

Acute respiratory failure: To intubate or not to intubate? Think about Noninvasive Ventilation!

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*Progress is not a speed issue but a matter of direction
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Key Words

Noninvasive ventilation
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Indications

Patients with severe acute respiratory failure have been traditionally treated by tracheal intubation and mechanical ventilation. The purpose of mechanical ventilation is the immediate correction of the life-threatening hypoxemia, the progressive ventilatory failure, and also, reducing dyspnea and inspiratory effort¹. Although mechanical ventilation is a lifesaving therapy, it is accompanied with respiratory complications that can significantly affect the outcome of critically ill patients². Most of these complications are related to the presence of endotracheal tube (ETT). The persistence of a foreign body, such as the ETT, in the airway, although critical for the management of the mechanically ventilated patient, contributes substantially to the development of severe complications mainly ventilator-associated pneumonia, and tracheal damage³. Moreover, ETT increases patient discomfort, hence the need for heavy sedation. All the above disadvantages of conventional mechanical ventilation lead not only to a longer intensive care unit and hospital stay, but also to a lower rate of survival.

Noninvasive ventilation (NIV) is a method of mechanical ventilation that does not require the use of ETT. NIV, therefore, may avoid most of the side effects and complications related to the ETT, ensuring at the same time a similar degree of efficacy⁴.

NIV can be used in a wide range of disorders that lead to acute respiratory failure. Strong evidence supports the use of NIV **as a first line intervention** in addition to usual medical care in the following situations⁵:

Acute respiratory failure in patients with mild-to-moderate (pH 7.30–7.34) exacerbation of chronic obstructive pulmonary disease mainly in the emergency department or in the ward. NIV should be tried early in the course of acute respiratory failure and before severe acidosis, to decrease treatment failure, avoid endotracheal intubation and reduce mortality^{6,7}.

Acute respiratory failure in patients with cardiogenic pulmonary oedema, mainly in the emergency departments. In this situation the implementation of NIV, including CPAP, is better than is standard medical therapy for reduction of intubation rate⁸.

Acute hypoxemic respiratory failure in immunocompromized patients

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(secondary to hematological malignancies, transplantation, or HIV infection) mainly in the ward or in the ICU. Early use of NIV in these patients reduce intubation rate, complications, mortality, and duration of stay in intensive care⁹.

Less evidence is available in the following situations:

ALI/ARDS: NIV cannot be recommended as routine therapy for ALI/ ARDS. Data support a cautious trial in highly selected patients (usually with SAPS II <34) and only in an ICU environment, where facilities for intubation and invasive ventilation are readily available¹⁰.

Pneumonia: Scant and conflicting data do not support the routine use of NIV in patients with severe pneumonia, with the exception of patients with underlying COPD¹¹.

Postoperative respiratory failure: Data support to the use of CPAP or NIV in postoperative patients, either prophylactically in high risk patients (mainly in elective abdominal or thoracoabdominal vascular surgery) or as an early therapy of respiratory insufficiency^{12,13}.

NIV is one of the most important developments in pneumonology and acute and critical care medicine and its use seems to increase over the last two decades. This may be a consequence of several reasons. First of all, and based on solid evidence NIV is nowadays considered by most pneumonologists and ICU physicians as an effective treatment for the above mentioned selected forms of acute respiratory failure (ARF). Second, in recent years there have been an increasing number of courses and workshops on NIV by scientific societies, universities, and hospitals that have contributed to the increase and diffusion of knowledge about both theoretical and practical issues concerning the use of NIV. Third, most of mechanical ventilator companies have included specific functions to detect and compensate for air leaks, which make the application of NIV much easier and less problematic in various settings. Last, but not least, the continuous improving of "conventional" interfaces (nasal and oronasal masks) or the developing of "new" such as the total full face mask and the helmet has increased their effectiveness and improved their quality, thereby, facilitating NIV application¹⁴.

NIV represents, perhaps, the greatest and wisest step "backward," in acute and critical care medicine¹⁵. Reaching for a facemask, an interface had not been used for critically ill patients for decades, rather than an endotracheal tube, Meduri and colleagues' 1989 in a case series changed decisively the future management of acute respiratory failure¹⁶.

Due to ease of application, less intensive monitoring,

more equipment availability, shortage of intensive care beds, and clinical benefits and highly cost effectiveness, NIV is more frequently used outside the intensive care unit, in high-dependent units, respiratory wards, and emergency departments¹⁷.

The application of NIV by a trained and experienced team, with careful patient selection and choice of appropriate location and setting, should optimise patient outcomes. Nevertheless, it should be made clear that NIV is not a panacea nor the "poor man's" technique of mechanical ventilation¹⁸. Conversely, it cannot replace endotracheal intubation in all circumstances. Even in conditions in which NIV has strong evidence of success, patients should be monitored closely for signs of treatment failure and prompt intubation.

Despite good evidence and the consensus of professional societies, NIV remains relatively underused. Among possible NIV candidates, actual application has been found to be only about 33%¹⁹. The low rate of use in some hospitals relates to little knowledge about or experience with the technique, insufficient technical equipment, and inadequate funding²⁰.

We believe that an intervention, such as NIV, that may improve outcome of patients with acute respiratory failure and contribute substantially to avoid intubation thus the subsequent admission in the ICU, should undoubtedly be constitute a main priority not only in the emergency departments but as well as for several other in-hospital settings. However, given the ongoing evidence supporting an increasingly use of NIV in various types of ARF we concur the suggestion of BTS that each hospital should have a specific designated area with experienced staff, where patients requiring NIV can be transferred with the minimum delay²¹.

This strategy would, in addition to improving the prognosis of patients, reduce the cost of treatment in an era of resource constraints on health due to economic crisis.

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