P2062
A randomized controlled trial comparing stepwise versus immediate withdrawal from non-invasive ventilation in chronic obstructive pulmonary disease patients recovering from acute hypercapnic respiratory failure

Background: COPD patients who suffer from exacerbation with acute hypercapnic respiratory failure (AHRF) benefit from non-invasive ventilation (NIV). The best withdrawal method of NIV is not known.

Aim and objectives: To compare the success rate of withdrawal in NIV between stepwise withdrawal and immediate withdrawal in COPD patients with AHRF.

Method: This was a prospective, single-centre, open-label randomised study comparing stepwise and immediate immediate withdrawal of NIV. The primary end-point was the success rate of NIV withdrawal. The secondary end-points were hospital length of stay and duration of NIV use.

Results: Sixty patients were randomised: 35 patients to the stepwise withdrawal group and 25 patients to the immediate withdrawal group. There was no statistically significant difference in the success rate of withdrawal of NIV and length of stay after randomisation, with the success rate of 74.3% and 56% in stepwise and immediate withdrawal group respectively (p = 0.139). There was statistically significant difference in the duration of NIV with median duration of 5 days and 3 days in stepwise and immediate withdrawal group respectively (p = 0.001). The post-hoc analysis showed the use of LAMA, higher inhaled steroid dosage and higher arterial pH value on randomisation were the factors associated with success in withdrawal in the immediate group.

Conclusion: Our study showed no significant difference in the success rate and length of stay between stepwise withdrawal and immediate withdrawal of NIV. Duration of NIV was significantly shorter in the immediate withdrawal group.

P2063
Automatic tailoring of positive end-expiratory pressure (PEEP) by forced oscillation technique (FOT) during non-invasive ventilation: Effects of posture and exertion in COPD
Raffaello Delmazzo1, Bob Romano2, Joe Garuccio3, Cherian John3, Ramesh Thimmal4, Melvin Saladus5, Charles Cam6, Departamento di Bioingegneria, Politecnico di Milano, Milan, Italy; 2Home Respiratory Care, Philips Respironics, Monroeville, PA, United States; 3Cardio-Pulmonary Medicine, Regional Medical Associates, Burgettstown, PA, United States

Expiratory Flow Limitation (EFL) promotes the development of intrinsic PEEP (PEEPi). EFL can be detected by FOT at 5 Hz from the difference between inspiratory and expiratory reactance (ΔXrs) during quiet breathing (ERJ 2004;23:232) and CPAP (ERJ 2006;27: 983). This non-invasive measurement has been incorporated in a mechanical ventilator (Synchrony, Philips Respironics, USA) resulting in a prototype that continuously measures ΔXrs and automatically adjusts PEEP to the minimum pressure able to abolish EFL (PEEPe).

The aim of this study was to measure PEEPp in a group of COPD patients and to evaluate its alterations with changes in posture and during a six minute walking test (6MWT).

Eleven COPD patients (GOLD stage 2-4; BMI 30±10; FEV1/FlC 56±8) were initiated to nasal BiPAP with automatic PEEP adjustment. After adaptation, ventilation was applied for 10 minutes in the seated and supine positions and during a 6MWT. Data were recorded in the last minute for each condition.

At PEEP=2cmH2O, 8 patients showed EFL in the seated position, 10 in the supine and 9 in the last minute of the 6MWT. The average PEEPp is reported in figure. In mild to severe COPD, the development of EFL is greatly affected by posture and exertion and this results in major adjustments in PEEP required to counteract PEEPp within the same patient.
P2066
Respiratory events during long term noninvasive positive pressure ventilation in children: Clinical implications and detection of events
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Introduction & methods: Non-invasive ventilation (NIV) is used to treat chronic respiratory failure complicating chronic obstructive pulmonary disease (COPD). This randomised prospective study compared the effectiveness of a volume assured pressure support ventilator (V APS - iV APS, Resmed) with a pressure controlled ventilation (PCV - NIPPV 3, B&D Electromedical) in this patient group. A longitudinal trial investigating survival may now be warranted.
Results: Forty subjects (19 male) were recruited with these demographics (mean ± standard deviation): age 66.9 (8.2) years; BMI 28.2 (7.0); smoking 46.5 (3.13) pack years; FEV1 27 (10.2) % predicted. They were randomised 20 to each treatment limb and at baseline there were no differences between the two groups.
Outcomes: pre-treatment and at 1-month (p values compared to pre-treatment values)

