

34-61); hip flexion 69% pred (IQR: 52-95); knee extension 26% pred (IQR: 11-37); ankle dorsiflexion 25% pred (IQR: 13-38). HHD demonstrated good inter-observer agreement with ICC >0.90 in 4 of the muscle groups tested (range: 0.91 to 0.96) and somewhat less for hip flexion (ICC=0.80) and ankle dorsiflexion (ICC=0.76). **Conclusions:** HHD is a reliable tool for the assessment of muscles that are strong enough to overcome gravity in cooperative critically ill patients. Future studies should focus on the sensitivity of HHD and on the relationship with functional outcome.

P1275

Effects noninvasive mechanical ventilation on muscle strength, ambulation, and functional performance in the intensive care
Sahveren Cakartas¹, Deniz Inal Ince¹, Sema Savci³, Hulya Arikani¹, Arzu Topeli Iskit². ¹Physiotherapy and Rehabilitation, Hacettepe University Faculty of Health Sciences, Ankara, Turkey; ²Internal Medicine, Intensive Care Unit, Hacettepe University Faculty of Medicine, Ankara, Turkey; ³School of Physiotherapy and Rehabilitation, Dokuz Eylul University, Izmir, Turkey

Aim: Muscle weakness is a common complication of stay in the intensive care unit (ICU). The aim of this study was to compare the effects of noninvasive mechanical ventilation (NIMV) and standard medical care on muscle strength, ambulation level and functional performance in ICU patients with acute respiratory failure.

Methods: Fifteen patients undergoing standard medical care (53.1±15.5 years) and 15 patients undergoing NIMV (59.9±14.4 years) participated in the study. Patients' characteristics, admission findings and length of ICU stay were recorded. An Acute Physiology and Chronic Health Evaluation (APACHE II) score was calculated. Peripheral muscle strength was assessed using the Medical Research Council Scale and handgrip dynamometry. Functional performance was evaluated using the Barthel Index. Ambulation level was recorded as six levels: (1) unsupported sitting in the bed, (2) transfer to chair, (3) sitting in the chair, (4) standing, (5) walking, (6) walking >30 m.

Results: APACHE II score was similar in both groups (p>0.05). Barthel Index score, ambulation score, and MRC sum score were significantly lower in patients with NIMV (p<0.05). No significant difference in hand grip force were found between the two groups (p>0.05). Length of ICU stay was significantly longer in patients undergoing NIMV (p<0.05).

Conclusion: Patients receiving NIMV had peripheral muscle weakness. These patients had more limitations in their functional performance as compared to patients undergoing standard care. Application of NIMV, similar to invasive mechanical ventilation, results in limitations in functional performance, ambulation, and muscle strength in the ICU.

P1276

Registry and conformity of endotracheal tube tip distance from carina at a large tertiary hospital

Leda Tomiko Yamada da Silveira^{1,2}, Aline Costa Lopes³, Rodrigo Marques Di Gregorio³, Carolina Fu^{1,3}. ¹Physical Therapy Department, Medicine School of University of São Paulo, São Paulo, SP, Brazil; ²Medical Department, Physical Therapy Service, University Hospital of University of São Paulo, São Paulo, SP, Brazil; ³Physical Therapy Department, Clinical Hospital of Medicine School of University of São Paulo, São Paulo, SP, Brazil

Physiotherapists are part of the Intensive Care Unit (ICU) team, although their role varies. In Brazil, they participate in endotracheal tube (ETT) management. Artificial airway management is an important part of routine ICU patient care. However, there are few studies about this subject. Objectives were to find out: if ICU staff registered the measured mark of ETT at the lips (ETT mark); if registry was in accordance with real ETT mark; if a specific field for ETT mark registry influenced the filling of patient's file; and if ETT tip distance from carina (ETT-carina distance) was correct according to thorax radiography.

199 cases of patients intubated for over 24 hours, from seven ICUs of Clinical Hospital of Medicine School of University of São Paulo, were included. Data observed: ETT mark, ETT-carina distance, ETT mark registry at patient's files. We found that there was no ETT mark registry neither on medical nor nursing records. Physiotherapists registered it in 55.8% of the cases. ETT mark registry was in accordance with observed in 82 cases (73.9%). Among the cases in which ETT mark was not registered, in most of them (72%) there was not a specific field. ETT-carina distance was correct (from 2.5 to 4.0 cm) in 60.8% of the cases.

In the ICUs analyzed, only physiotherapists registered ETT mark. In an expressive percentage (44.2%) there was no registry of this important information at all. The presence of a specific field may have positively influenced the filling of patient's files. In a significant number of cases (39.2%) ETT-carina distance was incorrect, propitiating risk for intubated ICU patients. Perhaps ETT positioning has not been given the necessary attention.

P1277

The use of an oxygen concentration 50% above baseline before and after endotracheal suctioning prevents hypoxemia in stable patients

Bruno Pessoa, Gisele Diniz, Pedro Figueiredo. *Physical Therapy, Pontifícia Universidade Católica de Minas Gerais, Betim, Minas Gerais, Brazil*

Objective: Few are known about the use of inspired fractions of oxygen less

than 100% (1) to prevent hypoxemia during endotracheal suctioning (ES). The objective was compare the repercussions of using a FiO₂ 50% above the baseline with a FiO₂ of 100% during ES in mechanically ventilated patients.

