325. Noninvasive ventilation on the intensive care unit: from novel application to end of life issues

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Noninvasive mechanical ventilation in patients with acute respiratory failure due to H1N1 infection

Eva Tonveronachi[1], Ilaria Valentini[1], Andrea Fabiani[1], Rosanna Vaschetto[2], Antonina Pigna[3], Riccardo Maviglia[4], Gabriela Sangiorgi[5], Massimo Gorini[6], Marco Adversi[3], Gianfranco Di Nino[3], Stefano Faenza[5], Massimo Antonelli[4], Paolo Navalesi[2], Stefano Nava[1]. *[1]Respiratory ICU, Sant'Orsola Malpighi Hospital, Bologna, Italy; [2]SCDU, Universita' Piemonte Orientale, Ospedale della Carita', Novara, Italy; [3]Anestesia e Terapia Intensiva Polivalente, Sant'Orsola Malpighi Hospital, Bologna, Italy; [4]Department of Intensive Care and Anesthesiology, Policlinico Universitario A. Gemelli, Università Cattolica del Sacro Cuore, Roma, Italy; [5]Anestesiologia e Rianimazione, Sant'Orsola Malpighi Hospital, Bologna, Italy; [6]Respiratory ICU, Ospedale Careggi, Firenze, Italy*

We evaluated the clinical outcomes of consecutive patients positive for H1N1 and admitted to 6 Intensive Care Units in Italy for severe Acute Respiratory Failure and requiring non-invasive mechanical ventilation (NIV). 29/54 (54%) patients admitted to the ICUs needed immediate intubation for gasping, coma or respiratory arrest. The remaining 25 patients (mean age 49.8±12) underwent an NIV trial as a first line treatment using the helmet (n.19 patients) or a total face mask (n.6). Arterial Blood Gases (ABGs) at enrolment were: pH=7,41±0.02, PaO_2/FiO_2=117±64 and $PaCO_2$=40,5±9. At the first ABGs control (between 30' and 90') PaO_2/FiO_2 significantly ($p<0.001$) improved to 187±43 with a concomitant decrease in $PaCO_2$ to 36.4±9. Mean duration of NIV was 49.8±33 hrs. 10/25 (40%) of the patients required intubation after 20.3 hrs. Overall mortality rate was 7/25 (28%), with all the deaths occurring in the NIV failure group. NIV failure had a lower PaO_2/FiO_2 at admission (78.6±21 vs 152.4±32 $p<0.01$, for NIV failure and success, respectively) and 5/7 patients had a known risk factor (i.e.hematological malignancies (n.2), previous solid organ transplant (n.1),multiple sclerosis (n.1) and CHF (n.1) None of the operators were apparently contaminated by the virus. NIV may be safely used to treat patients with severe ARF due to H1N1 infections. The success rate was similar for that reported in the literature for ALI/ARDS patients.

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NIV and influenza A H1N1 pneumonia

Antonello Nicolini[1], Mario Santo[2], Monica Bonfiglio[3], Alberto Carrassi[4]. *[1]Respiratory Diseases Department, Respiratory Intermediate Care Unit, Sestri Levante, Italy; [2]Internal Medicine Department, Medical Intermediate Care Unit, Lavagna, Italy; [3]Emergency Department, Intensive Care Unit, Lavagna, Italy; [4]Respiratory Diseases Department, Intermediate Care Unit, St. Paul Hospital, Bari, Italy*