<table>
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<tr>
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<th>Pre-treatment</th>
<th>1 Month</th>
<th>P value</th>
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<tr>
<td>Mean overnight oxygen saturations (%)</td>
<td>PCV 84.4 89.65 0.04</td>
<td>V APS 85.9 90.53 0.02</td>
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<tr>
<td></td>
<td>PCV 8.13 7.05 0.001</td>
<td>V APS 8.15 6.67 0.003</td>
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<tr>
<td></td>
<td>PCV 7.05 7.87 0.279</td>
<td>V APS 6.49 7.06 0.002</td>
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<tr>
<td>Shuttle walk test (m)</td>
<td>PCV 138 165 0.097</td>
<td>V APS 115 145 0.02</td>
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Mean hours of use between V APS and PCV were not significantly different (6.0 ±2.7) vs 5.9 (±2.4) hours respectively. There was a trend towards shorter time to initiate V APS compared to PCV (3.4 vs 4.7 days respectively, p=0.071). During the trial period 2 patients from each arm died.

Conclusion: In patients with COPD and chronic ventilatory failure, V APS achieves similar improvements in overnight oximetry and daytime PaCO2 compared to PCV. V APS is a well tolerated and effective treatment for chronic ventilatory failure in this patient group. A longitudinal trial investigating survival may now be warranted.

P2067
Polysomnographic criteria to assess the efficacy of noninvasive ventilation in chronic respiratory failure
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Introduction: We performed successive polysomnographies (PSG) under spontaneous breathing (SB) and under noninvasive ventilation (NIV) in order to assess the improvements of ventilation and sleep in patients with severe chronic respiratory failure.
Results: 12 patients indicated to domiciliary NIV because of chronic respiratory failure (neuromuscular disease (n=7), obstructive sleep apnea (n=8) and lung disease RAM) were described.
Aim: The aims of the study were (1) to describe the respiratory events during the patients with a minimal nocturnal SpO2 representing 87 ± 5% events per patient was 1.8 38%; 27%; 8%; 3%; 32% of the patients respectively. The mean number of type of respiratory events per patient at day 2 and therefore a third PSG under NIV titration was performed according to local protocols, with the newly implemented NIV at day 2 and so far 38 subjects were recruited: 32 males, 6 female, age 67 ±6.64 5 years, FEV1 14-49% predicted. Oxygen supplementation was performed in 10 mm intervals each with an augmentation of 0.5-1 L/min until a PaO2 >60mmHg was achieved. Using [TNI], oxygen was mixed with warm and humidified air at a constant flow rate of 15 L/min. Concerning safety high flow delivery was well tolerated in all patients and no significant differences were found for several spirometric parameters tested. Furthermore a highly significant decrease of CO2 in arterial blood after short-term treatment could be measured (↑↑. 287 mmHg; p<0.0001) compared to conventional oxygen administration.
Conclusion: In conclusion, we can postulate that short-term treatment with high flow [TNI] seems to be safe in patients with COPD /IV with a reduced oxygen demand. Further trials have to be enrolled for longer periods to prove efficacy.

P2070
Uptake of NIV treatment in MND is dependent upon caregiver variables
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There is robust evidence that NIV relieves respiratory symptoms and improves quality of life in MND. Nevertheless, about a third of those who would benefit
from NIV decline the treatment. It is important to understand why the most effective treatment available for MND patients [1] is refused. To investigate this phenomenon, we undertook a cross-sectional quantitative analysis of 27 patient and caregiver dyads offered ventilatory support based on physiological markers, including forced vital capacity and nocturnal pulse oximetry. The analyses indicated that there were no differences between the patients who went on to accept NIV treatment (n=17) and those who declined (n=10) in terms of age, MND symptomatology (ALS-FRS-R, ALSAQ-40, MND Dyspnoea Rating Scale, daytime sleepiness) and psychological measures (hopelessness, anxiety and depression). The similarity of the scores between the two groups is such that we are confident that we do not simply have a power issue. In view of assertions that uptake of NIV treatment increases caregiver burden, which suggests caregiver input in NIV treatment, we also analysed caregiving variables. There were no differences in general physical or mental health but caregivers who supported NIV treatment were significantly more emotionally stable and less anxious, and in terms of coping style more resilient, more committed and more in control. A regression analysis focusing on NIV symptoms to enter before caregiving variables still indicated that resilience: commitment alone explained 24% of the variance. We will discuss these findings, and implications for clinicians.

