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in the improvement of other parameters that improve when we combine a program of HMV combined with RR for the effect exerted by the RR.

P1711**Home mechanical ventilation and respiratory rehabilitation: Influence in BODE index, quality of life and inflammatory parameters**

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Our aim is to assess the impact on BODE index, quality of life and inflammatory parameters (IP) of a respiratory rehabilitation program (RR) compared with a program of home mechanical ventilation (HMV) and the summation of both interventions.

Methods: 45 COPD patients with severe functional impairment and in situations of hypercapnic respiratory failure were prospectively randomized to 3 groups: RR (12 weeks in 40-minute sessions that included strength training and resistance), HMV (12 weeks BiPAP mode) and RR-HMV (combination of the two interventions). The patients underwent different components of BODE index, quality of life (CRDQ) and IP: C Reactive Protein (CRP), Tumor Necrosis Factor- α (TNF- α), Interleucin-6 (IL-6), IL-8 and Surfactant D Protein (SDP).

Results: HMV group improved BODE index significantly by decreasing median 2 points ($p = 0.003$). Also get statistically significant improvement in quality of life index CRDQ (in total and its four components). IP improved significantly by decreasing TNF- α and IL-8. RR group obtained the same results in BODE index, and CRDQ. IP significantly improved by lowering CRP, IL-8, SDP and C3. RR-HMV group improves BODE index significantly when going from 5 to 3.5 ($p = 0.001$). CRDQ in total and components of dyspnea, fatigue and disease control. Significantly improved IP by lowering CRP, TNF- α , SDP and prealbumin.

Conclusions: HMV and the RR produced improvement in the BODE index and quality of life as well as when the two interventions are given together without finding differences when applied independently. The combination of both intervention control more IP than each other separately.

P1712**Home non-invasive ventilation (HNIV) improves survival in hypercapnic patients with cystic fibrosis**

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Background: The clinical benefits of home non-invasive positive pressure ventilation (HNIV) have not been well established in adult patients with cystic fibrosis (CF).

Objective: The purpose of this matched case-control study was to compare the effects of HNIV and long-term oxygen therapy (LTOT) on survival of adult CF patients with chronic hypercapnic respiratory failure (CHRF).

Methods: Twelve patients receiving HNIV were matched with 12 patients receiving LTOT regarding age, FEV1, PaCO2 and BMI.

Results: There were no differences between groups of patients in demographics, clinical and functional characteristics (HNIV patients: 24.9 \pm 4.8 years, BMI 16.1 \pm 3.3 kg/m², FEV1 15.3 \pm 3.4%, PaCO2 59.8 \pm 7.7 mmHg; and LTOT patients: 23.9 \pm 4.6 years, BMI 15.8 \pm 4.2 kg/m², FEV1 16.1 \pm 4.4%, PaCO2 61.4 \pm 7.9 mm Hg). HNIV settings were: ST mode, IPAP 20.1 \pm 4.2 cm H2O, EPAP 4.6 \pm 0.7 cm H2O (nasal mask – 4, oronasal mask – 8). Compared with LTOT, HNIV significantly reduced breathing rate ($p=0.036$), PaCO2 ($p=0.038$) and number of exacerbations ($p=0.028$). Survival was significantly better in HNIV group in comparison with LTOT group (survival time 12.5 [95%CI 0.6-16.4] months vs 6.0 [95%CI 0.7-7.3] months; log-rank test, $p=0.024$).

Conclusions: The survival of adult CF patients receiving HNIV was better than that of patients treated with LTOT alone. We suggest HNIV is a first-line treatment for adult CF patients with CHRF.

P1713**Meta-analysis on nocturnal non-invasive positive pressure ventilation for stable COPD; an update**

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Introduction: Nocturnal non-invasive positive pressure ventilation (NIPPV) might be beneficial in stable hypercapnic patients with COPD. However, evidence remains conflicting.

Aim: To determine the effect of NIPPV in patients with stable hypercapnic COPD. **Methods:** This meta-analysis gathered individual patient data from randomized controlled trials (RCTs) comparing NIPPV plus standard therapy with standard therapy alone. The current analyses are limited to gas exchange parameters.

