saga et al., 2025; Gipsman et al., 2023).

The accumulation of secretions in stroke patients not only compromises ventilation but also predisposes them to serious pulmonary complications. Impaired swallowing and decreased consciousness facilitate aspiration of oropharyngeal contents and pooled secretions, making aspiration pneumonia one of the most common and fatal complications post-stroke (Chang et al., 2022; Long et al., 2025). Studies have shown that pneumonia occurs in up to 30% of stroke patients and is associated with increased length of hospital stay, poor functional recovery, and a threefold increase in mortality risk Grossmann (Grossmann et al., 2021; Nigus et al., 2024). Because these patients often cannot generate an effective cough to clear their own airway, active interventions are required to maintain airway patency and prevent secondary lung injury. Without timely clearance, the risk of respiratory failure and death rises significantly. Suctioning is a critical non-pharmacological nursing intervention used to maintain airway patency in stroke patients with ineffective airway clearance (Sumarni et al., 2024). It provides immediate mechanical removal of secretions from the upper and lower airways when the patient's own defence mechanisms are compromised. Evidence-Based Nursing Practice supports suctioning as a safe and effective method to reduce airway obstruction, improve oxygenation, and decrease the work of breathing. Clinical guidelines recommend suctioning with a pressure of 100–120 mmHg for less than 15 seconds to minimize mucosal trauma and hypoxia while effectively clearing secretions. For stroke patients who are unable to cough effectively, regular and appropriately performed suctioning

has been shown to reduce adventitious breath sounds, relieve dyspnea, improve SpO₂ levels, and lower the incidence of aspiration pneumonia. Therefore, suctioning plays a vital role in the respiratory management of stroke patients and is essential for preventing life-threatening complications associated with ineffective airway clearance. Therefore, this case study aims to evaluate the extent of the effects of suctioning interventions on stroke patients experiencing airway clearance impairment at Harapan Regional General Hospital (RSUD Harapan) in Magelang City, Central Java.

Case Description

Mr. K, a 78-year-old male head of household from Magelang, was admitted to the hospital with a primary medical diagnosis of haemorrhagic stroke. Upon admission, his chief complaints were a decreased level of consciousness accompanied by severe shortness of breath and an accumulation of respiratory mucus. The clinical symptoms exhibited by Mr. K align precisely with the established characteristics of stroke-induced cognitive decline and subsequent airway compromise. This presentation is consistent with the Indonesian Nursing Diagnosis Standards (SDKI) noted that stroke frequently results in an inability to cough effectively, sputum retention, and an elevated respiratory rate. This decreased level of consciousness directly impairs the patient's protective airway reflexes, rendering him unable to effectively expectorate secretions. Consequently, the resulting buildup of sputum in the respiratory tract leads to the manifestation of adventitious breath sounds, specifically stridor and rhonchi. Mechanically, stridor is a continuous, high-pitched, monophonic sound that typically occurs during inspiration or expiration due to upper airway obstruction. In contrast, rhonchi are continuous, low-pitched, sonorous adventitious sounds that indicate the presence of fluid or thick secretions in the larger airways. These are distinct from crackles (sometimes referred to as wet rhonchi), which are discontinuous, interrupted sounds caused by the sudden opening of fluid-filled airways.

Discussion

Based on the collected data, the nursing diagnosis discussed in this study is ineffective airway clearance (D.0001), related to retained secretions as evidenced by the patient's inability to cough effectively, the presence of adventitious breath sounds, and shortness of breath. This diagnosis aligns with the Indonesian Nursing Diagnosis Standards (SDKI), which define ineffective airway clearance as the inability to clear secretions or obstructions from the respiratory tract to maintain airway patency. If left untreated, this condition can lead to breathing difficulties and increase the risk of mortality. In this case, Mr. K exhibited all major criteria for this diagnosis: ineffective cough, adventitious breath sounds, and dyspnea, which further support the diagnostic determination. In developing nursing interventions, the authors referred to the Indonesian Nursing Intervention Standards (SIKI), which categorize the nursing approach into four main stages: observation, therapeutic intervention, education, and collaboration. The therapeutic intervention implemented in this study was suctioning, aimed at clearing the airway. Management of ineffective airway clearance generally includes both pharmacological and non-pharmacological approaches. This study utilized non-pharmacological therapy—suctioning—due to its safety profile, minimal side effects, and proven effectiveness in improving airway clearance.

Following the suctioning intervention, patients showed improved airway patency, indicated by reduced dyspnea, absence of adventitious breath sounds, and vital signs returning to normal limits. These findings are consistent with previous research indicating that mucus suctioning for less than 15 seconds improves airway clearance, as shown by decreased sputum production and thinner secretion consistency. This case study employed an Evidence-Based Nursing Practice approach, focusing on suctioning as an intervention to improve airway patency. To assess airway patency, the authors used the following indicators as focal assessment instruments: effective cough, adventitious breath sounds, dyspnea, and vital signs. The use of these indicators is supported by prior studies confirming their validity and reliability in evaluating airway patency. Suctioning was performed for 3 consecutive days—7 times on day one, 6 times on day two, and 4 times on day three—using a pressure of 100–120 mmHg for less than 15 seconds per procedure. This intervention resulted in improved airway patency, a more regular breathing pattern, resolution of adventitious breath sounds, and vital signs trending toward normal.

The findings of this case study demonstrate improved airway patency after consistent suctioning over 3 days. Improvement was measured using indicators including effective cough, adventitious breath sounds, dyspnea complaints, and vital signs. Before suctioning, the patient presented with adventitious breath sounds, dyspnea, inability to cough effectively, tachypnea, tachycardia, and desaturation. After 3 days of suctioning, the patient still could not cough effectively; however, dyspnea decreased, adventitious breath sounds resolved, tachypnea improved with a respiratory rate of 28 breaths/min, and oxygen saturation increased to SpO₂ 98%. These results align with previous research on suction implementation conducted over 3 days at different times based on clinical practice schedules, which showed increased oxygen saturation and decreased respiratory rate post-intervention. This is also consistent with studies stating that suctioning is appropriate for unconscious patients with airway clearance problems, as it helps remove mucus and improves SpO₂ levels.

Conclusion

Following three consecutive days of airway suctioning, the patient demonstrated a significant increase in airway

patency, as evidenced by the complete resolution of adventitious (abnormal) breath sounds and a marked stabilization of vital signs. For context, the initial baseline assessment revealed severe data indicating ineffective airway clearance, including an inability to cough effectively, excessive sputum production, the presence of rhonchi and stridor, tachypnoea with a respiratory rate (RR) of 38 breaths per minute, a pulse rate of 109 beats per minute, and a compromised oxygen saturation (SpO₂) level of 93%. Post-intervention evaluation showed that while the patient still lacked the neurological ability to cough effectively due to the stroke, his secondary symptoms were successfully managed. His shortness of breath significantly decreased, and follow-up auscultation confirmed the complete absence of additional breath sounds. Furthermore, his tachypnoea resolved as his respiratory rate dropped to a more stable 28 breaths per minute, and his oxygen saturation remarkably improved, rising to an SpO₂ of 98%. The suctioning intervention was executed seamlessly according to standard clinical procedures and yielded a highly positive therapeutic response, reflected in the overall improvement of the patient's general physiological condition with no reported adverse events.

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