242. Application of noninvasive ventilation in non-obstructive patients

P2042
Results of non invasive ventilation in patients with acute hypercapnic ventilatory failure and obesity hypoventilation syndrome (OHS)
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Background: The NIV is used in patients with OHS presenting with hypercapnic respiratory failure. Few studies examine the evolution and impact after starting this therapy in this patient group.

Objective: - Evaluate the result of NIV started in obese patients in acute hypercapnic respiratory failure and its prognosis consequences.
- Assess the impact of long-term NIV.

Material and methods: Observational study with consecutive inclusion of obese patients with acute hypercapnic respiratory failure treated with NIV from Feb 08 to Jun 11.

Results: See Tables 1 and 2.
At the moment of discharge no differences were observed in commorbidities, clinical data an blood gases between patients with or without NIV treatment. Patients discharged with NIV had tolerated better and had more total hours of use with BiPAP than those discharged without it.
Compliance measured at 3 months of onset and the last recorded was 4.51±3.30 hours and 5.12±3.42 hours daily.

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N=196/Gender Age IMC PVC FEx1 PVC Follow up
171 F25 M 75±11 years 39±7 60±22 65±20 78±11 1,3±0.94

pH Pco2 PO2 Glasgow Mean stay Hospital mortality Global mortality
7.2±1±3 60±26 13±3 11±7 17.9% 80 (40%) 7.8±1±3 96±26 13±3 11±7 17.9% 80 (40%)

Conclusions: 1. Non invasive ventilation is an effective tool for treating patients with obesity-hypoventilation syndrome and hypercapnic respiratory failure. 2. Patients who received home treatment with NIV survived longer than those who didn’t. This forces us to review NIV treatment at discharge.

P2043
Noninvasive ventilation during percutaneous endoscopic gastrostomy in amyotrophic lateral sclerosis patients with severe ventilatory impairment
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Introduction: Patients with amyotrophic lateral sclerosis(ALS) and severe bulbar muscle impairment may be at respiratory failure risk during percutaneous endoscopic gastrostomy(PEG). Noninvasive ventilation(NIV) might reduce the risk of respiratory complications in patients with severe ventilatory impairment(SVI).

Objective: To report the outcomes of PEG placement with NIV in ALS patients with SVI.

Methods: Retrospective study including ALS patients with severe bulbar muscle impairment and indication for PEG placement. PrePEG pulmonary data was analyzed. Procedure was performed under nasal NIV using patients home b-level ventilator. Vital signs, estimated tidal volumes and air-leans were monitored. Due to increases in mouth air-leans during the procedure ventilator parameters were readjusted. Low flow oxygen was only for SpO2<95% despite NIV optimization. If SpO2<92% could not be reached the procedure was cancelled. NIV was maintained for 3h after.

Results: Ten patients(mean age 68.2 years) were included. Six patients didn’t require hospital admission. Patient’s prePEG pulmonary assessment is in Table1.

All patients used home NIV for 5.9±10 months(mean daily use 14h±32).

Patients started the procedure with mean IPAP:19.2±3 and EPAP:6.7±1.15 mmHg. All patients successfully underwent PEG placement with no complications, tolerated the ventilator adjustments maintaining SpO2>95% for 1month survival was 100%.

Conclusion: NIV allows successful PEG placement in ALS patients with severe ventilatory impairment.

P2044
Training and confidence in the use of NIV/BiPAP amongst front-line medical staff in a teaching hospital setting
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Background: Non-invasive ventilation is an evidence-based and validated treatment for patients with type II respiratory failure, and is widely used in acute and chronic settings. Poor training/preparedness have been linked with poor patient outcomes.

Aims and objectives: Staff confidence in managing patients on NIV is poorly described in the literature. Medical interns (with basic medical training) frequently care for patients on NIV during and outside normal working hours. We aimed to assess the preparedness and confidence of year 1 interns in managing patients on NIV within a teaching hospital in the UK. A structured questionnaire probed doctors’ understanding, confidence and practical skills in administering NIV.

Methods: 30 interns completed the questionnaire at a weekly mandatory teaching session. Answers were collated and analysed.

