# Determining the Optimal Use of Non-Invasive Ventilation and Invasive Mechanical Ventilation in the Treatment of Acute Respiratory Failure

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**K. . . :** Non-invasive ventilation; Invasive mechanical ventilation; Acute respiratory failure; Mechanical ventilation; Chronic obstructive pulmonary disease; Cardiogenic pulmonary edema; Acute respiratory distress syndrome

## I . .

Acute respiratory failure (ARF) is a life-threatening condition resulting in inadequate gas exchange, which can occur due to a wide range of pulmonary and extra-pulmonary causes. ARF is a common reason for admission to intensive care units (ICUs), and mechanical ventilation is an essential aspect of its management [1]. However, the optimal use of non-invasive ventilation (NIV) and invasive mechanical ventilation (IMV) in ARF remains a subject of debate. While NIV has been shown to reduce the need for intubation and ICU stay in some patients, its e ectiveness in treating severe ARF remains uncertain. However, IMV is the primary treatment for severe respiratory failure, but it is associated with signi cant risks and complications, such as ventilator-induced lung injury and nosocomial infections. erefore, determining the optimal use of NIV and IMV in the treatment of ARF is crucial to improve patient outcomes and reduce the burden on healthcare systems [2].

In this review article, we aimed to provide a comprehensive overview of the current evidence for the use of NIV and IMV in ARF and to identify the factors that determine the optimal use of each approach [3]. To achieve this goal, we conducted a systematic search of several electronic databases, including PubMed, Embase, and the Cochrane Library, to identify relevant studies published until September 2021. We included studies that evaluated the e cacy and safety of NIV and IMV in di erent clinical scenarios, including hypoxemic and hypercapnic respiratory failure. We also analysed the advantages and disadvantages of each ventilation approach, discussed the factors that determine the optimal use of each approach, and highlighted the importance of timely recognition and intervention in the management of ARF.

e ndings of this review can guide clinical decision-making and improve patient outcomes by providing evidence-based guidance on the optimal use of NIV and IMV in the treatment of ARF [4]. Furthermore, this review identi es gaps in current knowledge and highlights the need for further research to clarify the optimal use of NIV and IMV in particular patient populations with ARF.

3. NIV is preferred for hypoxemic respiratory failure, reducing need for intubation & mortality.

4. Optimal use of NIV & IMV in ARF requires careful consideration of patient characteristics.

**M**

Search strategy: We conducted a systematic search of several electronic databases, including PubMed, Embase, and the Cochrane Library, to identify relevant studies published up to September 2021. e search strategy included a combination of keywords and medical subject headings (MeSH) related to acute respiratory failure, mechanical ventilation, non-invasive ventilation, and treatment [5]. We also hand-searched the reference lists of relevant studies to identify additional articles.

**I** **a**: We included studies that evaluated the e cacy and safety of non-invasive ventilation (NIV) and invasive mechanical ventilation (IMV) in di erent clinical scenarios, including hypoxemic and hypercapnic respiratory failure. We included randomized controlled trials, observational studies, meta-analyses, and systematic reviews published in English [6]. We excluded studies that were not

ARF, considering the underlying etiology and severity of the disorder, as well as the availability of monitoring and support resources [22].

e evidence supports the use of NIV as an e ective and safe alternative to IMV for selected patients with ARF, particularly those with hypercapnic respiratory failure due to COPD exacerbation and acute cardiogenic pulmonary edema [23]. NIV has been shown to reduce the need for intubation, shorten the duration of mechanical ventilation, and improve outcomes in these groups of patients as shown in (Table 1).

However, in patients with severe ARF, including those with ARDS, IMV may be more e ective in rapidly and sustainably improving oxygenation and ventilation. Early initiation of IMV in these patients may lead to better outcomes [24].

It is important to note that several factors can in uence the optimal choice of respiratory support strategy, including the patient's clinical status, the underlying etiology and severity of ARF, and the availability of monitoring and support resources as shown in (Table 2).

Clinicians should consider these factors when deciding on a course of treatment and individualize care accordingly [25].

Our review has several limitations. First, the studies included in our review varied in their designs and patient populations, which make's it challenging to draw de nitive conclusions. Second, there were di erences in the management protocols and resources available across the studies, which may have in uenced the outcomes. ird, our review focused on comparing NIV and IMV and did not evaluate other respiratory support strategies, such as high- ow nasal cannula or extracorporeal membrane oxygenation [26].

In conclusion, our review suggests that NIV can be an e ective and safe alternative to IMV for selected patients with ARF [27]. e decision to use NIV or IMV should be based on a careful assessment of the patient's clinical status, the underlying etiology and severity of ARF, and the availability of monitoring and support resources.

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