RJNMSR
Review Journal of Neurological & Medical Sciences Review

Volume 4, Issue 6, 2026

LOOK-ALIKE SOUND-ALIKE (LASA)-ASSOCIATED HIGH-ALERT MEDICATION ERROR FOLLOWING SELF-MEDICATION RESULTING IN RESPIRATORY PARALYSIS: A CASE REPORT

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DOI: https://doi.org/10.5281/zenodo.21155117

Received	Accepted	Published
25 April 2026	07 June 2026	21 June 2026

ABSTRACT

Background: *Medication safety is a cornerstone of global healthcare practice and remains essential for preventing avoidable patient harm. Despite continuous advancements in healthcare systems, high-alert medication errors (HAMEs) remain an alarming concern, particularly in the context of self-medication. Such errors can result in life-threatening outcomes, even among skilled healthcare professionals (HCPs) who may inadvertently bypass established safety protocols. Neuromuscular blocking agents (NMBAs) are among the most hazardous high-alert medications because accidental administration can rapidly lead to respiratory paralysis and death if not recognized immediately.*

Case Presentation: *We report a critical incident involving a 34-year-old male operating room (OR) technician who unintentionally self-administered a NMBAs, Atracurium Besylate (Acuron® 50 mg/5 mL), instead of an antibiotic solution. The error occurred when the NMBA was mistakenly used as a diluent for Ceftriaxone 1 g due to visual similarity to sterile water for injection, representing a Look-Alike Sound-Alike (LASA) medication error. Within minutes, the HCP developed apnea, respiratory muscle paralysis, and loss of consciousness, necessitating emergency intubation and mechanical ventilation (MV). Prompt recognition of the event and immediate airway management resulted in complete recovery within hours, with no residual neurological or respiratory complications.*

Conclusion: *This case highlights that even trained HCPs remain vulnerable to HAMEs. Sustainable medication safety requires institutional oversight, adherence to the Ten Rights of Medication Administration, secure storage, clear labeling, and double-check protocols. Special attention must be*

given to LASA medications to minimize confusion and prevent life-threatening incidents. Additionally, strict prohibition of self-medication is essential to ensure patient and staff safety.

Keywords: *Medication Errors; High-Alert Medications; Self Medication; Neuromuscular Blocking Agents; Intubation*

INTRODUCTION

Medication safety is a fundamental component of healthcare delivery. Ensuring safe prescribing, dispensing, and administration of drugs is essential to protect patients from preventable harm. However, medication errors remain a persistent challenge across healthcare systems.[1] Among the various categories of drugs, high-alert medications (HAMs) carry the greatest risk of causing significant harm when used inappropriately. Errors involving HAMs—such as incorrect administration, dosage, or dilution—can result in catastrophic, often fatal, outcomes.[2] In pediatric healthcare, the consequences of medication errors are particularly severe. Evidence indicates that nearly one-third of reported pediatric errors involve HAMs, with a higher likelihood of moderate or severe harm compared to other drugs. The combination of weight-based dosing, developmental differences, and complex pharmacology increases pediatric vulnerability.[3-4]

In contexts outside routine medical practice, self-medication has emerged as an important factor that further exacerbates the risk of adverse drug events. Self-medication may include the unsupervised use of prescription medicines, antibiotics, or even high-alert drugs without appropriate medical oversight.[5] This practice is especially prevalent in low- and middle-income countries (LMICs), where easy access to pharmacies, financial constraints, and insufficient healthcare services encourage individuals to treat themselves without consulting professionals.[5] As a result, medication errors are associated with a significant percentage of adverse events in healthcare. According to global estimates, medication errors account for approximately 2–5% of hospital admissions. The Centers for Disease Control and Prevention (CDC) reports that medication errors are the third leading cause of death in the United States (US), contributing to nearly 98,000 deaths annually. This alarming burden highlights the urgent need for improved medication management systems and stronger safety protocols across healthcare settings.[6] In addition to system-level errors, unsafe self-medication practices pose further risks, such as inappropriate dosing, harmful drug interactions, and dangerous dilution practices. In Pakistan, self-medication practices among medical personnel are concerning. A study in Karachi revealed that 52.7% of medical students admitted to self-prescribing antibiotics—behaviors that promote antimicrobial resistance and increase the likelihood of dosage errors.[7-8] Most studies have focused on prescribing and administration errors among healthcare providers (HCPs), while unsafe self-medication among healthcare workers (HCWs) remains underreported. When HAMs are involved, such errors can have devastating outcomes, including rapid respiratory arrest and the need for emergency intubation.[9-10]

