

Gestione della NIV in PS: indicazioni e criticità

Dott.ssa Cristina Magliocco

**UOC di PS e Medicina D'Urgenza
Ospedale Sandro Pertini - Roma
Direttore Dr Francesco Rocco Pugliese**



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



Un giorno come tanti in PS....



XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018



INDICAZIONI ALLA NIV IN PS

- ✓ Insufficienza respiratoria acuta o «de novo»
- ✓ acuta su cronica (ovvero cronica riacutizzata)

Come

Perché

Quando



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



QUALI PAZIENTI VENTILARE?

Sintomi e segni di distress respiratorio

Dispnea di grado moderato-severo

FR > 24 (>30 nella forma ipossiémica)

Reclutamento della muscolatura accessoria

Alterazione del sensorio

Alterazioni emogasanalitiche:

$\text{PaCO}_2 > 45 \text{ mmHg}$ (o incremento di 15-20 mmHg)

$\text{pH} < 7.35$ (> 7.10)

$\text{P/F} < 200$ (< 300)



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



Medical Progress

ADVANCES IN MECHANICAL VENTILATION

MARTIN J. TOBIN, M.D.

N Engl J Med, Vol. 344, No. 26 • June 28, 2001

The objectives of mechanical ventilation are primarily to decrease the work of breathing and reverse life-threatening hypoxemia or acute progressive respiratory acidosis.



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018





CrossMark

Official ERS/ATS clinical practice guidelines: noninvasive ventilation for acute respiratory failure

Bram Rochweg¹, Laurent Brochard^{2,3}, Mark W. Elliott⁴, Dean Hess⁵, Nicholas S. Hill⁶, Stefano Nava⁷ and Paolo Navalesi⁸ (members of the steering committee); Massimo Antonelli⁹, Jan Brozek¹, Giorgio Conti⁹, Miquel Ferrer¹⁰, Kalpalatha Guntupalli¹¹, Samir Jaber¹², Sean Keenan^{13,14}, Jordi Mancebo¹⁵, Sangeeta Mehta¹⁶ and Suhail Raoof^{17,18} (members of the task force)

ERS/ATS GUIDELINES | B. ROCHWERG ET AL.

TABLE 2 Recommendations for actionable PICO questions

Clinical indication [#]	Certainty of evidence [†]	Recommendation
<i>Prevention of hypercapnia in COPD exacerbation</i>	⊕⊕	Conditional recommendation against
Hypercapnia with COPD exacerbation	⊕⊕⊕⊕	Strong recommendation for
Cardiogenic pulmonary oedema	⊕⊕⊕	Strong recommendation for
Acute asthma exacerbation		No recommendation made
Immunocompromised	⊕⊕⊕	Conditional recommendation for
De novo respiratory failure		No recommendation made
Post-operative patients	⊕⊕⊕	Conditional recommendation for
Palliative care	⊕⊕⊕	Conditional recommendation for
Trauma	⊕⊕⊕	Conditional recommendation for
Pandemic viral illness		No recommendation made
Post-extubation in high-risk patients (prophylaxis)	⊕⊕	Conditional recommendation for
Post-extubation respiratory failure	⊕⊕	Conditional recommendation against
Weaning in hypercapnic patients	⊕⊕⊕	Conditional recommendation for

[#]: all in the setting of acute respiratory failure; [†]: certainty of effect estimates: ⊕⊕⊕⊕, high; ⊕⊕⊕, moderate; ⊕⊕, low; ⊕, very low.