Results: Our older Cochrane review and 3 new studies were identified, totaling

210. Current trends in home mechanical ventilation

P1710**Home mechanical ventilation and respiratory rehabilitation: Influence in respiratory functional test and exercise capacity**

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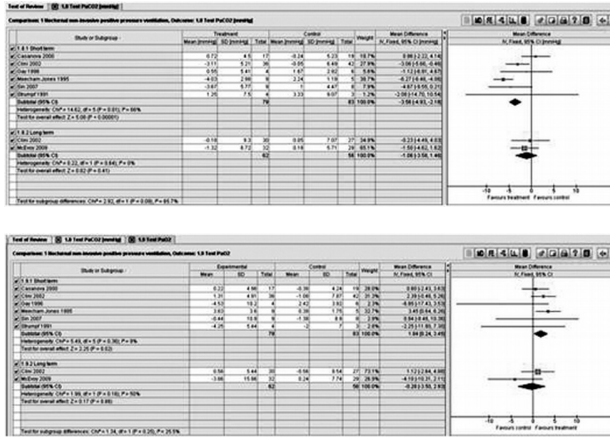
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Our aim is to assess the impact on respiratory function and exercise capacity of a respiratory rehabilitation program (RR) compared with a program of home mechanical ventilation (HMV) and the summation of both interventions.

Methods: 45 COPD patients with severe functional impairment and in situations of hypercapnic respiratory failure were prospectively randomized to 3 groups: RR (12 weeks in 40-minute sessions that included strength training and resistance), HMV (12 weeks BiPAP mode) and RR-HMV (combination of the two interventions). Patients underwent pulmonary function tests. Exercise capacity was measured with a measurement of peripheral muscle strength (PMS) using the one repetition maximum (1 RM) and maximal cardiopulmonary exercise testing performed on a cycle ergometer. Submaximal test of endurance was measured with cycle ergometer at 70% load.

Results: Neither HMV or RR produced changes in respiratory function tests, except for the blood gases that improved after HMV (PaCO2 significant improvement with a decrease of 4 mmHg, $p = 0.008$) and in the combined with improvement in PaO2 (increase of more than 3 mmHg, $p = 0.02$) and PaCO2 (decrease of 5 mmHg, $p < 0.001$). HMV improve PMS. RR and RR-HMV improve all exercise capacity tests.

Conclusions: RR with HMV improves blood gases over HMV in isolation as well as decreases hypercapnia and also decreases hypoxemia. HMV leads to an improvement in peripheral muscle strength. This improvement was not reflected



5 short-term and 2 long-term RCTs. After 3 months (n=162; age 66 yrs; FEV₁ 0.78L; IPAP 15.4(10-22); EPAP 3.4) we found a significant change in PaCO₂ (mean difference= -3.56 (95% CI=-4.93;-2.18 mmHg)) and PaO₂ (1.84 (95% CI=0.24; 3.45 mmHg)) but no significant changes after 12 months of NIPPV (n=118).

Conclusions: With the newer studies, this update now finds a significant decrease in PaCO₂ and increase in PaO₂ in stable hypercapnic COPD patients after 3 months of NIPPV, but not after a year. There was considerable variation in settings; notably inspiratory pressures.

P1714

The evolution of home mechanical ventilation in Poland between 2000 – 2010
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In the last decades the methods and indications for home mechanical ventilation (HMV) have changed significantly mainly due to technological development and an increasing number of patients with chronic pulmonary disorders. Data about HMV comes from developed countries. The aim of the study was to verify whether the same trends in HMV practice are observed in under privileged European country. Questionnaire was sent to 10 centres providing more than 90% of HMV in Poland. Questions concerned number of patients, setting of initiation, indications for and the modes of ventilation during the last ten years.