Methods: A randomized trial in 17 patients (55,7±23,9 years) underwent 2 sessions of ES (break of 6 hours) with prior hyperoxygenation by two values of FiO₂: 50% above the baseline and 100%. The heart rate (HR), mean arterial pressure (MAP), oxygen saturation (SpO₂) and breath rate (BR) were recorded at baseline, 5 minutes after adjusting the FiO₂, likewise 1 and 5 minutes after the end of procedures.

Results: SpO₂ within the groups increased in all phases of the two protocols, compared to baseline. There was an increase in HR at 1 min after ES in protocol with raising the FiO₂ to 50%, compared to PRE time and baseline, as well as the BR in procedure with FiO₂ of 100%. Already MAP increased only at 1^o min compared to baseline in the protocol with increase FiO₂ to 50%. In the intergroup analysis, SpO₂ and BR was higher in the procedure with FiO₂ of 100% at 1 min after the ES, but without clinical relevance.

Conclusion: The use of a FiO₂ 50% above baseline before and after ES prevented hypoxemia and negative changes in vital signs of stable patients on mechanical ventilation.

P1278

Non-invasive ventilation (NIV) as an aid to exercise in patients admitted with acute exacerbation of chronic respiratory disease

Fran Dyer¹, Farid Bazari¹, Caroline Jolley¹, Lizzie Flude¹, Victoria Lord¹, Mike Polkey¹, Nick Hopkinson². ¹NHRR Respiratory Disease Biomedical Research Unit, The Royal Brompton and Harefield NHS Trust, London, United Kingdom; ²NHRR, Imperial College, London, United Kingdom

Introduction: Patients with acute exacerbations of chronic respiratory disease are often too breathless to exercise leading to muscle deconditioning. Using NIV to assisted exercise during an exacerbation might prevent this but it is not known if this is acceptable to patients.

Methods: 10 in-patients with an acute exacerbation (including COPD, Bronchiectasis, CF) were recruited. If they were unable to cycle for 5 minutes at 20 watts unassisted they then cycled with NIV for up to 20 minutes. NIV settings were adjusted to patient comfort. Oxygen was titrated to maintain SpO₂ 88-92%. Patients were asked to rate their level of distress and willingness to repeat the intervention.

Results: Mean age was 52.8 (15.9). 56% male. 67% used NIV at night. All were naïve to NIV during exercise. NIV increased cycle time by 90 seconds (47.8%). All stated they would repeat this type of exercise and most (90%) reported it easier to exercise with NIV.

Table 1. Times cycled and change in parameters with exercise

	Without NIV	With NIV	Difference (95% CI)	p value*
Time cycled (mins)	3.18 (1.35)	4.7 (1.30)	1.52 (0.32 to 2.72)	0.02
Resting SpO ₂	94 (3.89)	96 (2.26)	2 (-4.36 to 0.63)	0.12
Resting HR	102 (14.87)	100 (16.19)	2.50 (-4.42 to 9.42)	0.44
Change in SpO ₂	-3.4 (4.72)	1.90 (3.35)	5.30 (0.89 to 9.71)	0.02
Change in HR	9.1 (7.99)	12.60 (7.35)	3.50 (-4.22 to 11.22)	0.33
End Borg dyspnoea	4.67 (1.86)	3.92 (0.67)	-0.75 (-2.79 to 1.29)	0.39
End Borg RPE	12.50 (2.88)	11.00 (3.16)	-1.50 (-4.05 to 1.05)	0.19

All data presented as mean (SD). *Paired t-test

Conclusion: NIV is well tolerated, feasible and significantly increases exercise capacity in patients hospitalised with an acute exacerbation.

P1279

Is there a need for training when using an oscillatory positive expiratory pressure device?

Thibault Coppens¹, Grégory Reyckler², Jean Roeseler¹, Pierre Delguste², Giuseppe Liistro². ¹Physical Medicine and Rehabilitation, Cliniques Universitaires Saint-Luc, Brussels, Belgium; ²Pneumology Unit, Cliniques Universitaires Saint-Luc, Brussels, Belgium

Introduction: Oscillatory positive expiratory pressure with Acapella[®] is routinely used to remove secretions. The system uses a counterweighted plug and a magnet to generate pressure and airflow oscillations. To be efficient, this pressure must be higher than 10 cm H₂O. There is no recommendation about the instructions for the patient and the interface (mouthpiece or facemask) to use with the system. The aim of this study was to measure the pressure generated by subjects after basic instructions.

Material and method: Eight healthy subjects (28.7 yrs.±8.0) were recruited. They were instructed to breathe through Acapella[®] with two interfaces (mouthpiece and facemask) and with different resistance settings in a randomized crossover design. Continuous recordings of airway pressure and airflow were performed. Sequence was composed by 5 breathes at each resistance setting. Success rate was defined as an expiratory pressure higher than 10cm H₂O.