Results: 43% of interns did not know what “BiPAP” stands for; 33% described their knowledge of NIV indications as inadequate; 87% had no formal teaching in the use of NIV; 87% described their practical knowledge of NIV as inadequate, and 70% felt their confidence in managing patients on NIV was inadequate. The overwhelming majority (90%) of respondents felt they needed formal training in the use of NIV to ensure patient safety.

Conclusion: Our study illustrates worrying shortfalls in the training and confidence of front-line medical staff in the use of a medical intervention frequently found on hospital wards. This suggests a role for formal training at either the undergraduate or early postgraduate stage.

P2045
Introduction of a non invasive ventilation (NIV) care bundle in a district general hospital
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Introduction: A care bundle is a group of evidence based actions needed to deliver optimal care in a clinical setting. It takes the form of a simple checklist, placed in the notes, which serves as a reminder to clinicians. It aims to ensure consistent delivery of care leading to safe and reliable care. Compliance with all elements is needed for optimum benefit.

Method: A 7 item bundle was created for acute NIV. It was introduced to coincide with the 2011 British Thoracic Society (BTS) NIV audit so that the impact could be assessed by comparison with the 2010 audit. The bundle was provided in the form of a sticker to be inserted in the case notes when NIV was commenced. Bundle elements not included in the table below were (1) NIV only to be delivered in areas where nursing staff are trained (2) arterial blood gases checked at 1 hour (3) and at 4 hours (4) review by a pulmonologist within 24 hours (Mon – Fri).

Results: 13 of 19 patients (67%) had a bundle in the notes. 11 of 13 (85%) had all 7 elements completed. The impact of the bundle on key measurements are summarised in the table (bundle items highlighted).

Conclusion: Implementation of an NIV bundle is possible in a DGH and coincided with improved audit outcomes, particularly documentation of escalation plan, and increased pressures. Numbers are small but it may have contributed to reduced mortality and length of stay.

P2046
Efficacy and safety of continuous sedation for agitated patients under noninvasive ventilation
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Introduction: Sedation is often required for agitated patients under noninvasive ventilation (NIV). However, there have been few reports on use of continuous sedation in this setting.

Aims: To evaluate the efficacy and safety of continuous sedation for agitated patients under NIV.

Methods: We retrospectively reviewed 110 patients receiving NIV for acute respiratory failure from May 2007 to December 2011, who needed sedation for treatment of agitation. Difference in clinical outcomes was compared between the continuous use group and intermittent use group, according to do-not-intubate (DNI) status (n=73) or non-DNI status (n=37).

Results: In non-DNI patients, the severity assessed by baseline P/F ratio and PaCO2 were lower in continuous use group and intermittent use group, according to do-not-intubate (DNI) status (p=0.005). No patient in continuous use group required intubation due to agitation, while three patients in intermittent use group required intubation due to failure of sedation (9% vs. 5%, p=0.54). In DNI patients, baseline PI/R ratio was lower and the mortality was higher in continuous use group (n=33) compared with intermittent use group (n=40) (131±41 mmHg vs. 151±42 mmHg, p=0.017, and 85% vs. 58%, p=0.01). Only one patient in continuous use group failed to continue NIV due to agitation. Patients with continuous sedation were safely managed under NIV with the level of sedation assessed by Richmond Agitation Sedation Scale, except only one adverse event of hypotension caused by midazolam.

Conclusions: Continuous sedation could be safely administered, and potentially prevent undesirable intubation due to persisting agitation under NIV.
P2047 Effects of a high-flow nasal cannula system (nHF) on ventilation in healthy volunteers and patients with IPF
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Introduction: Treatment with a nHF-system is able to improve symptoms of acute and chronic respiratory insufficiency. The method uses a warmed and humidified flow of air/oxygen with 10-50 liter per minute (lpm). By using these devices an increase of mean pressure, pressure amplitude and a decrease in pCO2 is observable.

Method: Healthy volunteers and patients with IPF were included in this study. For detection of volume changes, frequency variations and I/E-ratios we used impedance measure bands. The bands were placed 10 cm below jugulum and 10 cm below xiphoid. The signal was relayed to a polysomnography device. Flows from 10 lpm up to 50 lpm with small, medium and large nasal prongs were tested. To compare the results with a closed ventilation support system, the measurements were also performed with CPAP 6 and 10 mbar and BiPAP 14/6 mbar. We compared the results with values measured during spontaneous breathing.