Data regarding 1032 patients was collected from 8 HMV centres. The number of treated patients increased from 8 in 2000 to 799 in 2010. Neuromuscular diseases still remain the main indication for HMV, however, their contribution gradually decreased from 88% to 51% of all patients treated in favor of pulmonary diseases (from 6 to 23%) and hypoventilation syndromes (from 3 to 12%).

The number of patients treated via tracheostomy was higher than treated with NIV in the period 2000-2008 and then the proportions equalized. The percentage of children treated has decreased from 88% in 2000 to 21% in 2010.

ICU is the principal location where HMV was initiated. However, its role diminished from 86% of all qualified patients in 2000, to 46% in 2010, while an increasing number of patients were required in respiratory departments: from 8% in 2001 to 35% in 2010.

Indications for HMV in Poland moved from neuromuscular to respiratory diseases. However, the shift was not as marked as in more developed countries. Prevalence of invasive mode of ventilation still remains very high in relation to general European practice.

P1715

NIV (non invasive ventilation) improves Bode index in stable COPD with CHRF (chronic hypercapnic respiratory failure)
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Introduction: The BODE index, a simple multidimensional grading system, is used to predict the risk of death from any cause and from respiratory causes among

patients with COPD. The use of NIV in exacerbation of COPD is suggested. On the other hand there are not any guidelines for the use of NIV in patients with stable COPD.

Purpose: To investigate any improvement in patients with COPD and CHRF using NIV at home, in relation with BOE index and the factors that predict the improvement.

Material and methods: Patients with COPD and CHRF (in stable condition) with LTOT were included. Patients underwent a polysomnography study to exclude OSA (AHI<10). The patients used NIV at home for a year. BODE index and its components (FEV₁, MRC, BMI, 6MWT), were estimated at baseline (0 month) and 6 and 12 months after use. In addition, BODE index change on the 6th month was correlated with initial parameters {AHI, OD, min saturation, mean saturation at sleep, PO₂, PCO₂, BODE index (0month), FVC, FEV₁/FVC, age}.

Results: There is a statistically significant change of BODE index after 6 months and after 12 months of using NIV. There is a correlation between BODE index change and oxygen desaturation (OD) [polysomnography study].

Conclusion: NIV improves bode index in patients with stable COPD and CHRF. The change in BODE index is correlated with Oxygen Desaturation during sleep.

P1716

Co-morbidities and cardiovascular medications are the best predictors of mortality in patients with obesity-associated hypoventilation treated with long-term non-invasive ventilation

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Rationale: NIV is largely used to treat patients with obesity-associated hypoventilation (OH). The impact of comorbidities, their medications and NIV compliance on survival of these patients remain unexplored.

Methods: A Cohort of OH patients initiated on NIV between March 2003 and July 2008. Anthropometry, diurnal and nocturnal respiratory parameters, comorbidities, medications, conditions of NIV initiation and NIV compliance were used as covariates. Survival curves were estimated by the Kaplan-Meier method. Univariate and multivariate Cox models allowed estimating predictive factors of mortality.

Results: In 107 patients (56% women, mean follow-up of 43±14 months) NIV was initiated in acute conditions in 36%. The 1, 2, 3-year survival rates were 99, 85, 82% respectively. In univariate analysis, death was associated with older age (>61 yrs), low FEV₁ (<66% pred value), male gender, concomitant COPD, initiation of NIV in acute condition, use of inhaled corticosteroids, β-blockers, nonthiazide diuretics, angiotensin-converting-enzyme inhibitor and combination of cardiovascular agents (one diuretic and at least one other cardiovascular agent). In multivariate analysis, combination of cardiovascular agents was the only factor associated with a higher risk of death (HR= 5.3; 95% CI: 1.18; 23.9). In contrast, female gender was associated with a lower risk.

Conclusion: Cardiovascular comorbidities represent the main factor predicting mortality in NIV-treated OH patients. In this population, NIV should be used among a combination of treatment modalities allowing a reduction in cardiovascular risk.

P1717

Predictors of readmission in patients on home mechanical ventilation (HMV)
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Objectives: There are few studies that examine which factors determine the readmission of patients on HMV. Our objective was to study the variables related to this fact to determine which aspects should be monitored more closely.