References


P2071

Triple O - A new respiratory syndrome? Maria Drummond1, Ana Santos2, Tiago Pinto1, Miguel Gonçalves1,2, Anabela Marinho1, Maria Sucena1, Joao Almeida1, Joao Winck1,2.

1 Pulmonology Department, Centro Hospitalar São João, Porto, Portugal; 2 Medicine Faculty, Porto University, Porto, Portugal

Introduction: There is a growing number of patients needing nocturnal ventilatory support, presenting with Obesity-Hypoventilation Syndrome (OHS). Chronic obstructive pulmonary disease (COPD) and Obstructive Sleep Apnea (OSA). As these three entities seem so prevalent together and as, in many patients, in the light of their demographic characteristics and ventilatory needs, seem different from those with only one or two of the pathologies, a new respiratory syndrome can be found - The Triple O Syndrome (TOS).

Objective: To characterize TOS patients and compare their demographic characteristics and ventilatory needs with OHS patients.

Materials and methods: Forty-four patients over 40-year old, COPD Group (CG) and OSA Group (AHE) were included. Exclusion criteria were pulmonary diseases others than COPD; OSA, 1-AT deficit, bronchiectasis, Cheyne-Stokes Breathing. Complex OSA and Central Sleep Apnea. These patients were compared to 46 OHS patients. Both groups started ventilatory support between 2009 and 2011.

Results: TOS patients: sex mean age 69.4±9.1 years, 84.1% were male, BMI mean 35.8±4.5 kg/m2, mean Epworth 11.4±4.8, mean FEV1 57.9%±19.5% predicted, median AHI 36.3±19.9, median PaCO2 47.2±11.3 mmHg, median IPAP 18.0±11.8 cmH2O, median EPAP 10.0±5.8 cmH2O, median RR 14±7.7 cycles per minute, 23.3% needed oxygen supplement.

Compared to OHS patients, TOS patients were older, leaner, the percentage of male gender was higher, had less severe OSA and lower RR when adapted to ventilatory support.

Conclusion: TOS patients seem to be an individualized group, with different demographic characteristics when compared to OHS patients. The ventilatory needs were similar between both groups, but the RR and the mask used, mainly nasal, in TOS patients.

P3072

Adherence and tolerance of an auto-CPAP (AAPA) device specially designed for occidental way of life and bedroom: Beyond technology, medical appearance is obsolete

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Observance up than 3 hr/night, only is required in France is to allocate reimbursement of CPAP treatment for Sleep Apnoea Syndrome. But control of hypertension requires up than 4hr/night. Breas i-Sleep, or Fisher &Pakell ICON are clearly designed to look as a clock or a radio-alarm-clock without external electric transformer.

Aim: Define if such CPAP device is associated with a mean sleep use up than 4hr/30, achieving 3 sleep’s cycles. Data collection [comfort, residual AHI, therapeutic Pressure, etc.]

Methods: Two HomeCare HealthCare Providers (no financial or material conflict of interest), Noncomparative observational study. We collect use’s duration of CPAP treatment for 3 months of consecutive OSA patients, all ventilated by ICON, CPAP mode, 4/16 cmH2O, with no ramp with optimal subjective comfort humidification setting.

Results: 108 consecutive symptomatic OSA patients (I-AHI > 30/h), evaluation time 1 month, delay treatment, 61% air, residual AHI = 4.8±3.8/hr and P95% = 9.3±3.7 cmH2O.

Observance 34±2.4 min; comfort’s evaluation through a modified Analogic Visual Scale (AVS) 7.4±1.2; Design’s evaluation through a modified AVS 8.7±4.3.