Background: NIV was not recommended for patients with influenza A H1N1 virus pneumonia complicated by ALI or acute ARDS,because, although it could temporarily improve oxygenation, it does not necessarily change the natural disease course.In this regard several authors have reported high rates of NIV failure

in pandemic influenza A H1N1 pneumonia.However, other authors have recently reported some cases demonstrating the effectiveness of NIV in ARDS/ALI related to H1N1 pneumonia.
Aim and methods: The objective of this study is to describe the clinical characteristics of patients with diagnosis of Influenza A H1N1 pneumonia with ARDS/ALI with whom NIV has been effective.75 patients affected by Influenza A H1N1 pneumonia were admitted to our Hospitals: among them,29 patients presented ARDS/ALI;5 patients were admitted to ICU, and 24 underwent NIV and admitted to RICU.
Results: NIV failed in 3 of the 24 patients, but in 21 had a good outcome.
None of the patients treated with NIV died.
The duration of NIV was 5.0±1.9 days and the hospital stay 11.2±4.0 days. The average P/F ratio at admission was 184.6±29.2 and SAPSII was17.8±2.6; the average P/F ratio after 1 h of NIV was 239.1±42.3. No patient had multiorgan failure.
Discussion: In our study NIV had a success in 21 of the 24 patients (87.5%) and this the higher rate of success described in the literature: in our opinion the reasons explaining the results could be the choice of the patients to be treated with ALI and mild ARDS (P/F $\geq$ 150), and the strict following of the predictors of success for NIV as SAPSII $\leq$ 34 and P/F after 1 hour of NIV $\leq$175. Clinicians should be aware of pulmonary complications of influenza A H1N1 and strictly select the patients to undergo niv: perhaps, can we give niv a chance?

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Non-invasive ventilation with neurally adjusted ventilatory assist improves patient-ventilator interaction

Martin Dres[1], Matthieu Schmidt[1], Matthieu Raux[2], Thomas Similowski[1], Alexandre Demoule[1]. *[1]Service de Pneumologie et de Réanimation Médicale, Groupe Hospitalier Pitié Salpétrière, Paris, France; [2]Departement d'Anesthésie et de Réanimation, Groupe Hospitalier Pitié Salpétrière, Paris, France*

Neurally adjusted ventilatory assist (NAVA) is a mode of partial ventilatory support in which neural inspiratory activity is monitored and cycled through the continuous esophageal recording of the diaphragmatic electromyogram (EAdi). In non invasive ventilation (NIV), leaks can lead to patient-ventilator asynchronies which are source of failure. Then, using NAVA in NIV could, like in invasive ventilation, improve patient-ventilator interaction.
We analyzed whether, in comparison with pressure support (PS) with or without NIV algorithm (PS-NIV+ or PS-NIV0), NAVA with or without NIV algorithm (NAVA-NIV+ or NAVA-NIV0) could reduce inspiratory trigger delay, improve expiratory synchrony, and reduce the number of patient-ventilator asynchronies in NIV post-extubation patients. Randomly, the patients were ventilated during ten minutes in these four modes. Ventilatory breathing pattern and asynchronies (inspiratory and expiratory trigger delay, ineffective effort, autotriggering, double triggering, premature and late cycling) were compared between the four groups.
Seventeen patients were observed. Switching from PS-NIV+ to NAVA-NIV+ and from PS-NIV0 to NAVA-NIV0 did not appear to significantly modify the pattern of breathing. Leaks were significantly higher between NIV+ and NIV0. Inspiratory trigger delay was significantly shorter in NAVA-NIV+ than in PS-NIV+ (20 vs. 980ms, p < 000.1) and in NAVA-NIV0 than PS-NIV0 (10 vs 590ms, p <0.001). The asynchrony index significantly decreased when PS was switched to NAVA in both conditions (21.7 vs 8.1% and 43.1 vs 6.2%; p <0.0001).
Compared to PS, NIV with NAVA improves patient-ventilator interaction which did not depend of the leaks level.