CONTROINDICAZIONI ALLA NIV

BT5 (2002) [3]	AT5/ERS (2000-2001) [4]	NAVA S. et al. (2009) [1]	
Facial trauma/burns	Cardiac or respiratory arrest	ABSOLUTE	Respiratory arrest
Recent facial, upper airway, or upper gastrointestinal tract surgery *	Severe encephalopathy (e.g., GCS < 10 **)		Unable to fit mask
Fixed obstruction of the upper airway	Severe upper gastrointestinal bleeding	RELATIVE	Medically unstable—hypotensive shock, uncontrolled cardiac ischaemia or arrhythmia, uncontrolled copious upper gastrointestinal bleeding
Inability to protect airway *	Hemodynamic instability or unstable cardiac arrhythmia		Agitated, uncooperative
Life threatening hypoxaemia *	Facial surgery, trauma, or deformity		Unable to protect airway
Haemodynamic instability *	Upper airway obstruction		Swallowing impairment
Severe co-morbidity *	Inability to cooperate/protect the airway		Excessive secretions not managed by secretion clearance techniques
Impaired consciousness *	Inability to clear respiratory secretions		Multiple (ie, two or more) organ failure
Confusion/agitation *	High risk for aspiration		Recent upper airway or upper gastrointestinal surgery
Vomiting	<p>* NIV may be used, despite the presence of these contraindications, if it is to be the “ceiling” of treatment [3]</p> <p>** GCS: Glasgow Coma Scale</p>		
Bowel obstruction *			
Copious respiratory secretions *			
Focal consolidation on chest radiograph *			
Undrained pneumothorax *			



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018

«A decision about tracheal intubation should be made before commencing NIV in every patient»

BTS GUIDELINE THORAX 2002; 192-211



XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018



Noninvasive Ventilation for the Emergency



Table 2
Predictors of the failure or success of NIV after 1 hour

Failure	Success
Sepsis as a cause of the respiratory failure	Improving pH
ARDS	Improving $Paco_2$
Higher severity score (SAPS II)	Improving Pao_2/Fio_2 ratio

Abbreviations: ARDS, acute respiratory distress syndrome; Fio_2 , fraction of inspired oxygen; NIV, noninvasive ventilation; $Paco_2$, partial pressure of carbon dioxide in arterial blood; Pao_2 , partial pressure of oxygen in arterial blood; SAPS, Simplified Acute Physiology Score.

emergency department (ED) patients with ARF. The use of NIV is associated with decreased rates of intubation and mortality.^{1,2} Importantly, the use of NIV requires knowledge of appropriate patient selection, modes of delivery, selection of the correct amount of positive pressure, and appropriate methods of monitoring the patient.



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



*La ventilazione non invasiva (NIV)
migliora l'ossigenazione e la
ventilazione, previene l'intubazione
endotracheale e riduce il tasso di
mortalità in pazienti selezionati con
insufficienza respiratoria acuta.*

Pazienti selezionati



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



NIV NELL'INSUFFICIENZA RESPIRATORIA ACUTA

Addestramento del personale

- Tecnico
- Motivazionale
- Verificabile. Riverificabile
- Nursing infermieristico

AMBIENTE IDONEO

- Ventilatori, sistemi di ossigenazione
- Sistemi di monitoraggio adeguati
- Logistica dei locali
- Percorsi, protocolli condivisi



Ce la farò
anche stravolta!



Qual è il paziente ideale candidato alla NIV?

Quello che ci prova ma non ce la fa...



XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018



ORIGINAL ARTICLE

Non-invasive ventilation as a first-line treatment for acute respiratory failure: "real life" experience in the emergency department

C Antro, F Merico, R Urbino, V Gai

Emerg Med J 2005;22:772-777. doi: 10.1136/emj.2004.018309

«Il tasso complessivo di successo della NIV (60,5%) è molto inferiore a quello riportato negli studi randomizzati, ma è paragonabile a quello di altri studi osservazionali simili».



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



Noninvasive positive pressure ventilation in the acute care setting: where are we?

Abstract

Noninvasive positive pressure ventilation (NPPV) is a technique used to deliver mechanical

ventilation t

examines th

different co

Strong evid

well as to fa

disease and

patients. W

exacerbatio

respiratory

clinical and physiological monitoring for signs of treatment failure and, in such cases, ETI should be promptly available. A trained team, careful patient selection and optimal choice of devices can optimise outcome of NPPV.

Noninvasive positive pressure ventilation is increasingly being used in the management of acute respiratory failure but caregivers must respect evidence-supported indications and avoid contraindications. Additionally, the technique must be applied in the appropriate location by a trained team in order to avoid disappointing results.

CONCLUSIONS

Noninvasive positive pressure ventilation has assumed an important role in managing patients with acute respiratory failure. Even in conditions in which noninvasive positive pressure ventilation has strong evidence of success, patients should be monitored closely for signs of treatment failure and should be promptly intubated before a crisis develops. The application of noninvasive positive pressure ventilation by a trained and experienced team, with careful patient selection and choice of appropriate location and setting, should optimise patient outcomes. It should be made clear that noninvasive positive pressure ventilation is not a panacea nor the "poor man's" technique of mechanical ventilation. Conversely, it cannot replace endotracheal intubation in all circumstances.