Methods: Prospective observational study over a period of 10 years. We collected clinical variables during hospitalization and data related to treatment adherence and the date of hospital readmission. Bivariate analysis and a Cox multivariate model were performed

Results: We included 214 patients (55.6% women, mean age 63.8 years± 13.3). 50% required hospital readmission and the median time to readmission was 170 weeks (144.1 to 195.8). Readmission was not related to the presence of comorbidities, morbid obesity, situation at the start of ventilation (chronic respiratory vs. acute respiratory failure) or main diagnosis that led to the start of HMV. During follow-up readmission was associated with poor adherence to HMV (46.7% vs 29.9%, p = 0.017), previous admissions, previous respiratory failure and a poor quality of life. Predictors of readmission were also worse PaO₂ control and PaCO₂ control, greater number of previous admissions and poorer lung function. The multivariate model identified as independent predictors of readmission: Poor adherence to HMV (OR 1.7, CI 95% 1.1 -2.6), PaCO₂ control (OR: 1.03, 95% CI 1 to 1.06) and the level of dyspnea at follow up(OR:2.3,95%:1.5-3.3).

Conclusions: 1.-In our experience, a high percentage of patients on HMV required hospital readmission. 2. - Readmissions does not appear to be directly related to comorbidities neither the initial results of HMV and appear related to poor treatment adherence and severity of respiratory failure.

P1718

Effect of an automatic triggering and cycling system on patient-ventilator synchrony during noninvasive ventilation in a mechanical lung model

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Evaluate the effect of an automatic triggering and cycling system on patient-ventilator synchrony during NIV in a mechanical lung model. Bench study, one ICU ventilator (Esprit®) and one NIV ventilator (Trilogy®) were tested. The lung simulator ASL 5000 (Ingmar) was set with obstructive model: compliance 60mL/cmH2O, resistance 20cmH2O/L/s, and restrictive: compliance 30mL/cmH2O and resistance 8cmH2O/L/s, both with respiratory rate 15 bpm and ventilatory demand of 60 L/min. A facial mask was adapted to a head manikin, with an air leak of 10L/min. The Esprit® was adjusted in the NIV mode and the Trilogy® in the S/T mode: IPAP 10cmH2O and EPAP 4cmH2O, triggering and cycling were set automatically (AutoTrak®) or flow triggering (3L/min) with expiratory cycling 25% (conventional) in both ventilators. Inspiratory and expiratory delay, inspiratory work and patient-ventilator asynchrony were analyzed. Auto-triggering was observed in the restrictive model in the Esprit® with conventional adjustments, but the phenomenon was abolished with the automatic settings. Little difference was observed between the systems, suggesting that both methods were equivalent with respect to inspiratory and expiratory delay and work.

Table 1. Inspiratory and expiratory delay and work in the mechanical lung models

	Obstructive		Restrictive	
	Esprit® AT/CV	Trilogy® AT/CV	Esprit® AT/CV	Trilogy® AT/CV
Inspiratory delay (ms)	37/51	28/60	60/*	37/37
Expiratory delay (ms)	18/28	14/42	34/*	14/18
Inspiratory work (J/L)	1,40/1,38	1,38/1,39	1,71/*	1,77/1,77

AT = AutoTrak®; CV = conventional; *persistent asynchrony.

The automatic system showed advantage with respect to synchrony in the restrictive model.

P1719

The acute effects of postural change and non-invasive ventilation breathing on the regional distribution of lung ventilation: An electrical impedance tomography study