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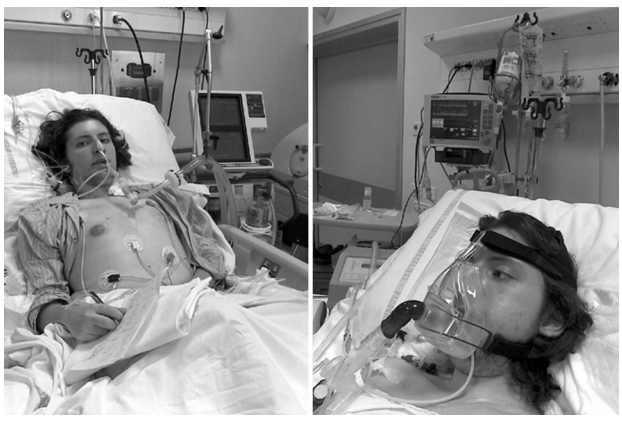
Prevention of extubation failure in high-risk neuromuscular disease patients

Luciana Paladini, Giovanna Arcaro, Federico Gallan, Maria Rita Marchi, Fausto Braccioni, Maddalena Chizzolini, Alessia Donà, Andrea Vianello. *Respiratory Pathophysiology Division, University-City Hospital of Padova, Padova, Italy*

Background: A substantial proportion of Neuromuscular Disease (NMD) pts who undergo invasive MV for ARF should be considered at high risk for extubation failure. We prospectively investigated the efficacy of early application of Non-Invasive Ventilation (NIV) combined with Assisted Coughing (AC) as an intervention aimed at preventing extubation failure in NMD pts.
Methods: Prospective analysis of the short-term outcomes of 10 NMD pts who were treated by NIV and AC immediately after extubation (Group A) and comparison with the outcomes of 10 historical control pts who received Standard Medical Treatment (SMT) alone (Group B).
Results: Significantly fewer pts who received the treatment protocol required reintubation and tracheostomy compared with those who received SMT (reintubation: 3 vs 10; tracheostomy: 3 vs 9; p=0.002 and 0.01, respectively). Pts in Group A remained for a shorter time in the RICU compared to Group B (7.8±3.9 vs 23.8±15.8 days; p=0.006).
Conclusions: Preventive application of NIV plus AC after extubation provides an important advantage to NMD pts by averting the need for reintubation or tracheostomy, and shortening their stay in the RICU.



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Do patients sleep under noninvasive ventilation (NIV) in the intensive care unit (ICU)?

Ana Cordoba Izquierdo, Xavier Drouot, Arnaud W. Thille, Fabrice Galia, Laurent Brochard. *Réanimation Médicale, AP-HP, Centre Hospitalier Albert Chenevier-Henri Mondor, Créteil, France Unité Explorations Fonctionnelles, AP-HP,Centre Hospitalier Albert Chenevier-Henri Mondor, Créteil, France Service de Soins Intensifs, Hôpital Universitaire de Genève et Université de Genève, Geneva, Switzerland*

Rationale: Whether patients receiving NIV are really sleeping in the ICU, and whether sleep occurs during the NIV sessions is unknown. In addition the ventilator used may influence patient-ventilator synchronizarion (1) and cause sleep disruption (2).
Objectives: 1. To analyze sleep quality and quantity in ICU patients receiving NIV for acute hypercapnic respiratory failure (AHRF). 2. To compare sleep between two different types of ventilators (these results are not yet available).
Material and methods: Prospective study on consecutive ICU patients treated by NIV for AHRF. On the 2nd to 4th day of admission patients were randomized to receive NIV with their current ICU ventilator or with a specific NIV ventilator (Respironics V60) and a polysomnographic study was conducted during a 17 hour-period (3pm to 8am).
Results: 14 patients included, 7 in each group, age 73±9, pH 7.28±0.07, PCO2 77±18 mmHg. Previous respiratory disease: COPD 39%, obesity hypoventilation/sleep apnea syndrome 43%. Time under NIV previous to inclusion 18±11hours. Time under NIV during the study period 7.5±1 hours in 2 or 3 sessions.
During the study period patients slept 5.9±2 hours (42±2% stages 1+ 2, 38±2% stage 3, 12±6% REM) with a fragmentation index of 29±13 arousals and awakenings per hour of sleep. 76% of the total sleep time (4.5±1.3 hours) happened during the night period (11pm to 8am), and 80% took place under NIV.
Conclusions: In patients treated for AHRF in the ICU, sleep architecture is relatively preserved, with most of the sleep time occurring at night. NIV seems to favour sleep during the night period.
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Ethical issues in idiopathic pulmonary fibrosis with acute respiratory failure (IPF-ARF): An Italian survey