Monitoraggio

Target	Tool
Clinical	
Sensorium	KELLY and MATHAY [107] scale, Glasgow Coma Scale
Dyspnoea	Borg Scale, Visual Analogue Scale
Respiratory rate	Clinical, ventilator monitor
Respiratory distress	Use of accessory muscles, abdominal paradox
Mask comfort	Clinical
Compliance with ventilator setting	Clinical
Vital signs	Clinical
Physiology	
Arterial oxygen saturation	Pulse oximetry, arterial blood gas sample (frequently during first hours)
Arterial blood pressure	Clinical, monitoring (noninvasive)
ECG	
Ventilator setting	
Air leaks	Clinical, ventilator monitor
Patient-ventilator interaction	Clinical, ventilator monitor
Set parameters	Ventilator monitor



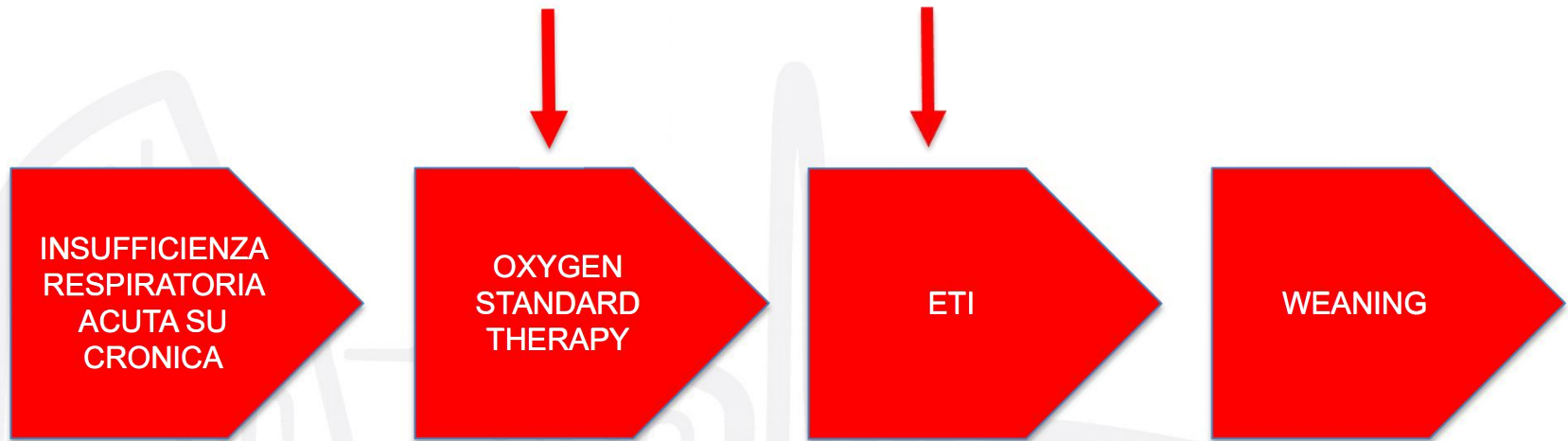
XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



EARLY IN ALTERNATIVA



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018

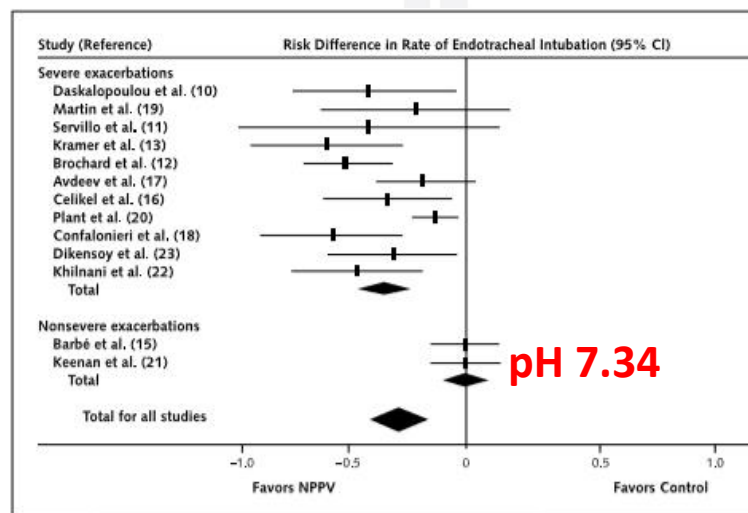


Which Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease Benefit from Noninvasive Positive-Pressure Ventilation?