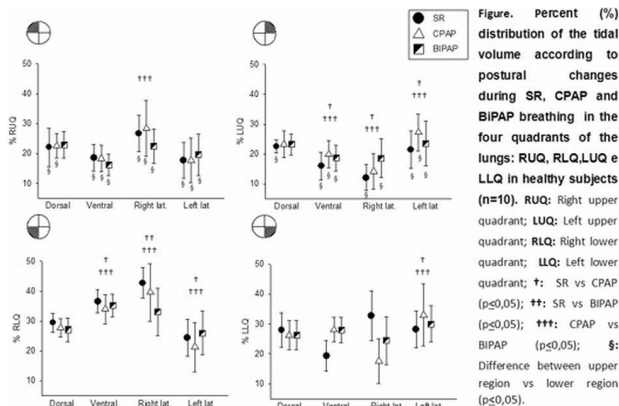
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Introduction: The combined effects of postural changes and the use of noninvasive positive pressure ventilation (NIV) on the regional distribution of lung ventilation (RDLV) is still underexplored. The electrical impedance tomography (EIT) has emerged as a consistent technique for the dynamic evaluation of RDLV.

Objectives: To evaluate the RDLV in healthy subjects during spontaneous respiration (SR) and during NIV breathing in different body positions.

Methodology: The RDLV was assessed by EIT (32 electrodes) in 10 healthy subjects (5 men), during 10 minutes of SR, or with CPAP of 10cmH2O and with BiPAP of 15/5cmH2O in four body positions (dorsal (D), ventral (V), right lateral (RL) and left lateral (LL)).

Results: The figure below shows the % of RDLV in the four quadrants of the lungs.



During SR, the RDLV was higher in the gravity dependent quadrants, mainly in

the lateral decubitus, except for the V position. NIV breathing (CPAP and BiPAP) did not alter the pattern of RDLV as compared to SR.

Conclusions: EIT can clearly demonstrate that, with the exception of prone positioning, the dependent regions of the lungs are better ventilated both during SR or CPAP and BiPAP breathing.

P1720

Observation cohort study of cause of death in patients with Duchenne muscular dystrophy (DMD)

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Prior to the introduction of home mechanical ventilation (HMV), the major cause of death in patients with Duchenne muscular dystrophy (DMD) was respiratory failure. We performed an observational mortality cohort study of our DMD population over a 6 year period. As a large specialist centre we have a current population of 117 adult patients with DMD and 12.7% of our total patient population died in the 6 year period.

Table to show cause and location of death in patients with DMD over a 6 year period

n=17	2006	2007	2008	2009	2010	2011	Total
Total Number of Deaths	1	1	2	5	5	3	17
Total on Ventilators	1	0	2	3	4	3	13 (76.5%)
Death in Hospital	0	1	1	2	5	1	10 (58.8%)
Death out of Hospital	1	0	1	3	0	2	7 (41.1%)
Respiratory Failure	1	0	1	3	0	2	6 (35.2%)
Cardiac Failure	0	1	1	2	5	0	10 (58.8%)
Other Medical	0	0	0	0	0	1	1 (5.9%)

Data are expressed in absolute values (%).

Out of a total of 17 deaths in a six year period, only 35.2% died of respiratory failure with a mean age of 22.7 years, despite 76.5% of the patients being dependent on NIV. The major cause of death in this cohort was cardiac failure, with 58.8% of patients dying from cardiac complications at a mean age of 19.1 years. Cardiac death was only anticipated in one of the 10 cases, and this patient died in the home environment. These data support the need for early regular cardiac surveillance. In addition to the standard electrocardiographic and echocardiographic measurements, the use of extended electrocardiographic measurements may be required. This is supported by the current UK guidelines endorsing yearly screening for patients with DMD once over the age of 10 years.

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P1721

Gastrointestinal dysfunction in ventilated patients with Duchenne muscular dystrophy

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Background: To evaluate mechanisms of abdominal discomfort in Duchenne muscular dystrophy patients with chronic respiratory failure we assessed symptoms and measured gastric-intestinal transport.

Methods: In 33 DMD patients, age 9-38y, questionnaires, clinical examinations and the DMD impairment score (Kohler 2009) were obtained. Gastric and intestinal transits were measured by ¹³C breath tests and by radiography after ingestion of radio-opaque markers.

Results: 23 of 33 patients complained of bloating and chronic constipation; 21 regularly used laxatives. 10 were not on PPV, 5 on PPV at night, 8 on 24h PPV. Gastric emptying and intestinal transit were increasingly delayed with older age and higher impairment scores. Use of PPV was correlated with accelerated gastric emptying when controlled for impairment (R=-0.43, P=0.048). Massive gastro-intestinal air accumulation was common.