Results: HFNC led to no changes in tidal volume in patients with IPF and a decrease in healthy volunteers. The breathing rates in healthy volunteers and patients with IPF in comparison with spontaneous breathing were decreased. The I/E-ratio results in no significant changes in healthy volunteers and patients with IPF. In both groups, the minute volume was decreased. In comparison with CPAP and BiPAP, the measuring results showed different effects like HFNC.

Discussion: HFNC resulted in significant effects on respiratory parameters of healthy volunteers and in patients with restrictive pulmonary diseases. The changes in healthy volunteers and IPF will support respiratory efforts and will finally result in a reduction of breathing-related work.

P2048 Acute repercussions of noninvasive ventilation in patient with severe heart failure
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Objective: To analyze the acute effects of noninvasive ventilation (NIV) on cardiac function in patients with severe heart failure (HF).

Method: The study involved 10 patients with HF functional class III and IV (NYHA), ejection fraction (EF) ≤ 40%. Shan CPAP was used and CPAP 10 cm H2O for 60 minutes with an interval of 20 minutes. We analyzed Simpson ejection fraction (EF), SIMP, cardiac output (CO), pulmonary artery pressure (PAP), heart rate (HR) and mean arterial pressure (MAP) by echocardiography and oxygen saturation (SaO2) monitored every 30 minutes.

Results: We observed a significant decrease in HR after CPAP 60' (71,13,17±13,17) compared to the initial rest (79,50,6±1,04) after using the PAM CPAP 30' (92,10,8±17,85) compared to the initial rest (97,50,8±18,04, p=0,01) and a significant increase in SaO2 after use CPAP 60' (79,70,6±6,67) compared to the initial rest (96,50,4±1,72, p=0,04). And the variables FE SIMP, DC and PAP were not significantly different after administration of CPAP.

Conclusion: CPAP significantly alter HR, MAP and SaO2. The NIV was significant changes on the FE SIMP, DC and PAP.
number of chest radiographs (median 40 for V and 9.5 for E), blood gas drawings (median 120 for V and 10 for E) and length of stay in the ICU (median 31 days for V and 9 days for E). IT has evolved into a therapeutic option, with an overall patient survival rate of 100%.

Younger IT recipients were less likely to be extubated within 72 hours of IT operation. Hirschsprung’s disease, pre-existing respiratory disease, severe acute rejection, immunosuppressive level and longer operation time appear to have an impact on ability to extubate.

P2052 Non-invasive ventilation failure predictor factors in acute respiratory infections in children

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Introduction: The use of noninvasive ventilation (NIV) has proved to be successful in acute respiratory failure (ARF) of children with chronic respiratory diseases; however, there is still no consensus as to its benefits in acute lower respiratory tract infections (LRTI).

Objective: Describe the use of NIV in ARF in acute LRTI, and seek for possible factors associated to the failure of this type of therapy.

Patients and methods: Retrospective review of medical records of patients that received NIV for acute LRTI, during winter season 2010 at Hospital Josefa Martinez. Demographic and clinical variables were analyzed: heart rate (HR), respiratory rate (RR), oxygen arterial saturation and use of accessory musculature (UAM) at hours 0, 3, 12, 24 and 48 of use of NIV.

Results: A total of 71 patients, 51% boys, age median 13 months (2-124), the most frequent admittance diagnosis was viral pneumonia 48%, median length of stay 6 days (2-15) and median duration of NIV: 3 days (1-11). Five patients needed endotracheal intubation and transfer to intensive care unit (NIV failure group). Comparing with the rest of the patients (NIV success group), there was a significant difference in age, HR, RR, and UAM, during the first 3 hours after NIV connection.

Conclusion: The use of NIV in respiratory failure in acute LRTI seems to be an effective ventilation strategy, appropriate for this population, with a high rate of success. The clinical parameters during the first 3 hours of NIV could be a useful tool at the time of redefining therapeutic options, as probable predictors of failure.