A Systematic Review of the Literature

Sean P. Keenan, MD, FRCPC, MSc (Epid); Tasnim Sinuff, MD, FRCPC; Deborah J. Cook, MD, FRCPC, MSc (Epid); and Nicholas S. Hill, MD

EARLY TO AVOID INTUBATION ENDOTRACHEAL INTUBATION



Unit of expression equates a reduction of 1.0 as equal to a 100% risk difference or absolute risk reduction. NPPV = noninvasive positive-pressure ventilation.



Acidosis, non-invasive ventilation and mortality in hospitalised COPD exacerbations

C M Roberts,^{1,2} R A Stone,^{1,3} R J Buckingham,¹ N A Pursey,¹ D Lowe,¹ On behalf of the National Chronic Obstructive Pulmonary Disease Resources and Outcomes Project (NCROP) implementation group

Review: non-published

Conclusions COPD admissions treated with NIV in usual clinical practice were severely ill, many with mixed metabolic acidosis. Some eligible patients failed to receive NIV, others received it inappropriately. NIV appears to be often used as a ceiling of treatment including patient groups in whom efficacy of NIV is uncertain. The audit raises concerns that challenge the respiratory community to lead appropriate clinical improvements across the acute sector.



XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018

Thorax Online First, published on November 12, 2010 as 10.1136/thx.2010.153114

Chronic obstructive pulmonary disease



KEY POINTS

La NIV nell'insufficienza respiratoria acuta ipercapnica rappresenta un ***gold standard***.

Se applicata precocemente:

Riduce significativamente in tasso di IOT, la mortalità e le complicanze infettive

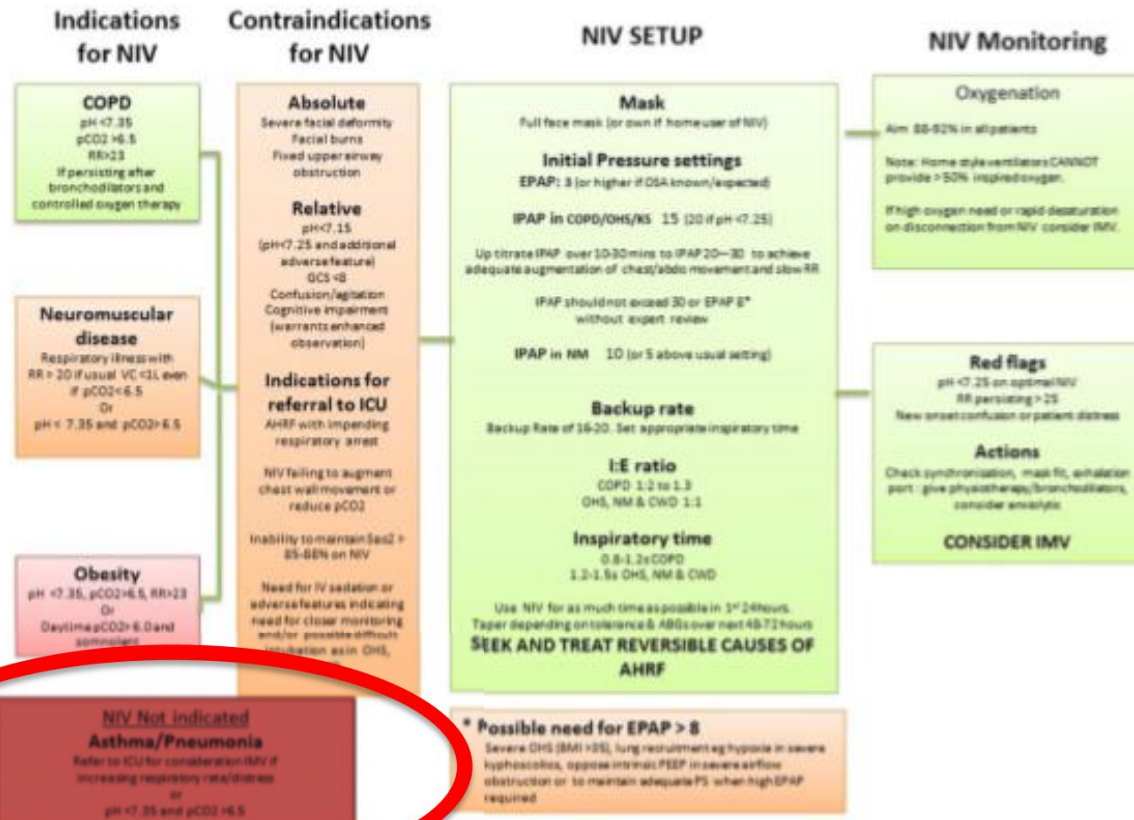
Cautela, invece, è richiesta nel trattamento delle forme di acidosi più severa, sia pur riducendo le complicanze infettive e la durata della degenza rispetto all'IOT, il rischio di IOT è più elevato.