Gastro-intestinal function in DMD patients

	Age, y	DMD physical impairment score	Gastric emptying, min	Intestinal transit, h	Colonic transit, h	Constipation present
No PPV, n=10	19.0±6.8	51±14	219±58	6.9±1.9	63.4±19.3	3 of 10
On PPV, n=23	25.9±5.8*	66±6*	187±60	6.7±2.6	65.5±29.9	19 of 23*

Means±SD. *P<0.05 vs. no PPV. DMD impairment scores range: 10 to 80 with increasing impairment. Constipation was rated subjectively as present or absent. Intestinal transit norm <5h (Geypens 1999); Colonic transit norm <50h (Southwell 2009).

Conclusions: Gastro-intestinal disturbances in DMD patients are common and related to delayed gastric and intestinal transit with increasing age, progression

of physical impairment and respiratory failure. PPV may accelerate the delayed gastric emptying, possibly by esophago-gastric air inflation.

P1722

Unplanned respiratory crises requiring ventilation in Duchenne muscular dystrophy (DMD) patients can be reduced by timely respiratory review and care co-ordination at the age of transition

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The introduction of home mechanical ventilation (HMV) in DMD is associated with increased life expectancy. In 2009, we introduced a transitional care coordinator role with the hypothesis that we would reduce the number of unplanned respiratory crises with early intervention. We have prospectively gathered data for all 75 patients with DMD under review in 2009.

Table 1

	2009	2010	2011
No. of DMD patients receiving HMV	34	46	60
New elective HMV initiations	2	7	7
Mean age of initiation NIV (yrs)	19.3 (16-23)	20.3 (16-25)	20.1 (16-25)
Mean length of set up - elective (days)	5 (3-10)	4.14 (2-9)	3.28 (2-8)
Mean length of set up - emergency (days)	67	15	33
No. of new patients requiring invasive ventilatory support with emergency set up	1	1	1*

*This patient did not require long term NIV; data expressed as absolute values.

Analysis of these data was focused on the primary respiratory crisis admission requiring ventilatory support. Within 3 years we identified 19 patients who required initiation of HMV, all known to the respiratory team prior to initiation and only 3 (15.8%) were as a result of an emergency admission. Out of the 19 patients initiated on HMV, 16 were elective with a mean length of stay of 4.7 days (2-9) days. 1 patient was admitted directly from clinic as an emergency, requiring invasive ventilation but without tracheostomy formation. Of the two patients who required tracheostomy formation, one did not require NIV post discharge from hospital. The data supports that with timely intervention and coordination you can reduce the need for emergency initiation of ventilation through respiratory crisis.

P1723

Introduction of domiciliary mechanical insufflation-exsufflation can reduce the incidence of crisis admissions in patients with Duchenne muscular dystrophy (DMD)

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Although trials are ongoing, there is limited evidence to support the use of mechanical insufflations-exsufflation as a method of secretion clearance to prevent chest infections in patients with DMD. However our local unit practice is to provide a machine to DMD patients that are established on non invasive ventilation with a peak expiratory cough flow < than 160 litres per min despite maximal physiotherapy adjuncts with either: (1) > 2 episodes of chest sepsis per year requiring antibiotics and hospital admission (2) 1 episode of severe chest sepsis requiring invasive ventilation. The aim of the use of the cough assist machine is to reduce the frequency of hospital admissions and length of stay (LOS). We reviewed the prospective data from our DMD patient cohort over a 7 year period in which 32 patients had been issued with a machine. We reviewed the data for 12 months pre and post issue in order to establish the effect on admission frequency and LOS.

Table 1

n=32	Pre home issue	Post home issue	Significance
Mean frequency of respiratory admissions in a 12 month period	3 (1-6)	0.3 (0.1)	p<0.001*
Mean LOS of respiratory admissions in a 12 month period	12.9 (2067)	11.4 (0.51)	p<0.001*

Data are expressed as absolute value (range). *Significant using Wilcoxon signed ranks test.