P2053 Incidence and risk factors for development of skin breakdown in patients undergoing prolonged noninvasive ventilation: A case-control study

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Among the adverse effects related to the mask, skin breakdown is a frequent complication and its occurrence may increase patient discomfort and failure of noninvasive ventilation (NIV). This study aimed to quantify the incidence and identify potential risk factors for the development of skin breakdown in patients undergoing prolonged NIV. A retrospective, observational study was conducted in the adult intensive care unit of a general hospital. It included 375 patients (between January and December 2011) receiving at least one application of NIV for a period longer than two hours. Cases were subjects who developed skin breakdown and controls were those who did not develop it. The risk factors evaluated were age, gender, interface, number of applications carried out for more than 2 hours (N>2h), average time of use per application, total time of NIV use, inspiratory and expiratory pressure titrated, and delta pressure. Of the included patients, 49 (13,1%) developed skin breakdown Stage I and 5 patients (1.33%) developed skin breakdown Stage II. Case group presented a higher face mask use (92,6%) than control group (21,5%) (p<0.001). The use of total facial mask was lower in case group (7,4%) when compared to control group (78,5%) (p<0.001). The N>2h in case group was 71±13.3 and in control group was 4.4±7.5 (p=0.03). Finally, the total time of NIV use was higher in case group (44.6±118.5 h) compared to control group (21.8±45.5 h) (p=0.01). We recommend the use of total face mask in patients expected to use NIV for a period longer than two hours in order to prevent the development of skin breakdown.

P2054 Correspondence between clinical prediction and outcome in patients with acute hypercapnic respiratory failure (AHRF) due to restrictive lung disease

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Introduction: Non-invasive ventilation (NIV) is widely used for the treatment of patients with decompensated ventilatory failure due to Restrictive Lung disease (RLD: thoracic cage and neuromuscular diseases) with AHRF in acute hospitals in the United Kingdom. The information on the accuracy of clinical prediction of survival of patients presenting with AHRF secondary to RLD is scarce.

Aims: We set out to establish how well the clinical prediction of poor prognosis during admission leading to use of NIV as “ceiling of care” with AHRF from RLD correlates with the actual outcome.

Method: A scientific survey was undertaken of 331 admissions due to AHRF secondary to RLD over a 6-year period ending 31 October 2010, to our 11-bedded ward based NIV unit (catchment population = 450000 approx.). In-hospital mortality was established in patients who were clinically assigned ward-based NIV as “ceiling of care” and compared with that in those who died clinically prior to NIV. NIV was used for further escalation to intubation and invasive ventilation on Critical Care Unit if needed.

Results: In the 331 episodes, the odds ratio of death in the “ceiling of care” group versus the escalation group was 4.41 and was highly significant (p<0.000001).

Conclusion: Our data suggest good correspondence between clinical prediction and outcome in patients with AHRF due to RLD - further prospective studies are needed to establish this in detail. As NIV is increasingly used acutely on critically ill patients beyond the originally supposed indication of AHRF in selected patients (and even in palliative care), the use of NIV as the “ceiling of care” needs consistent monitoring.

P2055 High flow nasal cannula oxygen in acute respiratory failure: effectiveness and predictors of failure

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Introduction: To determine the effectiveness of high flow nasal cannula (HFNC), and the factors predicting from failure of HFNC in acute respiratory failure. Method: We retrospectively evaluated acute respiratory failure patients who received HFNC at Chuncheon Sacred Hospital, between August 2011 and January 2012.

Results: In all, 33 patients were included in the study. Their median age was 73.4 years (49-89). Majority of the patients were male22, patients, 67%. The most common cause of acute respiratory failure was pneumonia followed by COPD acute exacerbation, acute pulmonary edema due to congestive heart failure, cancer progression, and lung fibrosis. The hospital mortality was 24%. In the unadjusted model, (P=0.03), APACHE II score (P=0.04), BNP (P=0.03) and higher respiratory rate (P=0.04) were associated with HFNC failure. However, in the adjusted model, higher respiratory rate (P=0.04) were associated with HFNC failure (P=0.04, OR 3.36).

Conclusion: HFNC has beneficial effect on clinical sign and oxygenation in ICU patients with acute respiratory failure. Predictors of high flow nasal cannula failure might be used to guide decisions regarding intubation.

P2056 Treatment of preterm infants with high-flow nasal cannulae: A review of the evidence

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Background: High-flow nasal cannulae (HFNC) are gaining popularity as a form of non-invasive respiratory support for preterm infants, and are proposed as an alternative to nasal continuous positive airway pressure (CPAP) in a variety of clinical situations.