Expertise, corretta selezione del paziente e dell'ambiente in cui trattarlo sono importanti chiavi per il successo.



BTS/ICS guideline for the ventilatory management of acute hypercapnic respiratory failure in adults

A Craig Davidson,¹ Stephen Banham,¹ Mark Elliott,² Daniel Kennedy,³ Colin Gelder,⁴ Alastair Glossop,⁵ Alastair Colin Church,⁶ Ben Creagh-Brown,⁷ James William Dodd,^{8,9} Tim Felton,¹⁰ Bernard Foëx,¹¹ Leigh Mansfield,¹² Lynn McDonnell,¹³ Robert Parker,¹⁴ Caroline Marie Patterson,¹⁵ Milind Sovani,¹⁶ Lynn Thomas,¹⁷ BTS Standards of Care Committee Member, British Thoracic Society/Intensive Care Society Acute Hypercapnic Respiratory Failure Guideline Development Group, On behalf of the British Thoracic Society Standards of Care Committee



BTS/ICS guideline for the ventilatory management of acute hypercapnic respiratory failure in adults

A Craig Davidson,¹ Stephen Banham,¹ Mark Elliott,² Daniel Kennedy,³ Colin Gelder,⁴ Alastair Glossop,⁵ Alistair Colin Church,⁶ Ben Creagh-Brown,⁷ James William Dodd,^{8,9} Tim Felton,¹⁰ Bernard Foëx,¹¹ Leigh Mansfield,¹² Lynn McDonnell,¹³ Robert Parker,¹⁴ Caroline Marie Patterson,¹⁵ Milind Sovani,¹⁶ Lynn Thomas,¹⁷ BTS Standards of Care Committee Member, British Thoracic Society/Intensive Care Society Acute Hypercapnic Respiratory Failure Guideline Development Group, On behalf of the British Thoracic Society Standards of Care Committee

Acute asthma

Recommendations

39. NIV should not be used in patients with acute asthma exacerbations and AHRF (Grade C).
40. Acute (or acute on chronic) episodes of hypercapnia may complicate chronic asthma. This condition closely resembles COPD and should be managed as such (Grade D).