These data have showed a significant reduction in both hospital admission frequency and LOS for those patients using a domiciliary cough assist machine. These are the first data to add support to the use of domiciliary cough assist machines in DMD patients with an ineffective cough and previous episodes of chest sepsis already established on NIV.

P1724

Neuropsychological functioning after CPAP treatment in obstructive sleep apnea: A meta-analysis

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Introduction: The generally held clinical view is that treatment with continuous positive airway pressure (CPAP) substantially improves cognition in patients with obstructive sleep apnea (OSA). The cognitive domains in which recovery is found as well as the extent of recovery differs widely between studies, however.

Objective: A meta-analysis was conducted to quantify the magnitude of the overall effect of CPAP treatment in OSA on neuropsychological functioning

Methods: A comprehensive literature search of clinical trials published from January 1990 to June 2011 was performed. The inclusion criteria were: randomized controlled trial, diagnosis OSA by polysomnography, apnea-hypopnea index, duration and compliance of CPAP treatment, one or more standardized neuropsychological tests. Mean-weighted effect sizes of CPAP treatment for 7 cognitive domains were calculated.

Results: 12 studies encompassing 516 OSA patients were included. A small significant effect on attention was observed in favour of CPAP treatment (d=.20). For the other cognitive domains the effect sizes did not reach significance. Improvement on measures of sleepiness was modest (d=.30-.40) and comparable to a prior meta-analysis.

Conclusion: This meta-analysis shows that effect of CPAP treatment on cognition is small and limited to the attention domain. These findings indicate that, contrary to the general assumption, only slight improvement of cognitive functioning after CPAP treatment can be expected.

P1725

Inaccuracy of built-in ventilator softwares (BIVS) in monitoring apnea-hypopnea index (AHI) in patients treated by home non invasive ventilation (NIV)

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Home ventilators are often equipped with BIVS able of recording various parameters over many months. AHI is one of the parameter most frequently used by clinicians to monitor efficiency of ventilation applied to patients with Obstructive Sleep Apneas (OSA). However, the reliability of algorithms used by BIVS to detect apnea (A) or hypopnea (H) has yet to be determined.

Patients & methods: We studied 5 patients with severe OSA (4M, 1F, 10.5 years, range 2.5-15 years) and treated by NIV (4 CPAP,1 BiPAP). An overnight respiratory polygraphy (RP) was performed while the patient was on NIV at home. All RP were analyzed as usually recommended by one of us (J.T) blinded to BIVS data. We compared A and H detected by BIVS versus those detected by RP.

Results: BIVS detected 169 A-H that were related to movements in 56% and no visible event using RP in 25% of cases.

Table 1

	Nb of events (%)	Movements-RP	No event-RP	A-RP	H-RP
A-VS	28 (100%)	21 (75%)	4 (14%)	2 (7%)	1 (4%)
H-VS	141 (100%)	74 (52%)	39 (28%)	9 (6%)	19 (13%)
A-H-VS	169 (100%)	95 (56%)	43 (25%)		31 (18%)

Among the 88 A-H detected by RP, only 35% were recognized by BIVS.

Table 2

	Nb of events (%)	No event-VS	A-VS	H-VS
A-RP	19 (100%)	8 (42%)	2 (11%)	9 (47%)
H-RP	69 (100%)	49 (71%)	1 (1%)	19 (28%)
A-H-RP	88 (100%)	57 (65%)		31 (35%)

Conclusion: The majority of A-H detected by BIVS was related to patient movements, whereas BIVS was unable to detect A-H seen in RP. These preliminary data support that AHI provided by BIVS is largely inaccurate in patients during NIV and should not be used to adjust NIV. Polysomnographies are required to monitor efficiency of NIV.