Conclusions: A pretty bedroom designed CPAP device is associated with a therapeutic offered duration up than 2hr/30. An affective-based customer societal approach of such treatment seems relevant to enhance patient adherence. Comparative studies are required to comfort this monocentric and limited non comparative descriptive study.


P2073

Our experience in home mechanical ventilation

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Background: Continuous positive airway pressure (CPAP) is an important strategy for improvement of gas exchange and breathing working in post operative of coronary artery bypass grafting surgery (CABG). However, it’s unknown the breathing pattern (BP) behaviour after inguent cardiac rehabilitation (CR) program associated to noninvasive ventilation (NIV) during exercises.

Aim: To evaluate the BP of post-CABG patients engaged in CR associated to NIV.

Methods: Nineteen patients submitted to twice-daily supervised postoperative exercise protocol, which consisted of respiratory exercises and early mobilization (upper and lower limbs exercises and ambulation) with NIV (CPAP=58±6.8±4.9 hrs) between 9-11 cmH2O and without (CG= 58±5±7hrs) were evaluated. BP was measured by respiratory indirect plethysmography (Lifeshine system) and analysed by inspiratory (ViVol) and expiratory tidal volume (VeVol); inspiratory, expiratory and total time and thoracoabdominal coordination measures (%RCl and %RCE percent rib cage inspiratory and expiratory contribution to tidal volume ratio, respectively) in rest sitting position at discharge time. Unpaired Student t test was applied for intergroup analysis (p<0.05).

Results: CPAP group presented lower values of %RCl (65±24 versus 84±12) and %RCE (64±24 versus 84±12) compared to CG. No others differences were observed.

Conclusion: These results suggest that patients engaged in CR associated to CPAP presents reduction of upper rib cage motion, which could be associated to better distribution of ventilation and decrease of breathing cost energy and accessory muscles activity. FAPESP SUPPORT (2009/51494-5).

P2074

Thoracoabdominal contribution to tidal volume after an inpatient cardiac rehabilitation program associated to continuous positive airway pressure (CPAP)

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P2075

Multidisciplinary MND clinics – Should every hospital have one?

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Motor neuron disease (MND) is best managed by a multi-disciplinary team, including a respiratory physician to assess for respiratory failure, for which non-invasive ventilation (NIV) is indicated. East Kent Hospitals University Foundation Trust has recently developed a regional neurology centre and has well established domiciliary ventilation services. The multi-disciplinary MND team was developed in 2008.
Aim: To review the management of MND in East Kent and the changes since the establishment of a multi-disciplinary MND team.

Methods: A retrospective analysis of the clinical notes of all patients diagnosed with MND over the last 10 years.

Results: Total number of patients with a diagnosis of MND was 65. 3 had familial disease (4.6%).

Conclusion: The number of patients managed by the East Kent team has increased 5 fold since 2008. This perhaps reflects the need for teams closer to home, which leads to better access to specialist intervention including NIV which improves survival. The mean time from symptom to diagnosis has also reduced since the introduction of a multi-disciplinary team, as has the earlier need for PEG. Further analysis may identify the contributing factors.

Methods: We prospectively studied a group of tracheotomized and chronically ventilated patients admitted to a weaning centre who could be suitable to decanulation and conversion to NIV because of absence of airway stenosis, normal swallowing function, preserved cough mechanism but unable to sustain a spontaneous breathing for more than 16 hours without increasing PaCO2. Data collected for follow-up were: demographic, functional, severity score (SAPSIII), need to re-trachecotomy, survival, hospital admissions/year, maintenance of adequate gas exchange. The Fisher exact test and the log-rank test have been employed for statistical analysis.

Results: 176 patients with tracheotomy and prolonged IV were evaluated: 26 patients (14 men) met the criteria and were decanulated and converted to NIV (16 obstr. 10 restr.). Mean age was 67.46 years, mean SAPSIII score was 26.8, mean follow-up time was 24.8 months; 12 patients had at least 1 new episode of exacerbation, in 5 cases requiring ICU admission, and 2 patients needed re-trachecotomy. Two years-mortality rate was 26%. Age and severity score turned out to be statistically significant predictors of survival.

