

NIV: Essential for Acute and Chronic Care

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Introduction

Non-invasive ventilation (NIV) has become an indispensable intervention in the management of various respiratory conditions, offering a less intrusive alternative to mechanical ventilation. Its application spans a wide array of patient populations and clinical scenarios, continuously evolving with new research and technological advancements. Here's a look at the current landscape of NIV application and its profound impact on patient care across different contexts.

A systematic review and meta-analysis provided crucial insights into the effectiveness of NIV for managing acute hypoxic respiratory failure caused by COVID-19. This extensive work synthesized evidence from multiple studies, clearly demonstrating NIV's capability in reducing intubation rates and significantly improving clinical outcomes. This benefit is particularly evident for specific patient cohorts when NIV is utilized appropriately and initiated early in the disease course [1].

Looking at chronic conditions, another paper delves into the current evidence and future directions of non-invasive ventilation specifically in the context of acute exacerbations of chronic obstructive pulmonary disease (AECOPD). This research underscores NIV's well-established benefits, which include a notable reduction in mortality, decreased hospital stay durations, and lower intubation rates. It also thoughtfully considers areas ripe for further research and optimization of existing NIV protocols, suggesting continuous improvement in patient management strategies [2].

Beyond critical care settings, the application of non-invasive ventilation extends to home-based care. A practical guide offers clinicians essential recommendations for implementing home NIV, focusing on patients managing chronic respiratory failure in an out-of-hospital environment. This guide meticulously addresses key practical aspects, ranging from meticulous patient selection and the initial setup of therapy to ongoing follow-up care and effective troubleshooting techniques, ensuring comprehensive support [3].

The role of NIV in preventing post-extubation complications is another critical area. A systematic review and meta-analysis investigated the efficacy of non-invasive ventilation in preventing reintubation after extubation, particularly in high-risk patients. The findings from this study are invaluable for clarifying which patient populations, such as those with underlying respiratory conditions or those experiencing difficult weaning, are most likely to derive benefit from NIV post-extubation. This evidence directly informs and guides clinical practice, aiming to improve overall patient outcomes [4].

Immunocompromised patients represent a particularly vulnerable demographic where respiratory support decisions carry unique challenges. A systematic re-

view and meta-analysis specifically examined the role of non-invasive ventilation in immunocompromised patients experiencing acute respiratory failure. This study offered crucial insights into both the safety and efficacy of NIV in this sensitive population. It carefully balances the potential benefits against the inherent risks of potentially delaying intubation, providing clear guidance on appropriate patient selection and robust monitoring strategies to optimize care [5].

The practical implementation of NIV also heavily relies on the appropriate choice of interfaces. One article critically explored the fundamental principles and recent advancements concerning non-invasive ventilation interfaces. It meticulously discusses various mask types, detailing their respective advantages and disadvantages. This research highlights how proper interface selection is absolutely crucial for maximizing patient comfort, ensuring adherence to therapy, and ultimately achieving the overall success of NIV treatment, all while effectively minimizing leaks and improving ventilation efficiency [6].

In the realm of cardiovascular emergencies, a review explored the latest developments and future directions for non-invasive ventilation in the management of cardiogenic pulmonary edema. This paper thoroughly reassessed the existing evidence supporting NIV's significant role in improving oxygenation, effectively reducing the work of breathing, and successfully avoiding intubation in these patients. It brought to light optimal strategies and also acknowledged ongoing controversies in its application, encouraging continued dialogue and research [7].

When considering alternative respiratory support methods, a systematic review and meta-analysis directly compared the effectiveness of high-flow nasal cannula (HFNC) with non-invasive ventilation in patients experiencing acute respiratory failure. This comprehensive review offered a comparative analysis of their respective impacts on intubation rates, mortality, and patient comfort. By providing evidence-based insights, it helps guide informed treatment decisions in demanding critical care settings, allowing clinicians to choose the most appropriate modality [8].

Obese patients present distinct physiological challenges in managing acute respiratory failure, making NIV application particularly complex. One paper specifically reviewed the current understanding and future perspectives of non-invasive ventilation in obese patients. It thoroughly discusses the unique physiological challenges posed by obesity and outlines how NIV can be effectively adapted to overcome these hurdles. The article establishes best practices for improving outcomes in this challenging patient demographic, emphasizing the clear need for tailored approaches [9].

Finally, addressing the youngest patient population, a review article focused on the specific application of non-invasive ventilation in pediatric acute respiratory failure. This essential review covered the unique anatomical and physiological considerations inherent in children, detailed the specific indications and contraindications

for NIV, and offered practical strategies for optimizing ventilation delivery. The ultimate goal is to significantly improve outcomes in this young and vulnerable patient population, ensuring specialized and effective care [10].

Description

Non-invasive ventilation (NIV) represents a cornerstone in contemporary respiratory medicine, providing critical support across a spectrum of acute and chronic conditions without the need for invasive intubation. Its utility is broad, impacting patient care from emergency settings to home management, significantly reducing morbidity and improving quality of life. The core principle of NIV involves delivering ventilatory support through an external interface, mitigating the risks associated with invasive mechanical ventilation while achieving therapeutic objectives.