XI congresso nazionale

simeu

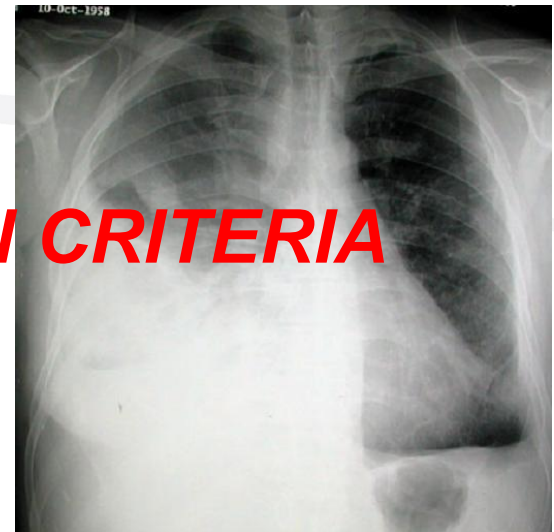
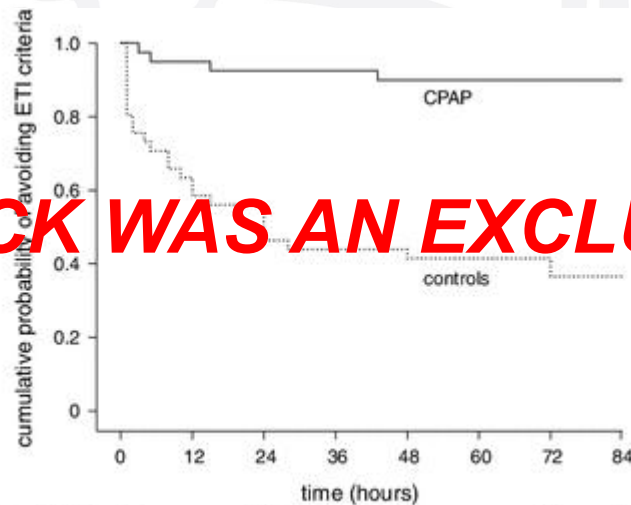
ROMA 24-26 MAGGIO 2018

Anna Maria Brambilla
Stefano Aliberti
Elena Prina
Francesco Nicoli
Manuela Del Forno
Stefano Nava
Giovanni Ferrari
Francesco Corradi
Paolo Pelosi
Angelo Bignamini
Paolo Tarsia
Roberto Cosentini

Helmet CPAP vs. oxygen therapy in severe hypoxemic respiratory failure due to pneumonia

	Helmet – CPAP (n.40)
PaO ₂ /FIO ₂	134
Rate of NIV Failure	15%

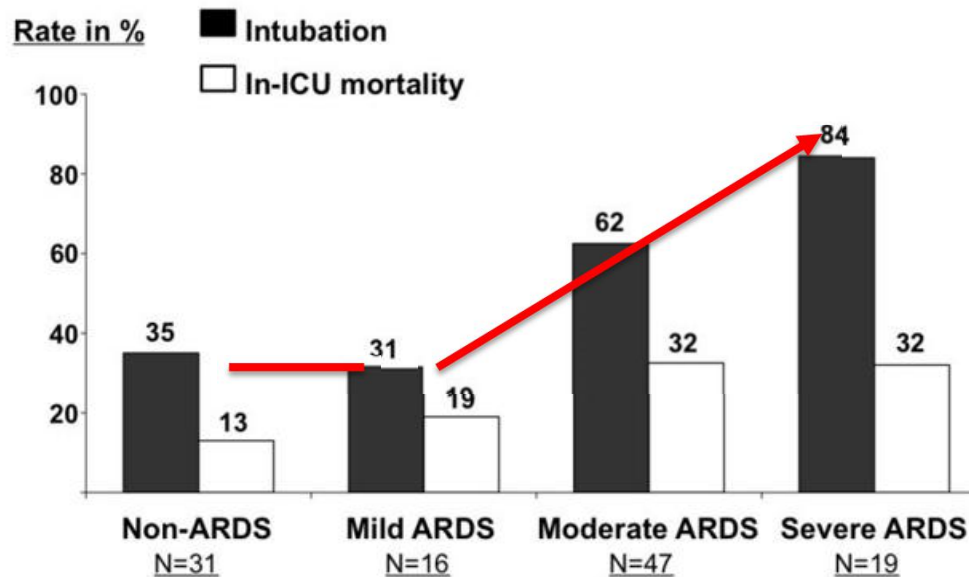
O ₂ therapy (n. 41)
148
63,4%



Non-invasive ventilation for acute hypoxemic respiratory failure: intubation rate and risk factors

Arnaud W Thille , Damien Contou, Chiara Fragnoli, Ana Córdoba-Izquierdo, Florence Boissier and Christian Brun-Buisson

Critical Care 2013 **17**:R269



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018

Critical care 2013, 17-26



KEY POINTS

La NIV nell'insufficienza respiratoria acuta de novo **NON** rappresenta un gold standard.