Objectives: We critically examined the published evidence for the mechanism of action, efficacy and safety of HFNC as a treatment for preterm infants.

Methods: Internet-based literature search for relevant, original research articles on use of HFNC in preterm infants. PubMed, Medline, and the Cochrane Library were searched, search terms [high flow OR high-flow] AND nasal cannula(e), without language restriction.

Results: The search produced a total of 73 articles; 15 studies were included in the review. Distending pressure generation from HFNC increases with increasing flow rate and decreasing infant size, and varies according to the amount of leak around the prongs. HFNC may be as effective as CPAP at improving respiratory parameters such as tidal volume and work of breathing in preterm infants, but perhaps only at flow rates above 2 Litres/minute. Only four published randomized controlled trials (RCTs) of HFNC use in preterm infants were found; only two of these compare HFNC to CPAP, and all are small. Based on the current, limited evidence, HFNC appears to be inferior to CPAP as post-extubation support, and ineffective when used to wean from CPAP. There are no RCTs of HFNC as a treatment for early respiratory distress.

Conclusions: The efficacy and safety of HFNC in preterm infants remain to be determined, and further RCTs in the settings of primary support from birth, post-extubation support, and weaning from CPAP are required.
Methods: Prospective interventional trial of all 22 patients with ACPE with SBP 75-90 mm Hg, with no acute arrhythmia, SaO2 90% on spontaneous breathing with 10 per minute oxygen, cooperative, not hypoxemic, with low cardiac output due to acute myocardial infarction, mitral regurgitation or congestive heart failure, was done from July 1, 2010 through December 31, 2011. All patients were immediately started on conventional therapy (dobutamine and/or dopamine, morphine, furosemide, nitroglycerine) and NIV through a face mask with FiO2=1.0, initial PEEP 5 cm H2O and pressure support (PS) 5 cm H2O. Hemodynamic parameters, SaO2, central venous saturation (ScvO2), respiratory rate (RR) and oxygenation (VcO2) were recorded every 3 minutes. If no relief in 3 minutes, PEEP was enhanced to 7 cm H2O and after next 3 minutes PS added to 7 cm H2O.

Results: All patients had SaO2 90% and SBP>90 mm Hg after 10 minutes. If at this moment RR was 30 and Vc 5 ml/kg of body weight, or more than low doses of cardiotonics were needed, the patient was intubated (4 patients). After 30 minutes, those who needed FiO2 60% on NIV, were oliguric and failed to rise ScvO2 above initial, were intubated (2 patients). No intubation was needed in 16 patients (73%). No factors correlated with NIV failure.

Conclusion: In selected hemodynamically unstable patients with ACPE NIV helps avoid intubation.

P2601
Noninvasive ventilation in the emergency department: Early predictors of outcome in acute cardiogenic pulmonary oedema
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Introduction: The application of early continuous noninvasive ventilation (NIV) is well established in the Emergency Department (ED) for the treatment of acute respiratory failure (ARF) due to Acute Cardiogenic Pulmonary Oedema (ACPO). Aims and methods: To critically analyse the impact of NIV in ACPO, after ARF presentation and the treatment efficacy or failure (defined as hospital mortality or need for invasive mechanical ventilation). Observational clinical study in the real life practice of the ED of a University teaching Hospital, during 5 months, including every patient emergently admitted and treated for ACPO according to inclusion criteria referring to an institutional protocol.

Results: 214 patients (media 1.42/day). Failure rate 15.5%. Failure versus success groups were similar in many characteristics and parameters. They were mainly different in: comorbid diseases, neurologic status, arterial blood pressure, rates of palliative or “ceiling” NIV, leukocytes, AST, CKMB, troponinT, LDH, PCR, changes in blood gas analysis parameters after 120 minutes.

Conclusions: We identified early predictors of outcome in the ED: clinical parameter, biomarkers and arterial blood gas analysis data to recognize severe conditions and the response to treatment. Unnecessary delaying trachéal intubation remains
the major hazard of NIV in ARF; the overutilization of NIV is also a concern. A pivotal unresolved question is about selection criteria and early choices for patients having preset therapeutic and prognostic limits and acutely reversible processes. RCTs in the ED are necessary to define the subgroups of patients who are most likely to benefit for the early application of NIV.