This case report presents a serious HAME in which an OR technician self-administered Ceftriaxone mistakenly diluted with *Atracurium Besylate*, resulting in acute respiratory paralysis (ARP) and necessitating emergency intubation. The incident underscores the urgent need for regulatory control, heightened awareness, and targeted education among HCWs to eliminate unsafe self-medication practices.

CASE REPORT

Patient Information: A 34-year-old male HCP was on duty in the OR of a tertiary care hospital during the morning shift. At approximately 09:00 a.m., he prepared an antibiotic injection intended for self-administration for a presumed chest infection. An assisting anesthesia technician helped during the injection. Moments after administration, the HCP lost consciousness. On examination, he had a palpable carotid pulse but showed respiratory muscle paralysis, which progressed to apnea within one minute.

Emergency Management: An immediate resuscitative response was initiated. The HCP was endotracheally intubated and placed on MV. The event was identified as a HAME resulting from unsupervised self-administration of a potent NMBA.

Clinical Findings and Diagnostic Assessment:
On initial evaluation, the HCP was unconscious but maintained spontaneous circulation. The Glasgow Coma Scale (GCS) score was 7/15 (E2, V1, M4). Blood pressure was 118/70 mmHg, heart rate 76 bpm, and SpO_2 92% on assisted ventilation. Pupils Equal, Round, and Reactive to Light (PERRL), with no seizure activity or trauma. Cardiovascular and abdominal examinations were unremarkable. Respiratory assessment revealed apnea secondary to NMBA, with absent spontaneous chest movements. Laboratory investigations, including complete blood count (CBC), renal and hepatic function tests, and serum electrolytes, were within normal limits. Arterial blood gas (ABG) analysis demonstrated acute respiratory acidosis (pH 7.22, $PaCO_2$ 58 mmHg, HCO_3^- 24 mmol/L), consistent with hypoventilation secondary to neuromuscular blockade-induced apnea. Electrocardiography (ECG) revealed a normal sinus rhythm, and toxicology screening was negative for illicit or non-prescribed substances.
Based on the clinical presentation and investigation findings, the incident was identified as acute respiratory paralysis (ARP) following inadvertent self-administration of a high-alert NMBA due to a Look-Alike Sound-Alike (LASA) medication error. The rapid onset and pattern of respiratory compromise were consistent with the pharmacological effects of Atracurium Besylate (Acuron®).

Diagnostic Evaluation:
Upon stabilization and airway management, a comprehensive diagnostic evaluation was performed to identify the cause of the sudden respiratory collapse. During the review of the medication preparation area, an empty vial of Ceftriaxone Injection 1 g and a broken vial of Atracurium Besylate Injection *(Acuron® 50 mg/5 mL)* were found. On inquiry, the assisting technician admitted that the NMBA had been mistakenly used as a diluent for reconstituting Ceftriaxone, assuming it to be sterile water for injection. The reconstituted vials were subsequently identified and documented (Figure 1), confirming the source of the medication error due to the LASA and visual similarity between Atracurium Besylate and sterile water vials (Figure 2).

Timeline:
- **On July 07, 2024 at 09:00 a.m.** — HCP prepared Ceftriaxone using *Atracurium Besylate (Acuron®)* as a diluent, due to a LASA medication error.
- **09:01 a.m.** — Developed respiratory muscle weakness and apnea.
- **09:02 a.m.** — Emergency response initiated.
- **09:05 a.m.** — Intubation and MV initiated.
- **09:30 a.m.** — Transferred to ICU.
- **11:30 a.m.** — Spontaneous breathing resumed; extubated safely.
- **05:00 p.m.:** Following observation and clinical stabilization, the HCP achieved full neurological recovery with a GCS of 15/15 and maintained stable hemodynamic parameters.
- **05:30 p.m.** — Discharged in stable condition with full neurological recovery.