È necessaria un'accurata selezione del paziente da trattare: EPA, IRA post chirurgica e immunodepressione rappresentano la categoria con più alta evidenza di successo della NIV

Cautela, invece, è richiesta nel trattamento delle CAP/ARDS con NIV: monitoraggio, rapida valutazione di efficacia (1-2 ore), rapido passaggio alla IET se necessario

Il **casco** potrebbe rappresentare la scelta più efficace

Alti flussi prima scelta e dovrebbero essere introdotti non appena si renda necessario aumentare i flussi di $O_2 > 5 \text{ l/m}$

Timing of noninvasive

pot

Ezgi

Author

This

Abs

Back

Ident

of the

timin

poter

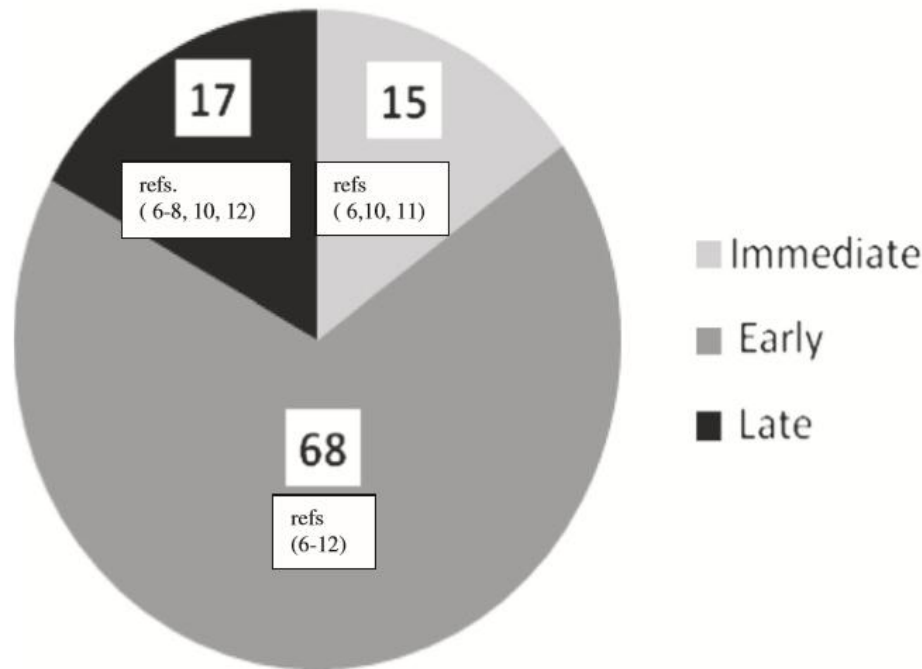
Results

The possible secretions, hy major potenti changing ven differ for hyp poor arterial t the persistenc NIV) can occ

Conclusion

Every clinicia NIV failure th late signs of c

NIV Failure Rate (%)



ex, excessive
nchry. The
c bronchoscopy,
within 1 to 48 h) may
failure are due to
erity of illness, and
are (48 h after

l parameters of
l to detect early and



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018

«NIMV MAY BE AN ALTERNATIVE, IN PATIENTS REFUSING INVASIVE MV, OR FOR THOSE IN WHOM THE PHISICIAN IN CHARGE DECIDED THAT INVASIVE MV MAY BE UNETHICAL..»

WISACHI M. ANTONELLI M. EUR. RESPIRATORY JOURNAL 2001



XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018



Palliative use of non-invasive ventilation in end-of-life patients with solid tumours: a randomised feasibility trial.

Nava S¹, Ferrer M, Esquinas A, Scala R, Groff P, Cosentini R, Guido D, Lin CH, Cuomo AM, Grassi M.

Author information

Abstract

BACKGROUND: Despite best-possible medical management many patients with end-stage cancer experience breathlessness

BACKGROUND: Despite best-possible medical management, many patients with end-stage cancer experience breathlessness, especially towards the end of their lives. We assessed the acceptability and effectiveness of non-invasive mechanical ventilation (NIV) versus oxygen therapy in decreasing dyspnoea and the amount of opiates needed.