Raffaele Scala[1], Stefano Nava[2], Antonio Corrado[3], Marco Confalonieri[4], Nicola Facciolongo[5]. *[1]UO Pneumologia e UTIR, Ospedale Campo di Marte, Lucca, Italy; [2]UO Pneumologia e UTIR, Ospedale S. Orsola, Bologna, Italy; [3]UTIP, Azienda Ospedaliera-Universitaria Careggi, Firenze, Italy; [4]UO Pneumologia e UTIR, Ospedale Cattinara, Trieste, Italy; [5]UO Pneumologia e UTIR, Arcispedale S. Maria Nuova, Reggio Emilia, Italy*

Aims: To determine Italian Pulmonologist's attitudes and behaviour towards diagnostic and therapeutical choices in competent IPF-ARF patients.
Methods: A web-site survey (30-items questionnaire) was sent to all the members of the Study Groups of *Respiratory Intensive Care* and *Diffuse Lung Diseases* of *Italian Association of Italian Pulmonologists* (January-March 2009).
Results: 248/370 (67%) physicians responded to the questionnaire (>60%:over-fifties, male, Catholics).
About 75% of respondents agreed on having *anticipated directives* and on eventually communicating *bad news* about IPF-ARF.
>75% of respondents answered that any diagnostic (BAL and/or TBB) and therapeutical choices (drugs,ventilation,palliative care) should be discussed with the patients and relatives. However, almost 50% of respondents reported to start ventilation and palliative care only in <25% of cases.
BAL under NIV was recommended to eventually find the cause of ARF by half of respondents, while 77% reported to perform BAL and/or TBB in <25% of cases.
More responders stated that NIV was not likely to improve survival (76.7% vs 10.0%) and to facilitate the communication with the relatives (50.7% vs 19.4%).
43.5% of the physicians did not agree on the concept of using NIV to reduce dyspnea and 40% on its use to gain time for end-of-life decisions. >60% of the

respondents considered to perform NIV and intubation when a reversible ARF cause is supposed.
About 60% of the respondents used NIV and palliation in <25% of cases, while >90% of them intubated patients in <25% of cases.
Conclusions: A discrepancy between attitudes and behaviour of Italian Pulmonologists emerged towards IPF-ARF issues.

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Are inpatients with COPD requiring treatment with NIV receiving adequate palliative care at the end of their life?

William Kent, Seher Zaidi, Thomas Bongers. *Respiratory Medicine, Southport and Ormskirk NHS Hospital Trust, Southport, United Kingdom*

Introduction: Although beneficial to many patients, recent data suggests significant mortality rates of up to 25% with acute Non-Invasive Ventilation (NIV) treatment [1]. It is therefore important to recognize when treatment is failing and when palliative care is appropriate.
Methods: A retrospective case note review of patients who died with type II respiratory failure due to COPD on NIV as ceiling of treatment was performed. Patients were identified at two hospital sites (University Hospital=UH) and (District General Hospital=DGH). The diagnosis, prognosis, discussion with next of kin and management plan for each patient was studied. For the DGH patients it was also recorded whether they had been prescribed "prn medications" for palliative relief of their symptoms.
Results: 16 DGH/21UH patients were identified and the results combined. Prognosis was identified as poor in 30/37 patients (81%). Discussion with next of kin took place in 30/37 patients (81%). A "care of the dying" pathway was started in 7/37 patients (19%). In the DGH patients, "prn medications" were prescribed in 7/16 patients (44%). No Cardio Respiratory Resusitation (CPR) decision was made in 2/16 patients which resulted in inappropriate CPR attempts.
Conclusion: This study highlights the deficiency in our management of end of life care in patients with end stage COPD on NIV. We need to improve our decision making with regards to CPR decisions, symptom control and appropriate palliative care.
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