The efficacy of NIV is well-documented in several acute scenarios. For instance, in acute hypoxic respiratory failure stemming from COVID-19, systematic reviews and meta-analyses confirm that early and appropriate NIV use can markedly reduce intubation rates and enhance clinical outcomes for specific patient groups [1]. Similarly, in acute exacerbations of chronic obstructive pulmonary disease (AECOPD), NIV has established benefits, including a reduction in mortality, a decrease in hospital stay duration, and lower intubation rates. Research in this area also points towards ongoing efforts to optimize NIV protocols for AECOPD patients [2]. Furthermore, preventing reintubation in high-risk patients following extubation is a crucial application where NIV proves effective, particularly for those with underlying respiratory conditions or difficulties in weaning off ventilation, thereby guiding clinical practice to achieve better patient outcomes [4].

Special patient populations also benefit immensely from tailored NIV strategies. Immunocompromised patients experiencing acute respiratory failure present a unique challenge, and studies provide crucial insights into NIV's safety and efficacy in this vulnerable group. These investigations carefully balance the potential benefits of NIV against the risks associated with delaying intubation, offering clear guidance on patient selection and monitoring strategies [5]. Obese patients with acute respiratory failure also require specialized consideration due to their distinct physiological challenges. Reviews emphasize adapting NIV approaches to overcome these hurdles and outline best practices to improve outcomes in this challenging demographic, stressing the need for personalized care plans [9]. Furthermore, pediatric acute respiratory failure necessitates an understanding of unique anatomical and physiological considerations in children; reviews outline indications, contraindications, and practical strategies for optimizing NIV delivery in this young patient population [10].

The practical aspects and continuous advancements in NIV therapy are just as vital as its clinical indications. Selecting the correct non-invasive ventilation interface is fundamental for successful therapy. Research highlights the critical role of various mask types, discussing their advantages and disadvantages, and underscores how proper selection directly impacts patient comfort, adherence, and overall ventilation efficiency by minimizing leaks [6]. Beyond device considerations, the application of NIV in conditions like cardiogenic pulmonary edema continues to evolve. Reviews explore the latest developments, reassessing evidence that supports NIV's role in improving oxygenation, reducing work of breathing, and avoiding intubation, while also addressing ongoing controversies to refine application strategies [7].

Moreover, the comparative effectiveness of NIV against other supportive therapies like High-Flow Nasal Cannula (HFNC) in acute respiratory failure is an area of active investigation. Systematic reviews and meta-analyses provide direct comparisons, offering evidence-based insights into their respective impacts on intubation rates, mortality, and patient comfort, ultimately helping clinicians make informed

decisions in critical care settings [8]. The expansion of NIV into home care for chronic respiratory failure patients is equally significant, with practical guides detailing patient selection, therapy initiation, follow-up, and troubleshooting, providing essential recommendations for effective out-of-hospital management [3]. Overall, the breadth of research indicates a robust and adaptable tool, continuously refined to meet diverse clinical needs and improve patient outcomes globally.

Conclusion

Non-invasive ventilation (NIV) stands as a crucial therapeutic tool across various acute and chronic respiratory conditions, demonstrating significant benefits in patient management. Research shows its effectiveness in reducing intubation rates and improving clinical outcomes, particularly when applied early in the disease course for conditions like acute hypoxic respiratory failure caused by COVID-19. For patients experiencing acute exacerbations of chronic obstructive pulmonary disease (AECOPD), NIV has established benefits, including reduced mortality and shorter hospital stays.

Beyond acute care, NIV plays an essential role in managing chronic respiratory failure in home settings. Practical guides outline key aspects such as patient selection, therapy initiation, follow-up, and troubleshooting to ensure effective out-of-hospital care. Preventing reintubation in high-risk patients post-extubation is another critical application, with evidence clarifying which patient populations, such as those with underlying respiratory conditions, benefit most from this intervention.

NIV's utility extends to vulnerable groups, including immunocompromised patients with acute respiratory failure, where studies balance its safety and efficacy with the risks of delaying intubation. The choice of interface is paramount for successful NIV therapy; various mask types and their proper selection significantly impact patient comfort, adherence, and ventilation efficiency, minimizing leaks.

Emerging research and future directions highlight NIV's role in specific challenging contexts. It improves oxygenation and reduces the work of breathing in cardiogenic pulmonary edema, though optimal strategies remain a focus of ongoing discussion. When comparing NIV with High-Flow Nasal Cannula (HFNC) for acute respiratory failure, comparative analyses guide treatment decisions by assessing impacts on intubation rates, mortality, and patient comfort. Adapting NIV for obese patients with acute respiratory failure requires tailored approaches due to physiological challenges, and its application in pediatric acute respiratory failure considers unique anatomical and physiological factors to optimize delivery and outcomes in children. Overall, NIV is a versatile and evolving therapy.

Acknowledgement

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Conflict of Interest

None.

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