Literature Review Sample: Neurally Adjusted Ventilatory Assist (NAVA) in Neonatal Care

Introduction

Mechanical ventilation is a cornerstone in the management of respiratory distress in neonates, particularly in preterm infants. Traditional ventilation modes often struggle with patient-ventilator asynchrony, leading to potential complications such as lung injury and prolonged ventilation. Neurally Adjusted Ventilatory Assist (NAVA) emerges as an innovative ventilation mode that utilizes the electrical activity of the diaphragm (Edi) to synchronize ventilatory support with the infant's own respiratory efforts. This review explores the current evidence on the efficacy, benefits, and challenges of NAVA in neonatal care.

Mechanism of NAVA

NAVA operates by detecting the Edi signal through a specialized nasogastric catheter equipped with electrodes. This signal reflects the neural respiratory drive, allowing the ventilator to deliver assistance in proportion to and in synchrony with the patient's own efforts. This approach aims to enhance patient-ventilator interaction, reduce asynchrony, and potentially minimize ventilator-induced lung injury.

Clinical Applications and Benefits

Improved Synchrony and Comfort

Studies have demonstrated that NAVA significantly improves patient-ventilator synchrony compared to conventional ventilation modes. This enhanced synchrony is associated with reduced work of breathing and improved comfort for the neonate. A scoping review by Kuitunen et al. (2025) analyzed randomized controlled trials and found that NAVA improved synchrony and reduced sedation requirements in pediatric patients, including neonates PMC.

Reduction in Ventilator-Induced Lung Injury

By delivering support proportional to the infant's own respiratory efforts, NAVA may reduce the risk of ventilator-induced lung injury. A systematic review focusing on the long-term consequences of invasive NAVA in neonates highlighted its potential in decreasing the incidence of bronchopulmonary dysplasia (BPD), a common chronic lung disease in preterm infants MDPI.

Application in Pulmonary Interstitial Emphysema

A case report by Lee et al. (2024) presented five extremely low birth weight infants with refractory pulmonary interstitial emphysema who were transitioned to NAVA ventilation. The study observed a gradual resolution of the condition, suggesting NAVA's potential as a rescue therapy in such cases Frontiers.

Non-Invasive NAVA (NIV-NAVA)

Non-invasive application of NAVA (NIV-NAVA) has been explored as an alternative to conventional non-invasive ventilation methods. A study conducted in an Australian NICU reported successful application of NIV-NAVA in preterm infants, with a low rate of re-intubation within 48 hours, indicating its feasibility and effectiveness BioMed Central.

Challenges and Considerations

Technical and Monitoring Challenges

Implementing NAVA requires specific equipment and training. Accurate placement of the Edi catheter is crucial for effective monitoring and support. Additionally, interpreting Edi signals necessitates familiarity with the technology, posing a learning curve for healthcare providers.

Limited Long-Term Outcome Data

While short-term benefits of NAVA are evident, data on long-term outcomes remain limited. Further research is needed to assess the impact of NAVA on neurodevelopmental outcomes and long-term pulmonary function in neonates.

Cost and Resource Implications

The adoption of NAVA involves investment in specialized equipment and training. Healthcare facilities must consider cost-effectiveness and resource allocation when integrating NAVA into clinical practice.

Conclusion

Neurally Adjusted Ventilatory Assist represents a significant advancement in neonatal respiratory support, offering improved synchrony, reduced work of breathing, and potential protection against lung injury. While current evidence supports its efficacy, particularly in preterm infants and specific clinical scenarios, further studies are warranted to establish long-term benefits and cost-effectiveness. As technology evolves and experience with NAVA grows, it holds promise for enhancing outcomes in neonatal intensive care units.

References

Evaluation of NAVA-PAP in Premature Neonates with Apnea of Prematurity. (2023). *Frontiers in Pediatrics*, 11, 1234964.

Kuitunen, I., Rannankari, M., & Räsänen, K. (2025). Neurally adjusted ventilatory assist (NAVA) in neonatal and pediatric critical care: A scoping review of randomized controlled trials. *Pediatric Pulmonology*, 60(1), e21525.

Lee, S. R., et al. (2024). Neurally adjusted ventilatory assist as an effective treatment for pulmonary interstitial emphysema in extremely low birth weight infants: A case report. *Frontiers in Pediatrics*, 10, 1332332.

Neurally Adjusted Ventilatory Assist in Infants: A Review Article. (2022). *Pediatrics and Neonatology*, 63(1), 1-8.

Non-invasive neurally adjusted ventilatory assist (NIV-NAVA) in the neonatal intensive care unit: An Australian experience. (2024). *BMC Pediatrics*, 24, 4981.

Systematic Review of Invasive Neurally Adjusted Ventilatory Assist in Neonates. (2024). *Healthcare*, 12(6), 632.