Conclusions: Long-term maintenance of tracheotomy and invasive ventilation makes the patient more fragile and difficult to manage in the domiciliary setting. Decanulation and conversion from IV to NIV is a safe and feasible technique and should be attempted in selected hypercapnic patients.

Use of home non-invasive ventilation (NIV) in patients with ankylosing spondylitis (AS)

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Background: Ventilatory impairment is a recognised extra-articular manifestation of AS. To our knowledge there are no published data describing home NIV in this condition.

Aims and objectives: Retrospective assessment of home NIV in AS patients at a tertiary UK ventilatory support centre to determine i) indications for NIV, ii) physiological response to treatment and iii) compliance and survival.

Methods: Case records of patients referred for consideration of NIV between 1993 and 2011 were retrospectively reviewed and information regarding the indication for NIV, demographics, co-morbidities, arterial blood gas analysis, pulmonary function, mean overnight oxygen saturation (SpO2), compliance and survival recorded.

Results: The case notes of 18 patients (15 male, mean age 49.2 yrs) were reviewed. Most commenced NIV in the context of acute respiratory decompensation (n=11; 61%); The most frequent indication for NIV was hypercapnia (PaCO2 ≥5.6 kPa; 14, 78%). NIV led to a sustained decrease in PaCO2 from the baseline (p<0.05) and rise in the mean overnight oxygen saturation (p<0.05). Twelve patients have died (66%) with the median time to death from starting NIV of 31 months (range 1-98). The median duration of treatment was 33 months (range 1-99).

Conclusion: AS patients demonstrated good compliance with NIV, which was associated with a sustained improvement in physiological parameters.

Home mechanical ventilation the Netherlands; an overview

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Background: Home Mechanical Ventilation (HMV) is well known as a cost-effective treatment which significantly improves quality of life. In this abstract we give an overview of the development of HMV in the Netherlands.

Methods: Since 1991 we have been collecting data regarding all patients treated with HMV the Netherlands.

Results: Over the last 20 years, the number of Dutch patients treated with HMV increased from 200 to 2000. There is a significant growth in number of patients treated with non-invasive ventilation. Mask and mouth-piece ventilation in combination with the progress in technical abilities of the equipment, allows patients to use the non-invasive ventilation up to 24 hours a day. Patients were divided in four categories: neuromuscular disease (NMD), thoracic cage restriction (TCR), lung disease and obstructive or central sleep apnea syndrome. Patients with NMD have always been and still remain the largest category in the Netherlands. The rise in NMD is especially due to patients with ALS; almost 100 patients with ALS started HMV last year. The 2nd largest group includes patients with TCR. Patients with...
Obesity hypoventilation syndrome (OHS) are primarily responsible for the growth in this group. Patients with obstructive lung disease are a fairly stable group. Of all patients on HMV, 83% live at home.

**Conclusion:** Most patients on HMV are currently treated non-invasively. The growth of these patients is specifically seen in patients with ALS or OHS. Despite this enormous rise of patients treated with HMV, 83% of the patients still live at home.

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**P2080**

**Home NIV for patients with stable COPD**

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**Background:** Non invasive ventilation (NIV) is shown to be effective in the treatment of acute respiratory failure in patients with chronic obstructive pulmonary disease (COPD) and as treatment at home in patients with chronic respiratory failure due to e.g. neuromuscular disease. Previous studies in patients with COPD have shown conflicting results of home NIV.

**Aim:** Audit of home NIV treatment initiated due to repeated admissions with NIV treated acute hypercapnic respiratory failure (AHRF).

**Method:** Retrospective study of acutely NIV treated patients in our dept. of lung medicine. Frequency and duration of hospital admissions respectively 12 and 6 months before and 6 months after the initiation of home NIV were compared.

**Results:** Figure shows a significant reduction in number of admissions 6 months after initiation of home NIV compared to 12 (avg 2.4 to 0.75 (p=0.05)) and 6 months before initiation (avg. 4 to 0.75 (p=0.0046)).

![Figure 1. Frequency of admissions to a pulmonary ward before and after initiation of home NIV.](image)

**Conclusion:** The study shows that home NIV is effective to reduce admissions with respiratory problems in a highly selected group of COPD patients with previous repeated AHRF and need of acute NIV treatment.