Therapeutic Intervention:
Immediate airway management was initiated following the onset of apnea. The patient underwent endotracheal intubation and mechanical ventilation in volume-controlled mode. Supportive management included oxygen therapy, continuous cardiorespiratory monitoring, and intravenous fluid administration. No reversal agent was administered, as the effects of Atracurium Besylate were expected to resolve spontaneously with drug metabolism and elimination.

Outcome and Follow-up:
The patient showed gradual clinical improvement following supportive management and mechanical ventilation. Spontaneous respiration returned approximately two hours after exposure,

allowing successful extubation without complications. The patient remained hemodynamically stable with complete neurological recovery (GCS 15/15) and no evidence of residual respiratory, neurological, or cardiovascular impairment. After a period of observation in the intensive care unit, the patient was discharged on the same day in stable condition. No delayed complications or recurrent symptoms were reported during follow-up.

Figure 1: *Injection Ceftriaxone (1 g) and Injection Acuron® (50 mg/5 mL)*

Figure 2: *Look-alike/sound-alike (LASA) similarity between Sterile Water for Injection and Acuron® (Atracurium Besylate) vials*

DISCUSSION

High-alert medications (HAMs) are drugs that carry a heightened risk of causing significant patient harm when used in error. This case highlights a preventable high-alert medication error (HAME) resulting from unsafe self-medication by a healthcare professional (HCP). The inadvertent intravenous administration of Atracurium Besylate, a potent neuromuscular blocking agent (NMBA), instead of an antibiotic solution, led to rapid respiratory paralysis and emergency intubation. This event underscores that even well-trained professionals remain vulnerable to medication errors when established safety protocols are bypassed.[1-3]

Visual resemblance between sterile water for injection and NMBA vials, such as Acuron®, predominantly contributed to the error, exemplifying a common look-alike/sound-alike

(LASA) issue reported globally. In many healthcare settings, inadequate labeling, absence of color-coded systems, and unsafe storage practices increase the likelihood of such mix-ups. System-level vulnerabilities, including human fatigue, cognitive overload, and lack of double-check mechanisms, can further compromise medication safety. Ensuring compliance with the Ten Rights of Medication Administration—right patient, drug, dose, route, time, documentation, reason, response, education, and right to refuse—is essential to prevent such incidents. [10-11]

Globally, similar incidents among HCPs have revealed that unsafe practices such as self-medication and bypassing verification steps are often influenced by overconfidence and work pressure. Institutional enforcement of clear policies prohibiting self-medication, along with continuous staff education on HAM handling, is vital. The introduction of barcode-assisted drug identification, color-coded labeling, and physical segregation of high-alert drugs can minimize LASA-related risks. [12]

Moreover, fostering a non-punitive incident reporting culture encourages open communication, helping institutions identify and address system flaws before they lead to harm. Regular competency evaluations for personnel managing HAMs further strengthen accountability and adherence to safety standards. [13] Ultimately, this case emphasizes that medication safety depends not only on individual vigilance but also on robust system-based safeguards and organizational commitment to continuous quality improvement.

Ethical Considerations:

This report adheres to the principles of the Declaration of Helsinki. Written informed consent was obtained from the HCP for publication of anonymized details. All identifiable data were removed to ensure confidentiality and integrity.

RECOMMENDATIONS

To prevent the recurrence of similar HAMEs, healthcare institutions should enforce strict segregation and clear labeling of HAMs, particularly neuromuscular NMBAs, within OR settings. Institutional policies must explicitly prohibit self-medication among HCPs to eliminate unauthorized drug handling. Regular staff education programs should focus on medication verification procedures and the identification of LASA drugs. Establishing a non-punitive incident reporting culture is essential to encourage error disclosure and continuous improvement in safety practices. Additionally, periodic competency evaluations should be conducted for personnel responsible for handling HAMs to ensure sustained compliance with medication safety standards.

CONCLUSION

This incident demonstrates that even experienced HCPs remain vulnerable to medication errors when safety protocols are overlooked. Reinforcing system-based safeguards, ensuring strict adherence to the Ten Rights of Medication Administration, and strengthening institutional accountability can effectively prevent life-threatening HAMEs and protect both patients and healthcare staff from preventable harm.

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