METHODS: In this randomised feasibility study, we recruited patients from seven centres in Italy, Spain, and Taiwan, who had solid tumours and acute respiratory failure and had a life expectancy of less than 6 months. We randomly allocated patients to receive either NIV (using the Pressure Support mode and scheduled on patients' request and mask comfort) or oxygen therapy (using a Venturi or a reservoir mask). We used a computer-generated sequence for randomisation, stratified on the basis of patients' hypercapnic status ($\text{PaCO}_2 > 45 \text{ mm Hg}$ or $\text{PaCO}_2 \leq 45 \text{ mm Hg}$), and assigned treatment allocation using opaque, sealed envelopes. Patients in both groups were given subcutaneous morphine to reduce their dyspnoea score by at least one point on the Borg scale. Our primary endpoints were to assess the acceptability of NIV used solely as a palliative measure and to assess its effectiveness in reducing dyspnoea and the amount of opiates needed compared with oxygen therapy. Analysis was done by intention to treat. This study is registered with ClinicalTrials.gov, number NCT01331438.

RESULTS: We recruited patients between Jan 13, 2008, and March 3, 2011. Of 234 patients eligible for recruitment, we randomly allocated 200 (85%) to treatment: 99 to NIV and 101 to oxygen. 11 (11%) patients in the NIV group discontinued treatment; no patients in the oxygen group discontinued treatment. Dyspnoea decreased more rapidly in the NIV group compared with the oxygen group (average change in score, -0.3 [95% CI -0.23 to -0.23 , $p=0.0012$), with most benefit seen after the first hour of treatment and in hypercapnic patients. The total dose of morphine during the first 48 h was lower in the NIV group than it was in the oxygen group (26.9 mg [37.3] for NIV vs 59.4 mg [SD 67.1] for oxygen; mean difference -32.4 mg , 95% CI -47.5 to -17.4). Adverse events leading to NIV discontinuation were mainly related to mask intolerance and anxiety. Morphine was suspended because of severe vomiting and nausea (one patient in each group), sudden respiratory arrest (one patient in the NIV group), and myocardial infarction (one patient in the oxygen group).

INTERPRETATION: Our findings suggest that NIV is more effective compared with oxygen in reducing dyspnoea and decreasing the doses of morphine needed in patients with end-stage cancer. Further studies are needed to confirm our findings and to assess the effectiveness of NIV on other outcomes such as survival. The use of NIV is, however, restricted to centres with NIV equipment, our findings are not generalisable to all cancer or palliative care units.

Riduzione della dispnea
Riduzione dosaggio di morfina 26,9 vs 59,4 mg
Riduzione tp con ossigeno





TASK FORCE REPORT
ERS/ATS GUIDELINES



CrossMark

Official ERS/ATS clinical practice guidelines: noninvasive ventilation for acute respiratory failure

Bram Rochwerg¹, Laurent Brochard^{2,3}, Mark W. Elliott⁴, Dean Hess⁵, Nicholas S. Hill⁶, Stefano Nava⁷ and Paolo Navalesi⁸ (members of the steering committee); Massimo Antonelli⁹, Jan Brozek¹, Giorgio Conti⁹, Miquel Ferrer¹⁰, Kalpalatha Guntupalli¹¹, Samir Jaber¹², Sean Keenan^{13,14}, Jordi Mancebo¹⁵, Sangeeta Mehta¹⁶ and Suhail Raoof^{17,18} (members of the task force)

Conclusions

Based on a systematic review of the literature, and building upon previous meta-analyses and guidelines, we make recommendations regarding the current use of NIV for various forms of respiratory failure encountered in acute care settings (table 2). Our recommendations are largely in line with guidelines published within the past 15 years, but others have been incremental adaptations to new studies and information have become available. We anticipate that some of these recommendations will change in the future as new studies are completed, especially regarding the use of NIV as opposed to other emerging technologies such as high-flow nasal cannula therapy and extracorporeal CO₂ removal. We emphasise that these guidelines should not be interpreted as absolute and should be implemented based on patient factors, including individual values and preferences, only in combination with clinical judgement. We also refer readers to the supplementary material in which we address a number of issues related to practical application of NIV that have not been subject to the GRADE process.



XI congresso nazionale

simeu

ROMA 24-26 MAGGIO 2018



La NIV, così come le altre terapie, pur tenendo conto delle linee guida, non dovrebbe mai prescindere dal giudizio clinico.