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The inter-observer reliability of using a new non-invasive technique to identify patient ventilator asynchrony (PVA) during non-invasive ventilation (NIV)

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Introduction: Poor patient-ventilator interaction reduces respiratory muscle unloading resulting in patient discomfort and reduced adherence. We hypothesised that non-invasive measurements with pre-defined PVA criteria would be reliably correlated between 2 independent observers.

Methods: 5 patients initiated on NIV were assessed for PVA using respiratory inductance plethysmography (RIP), 2nd intercostal space parasternal electromyography (EMG_{para}) and mask pressures (P_{mask}). Two independent observers each recorded PVA from the overnight traces examining each breath from a 2 minute period for each 10 minute epoch over an hour.

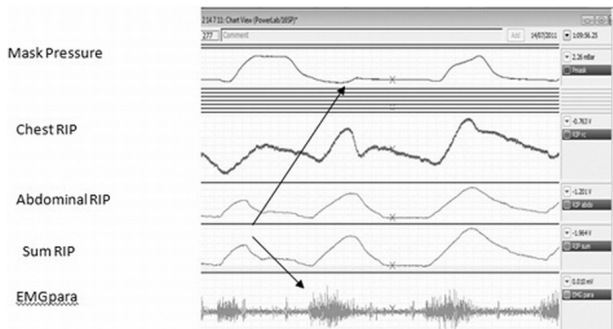


Figure 1. Representative trace showing an "Ineffective Effort" asynchronous event with EMGpara activity and chest wall movement without pressurisation of the ventilator (arrowed).

Results: A total of 1347 breaths were analysed by each observer.

Correlation between two independent observers

Type of Asynchrony	Observer 1	Observer 2	Intraclass correlation coefficient (ICC), 95% CI	Bland-Altman
Ineffective efforts	255 (19%)	219 (16%)	0.90, 0.39–0.99	7.2 (–45.3, 59.7)
Premature cycling	63 (5%)	49 (4%)	0.75, –0.19–0.97	2.8 (–19.9, 25.5)
Extended cycling	4 (<1%)	10 (<1%)	0.36, –0.58–0.90	–1.2 (–6.5, 4.1)
Auto-triggering	103 (8%)	22 (2%)	0.086, –0.29–0.76	16.2 (–15.1, 47.5)
All asynchronies	429 (32%)	312 (23%)	0.87, 0.75–0.94	2.6 (–33.5, 40.7)

Conclusion: PVA can be reliably identified using the above technique. The predominant PVA was *ineffective effort*. This analysis could be automated to provide a simple approach to assessing PVA.

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How well do questionnaires capture symptomatic relief and well-being over time with NIV in motor neurone disease?

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Benefits of non-invasive ventilation (NIV) in motor neurone disease (MND/ALS) have been explored using quantitative health measurements with little examination of subjective experience. This study explored whether current quantitative tools commonly used in MND adequately capture the effects of NIV. 6 patients (all male, mean age= 67) from an original cohort of 35 were available for the present study having survived a year on NIV. Both questionnaires and semi-structured interviews were completed at 3 occasions: pre-NIV (Point A), 4-6months (Point B) and 10-12months post-NIV (Point C). The scales used were ALSFRS-R (physical functioning), ALSAQ-40 (ALS specific health status), MNDRS (dyspnoea), BDI (depression), BHS (hopelessness), HADS (depression and anxiety), and ESS (sleepiness). During the interviews, experience of NIV, physical changes and their impact on daily life were explored. All interviews were assessed using thematic analysis. Quantitative scores were compared using analysis of variance. Changes were seen from points A to C in ALSFRS-R 33 v 27 (p=0.021), ALSAQ subscale for communication 46 v 29 (p=0.018), BHS 3.67 v 1.80 (p=0.03) and ESS 9.50 v 2.8 (p=0.046). The scores of ALSFRS-R denote worsening functional status, while the other scales indicate improvement. Qualitatively, 4 symptoms were discerned

as problematic and were improved by NIV: energy level, quality of night sleep, daytime sleepiness and breathlessness. The results show the multidimensional range of symptoms that relate to hypoventilation in MND and how the routinely employed scales may fail to capture significant symptomatology or the impact of NIV on such symptoms.