Results: Depending on interface, significant differences (mouthpiece vs facemask) were measured for Pe max (11.23cm H₂O±3.6 vs. 10.3cm H₂O±2.52; p=0.001), Pe mean (6.67cm H₂O±1.58 vs. 6.2cm H₂O±1.43; p=0.001), inspiratory (3.04s±0.94 vs. 3.47s±1.11; p=0.001) and expiratory time (5.94s±2.05 vs 6.23s±2.01; p=0.01). Time spent with Pe ≥ 10cm H₂O (1.24s±1.33 vs.

1.19s±1.48; p=0.69) was similar between interface. Success rate was low (59%). Neither difference in success rate (p=0.896) nor resistance (p=0.563) was observed depending on interface. Time with a pressure higher than 10cm H₂O was only 20% of total expiratory time.

Conclusion: Without specific training, efficient expiratory pressure (higher than 10cm H₂O) was obtained in less than 60% of breathing.

P1280

Validation of a time-frequency wheeze detector in cystic fibrosis: A pilot study
Daniela Oliveira¹, Catia Pinho^{1,2}, Alda Marques¹, Joao Dinis^{1,2}. ¹Higher School of Health University of Aveiro, University of Aveiro, Aveiro, Portugal; ²Institute of Electronics and Telematics Engineering of Aveiro, University of Aveiro, Aveiro, Portugal

Background: Computerised lung-sound analysis can be used to identify and quantify wheezes which are associated with pulmonary diseases. However, this type of analysis requires further validation before it can be implemented routinely in the clinical practice across different respiratory pathologies.

Objective: This pilot study aimed to validate a time-frequency wheeze detector (TF-WD) in the cystic fibrosis disease.

Methods: Recordings were made in a clinical setting from a stable cystic fibrosis adult outpatient with a digital stethoscope following the CORSA guidelines. Several TF-WD algorithms were tested and the best performance was obtained with the Taplidou et al. (2007) algorithm, which was validated in four sound files. The number, duration and type of wheezes were blindly analysed independently by three experienced respiratory physiotherapists. Their evaluation was then compared with the automatic method. The statistics accuracy of the wheezes detection was quantified through sensitivity, specificity and performance measures using MatlabR2007b. True positives/negatives and false positives/negatives were counted by comparing each point of the sound file.

Results: Inter-rater agreement between the physiotherapists was 96.9%. The sensitivity, specificity and performance of the automated method were 77.2%, 98.4% and 87.1%, respectively.

Conclusion: The automated method tested shows sufficient reliability to continue the study and implement a future clinical validation with a larger sample. Wheezes detection through computerised analysis can provide an objective measure to assess and monitor cystic fibrosis patients, however further research is needed to validate the most robust algorithm.

P1281

Randomized clinical trial: Effects of controlled breathing exercises on respiratory muscle in the elderly

Maria Àngels Cebrià i Irazo¹, David Alan Arnall², José Manuel Tomás Miguel³, Celedonia Igual Camacho¹, Juan Carlos Meléndez Moral⁴, Jon Roger Webb⁵. ¹Physiotherapy Department, University of Valencia, Valencia, Spain; ²Physical Therapy Department, East Tennessee State University, Johnson City, United States; ³Department of Methodology for the Behavioural Sciences, University of Valencia, Valencia, Spain; ⁴Department of Developmental and Educational Psychology, University of Valencia, Valencia, Spain; ⁵Psychology Department, East Tennessee State University, Johnson City, United States

Introduction: Respiratory muscle (RM) strength decreases with aging, and in most cases this decrease is associated with functional impairment and disabilities, particularly in the frail elderly. RM training has been shown to be an effective method to improve RM strength. The purpose of this study was to assess the effect of controlled breathing exercises on RM strength among elderly people with disabilities who are unable to engage in general exercise reconditioning. The hypothesis is that controlled breathing exercises will improve RM strength vs. a control group.

Methods: Forty-eight elderly were randomly assigned to a control group (n=24) or training group (n=24). A supervised training protocol, consisting of controlled Pranayama breathing exercises, was performed 5 times per week for 6 weeks. Maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) were assessed at 4 time points: pre-test, intermediate, post-test and follow-up.

Results: The anthropometrics, pulmonary function and RM function data of participants did not show significant differences between groups. ANOVAs revealed significant differences in MIP and MEP between the two groups after the training protocol. For MIP the treatment was effective (F3,138=9.122, p<0.001, $\eta^2=0.165$). Also for MEP is statistically significant (F3,138=9.102, p<0.001, $\eta^2=0.165$).

Conclusions: This is the first controlled study in elderly people that reports a significant gain in RM strength due to the Pranayama training program.

P1282

Laryngeal movements during mechanical insufflation-exsufflation

Tiina Andersen^{1,2}, Astrid Sandnes⁵, Ove Fondenes¹, Thomas Halvorsen^{3,5}, John-Helge Heimdal^{4,6}, Magnus Hilland⁴, Tom Karlsen⁴, Thor-Andre Ellingsen⁴, Ola Røksund^{3,5}. ¹Norwegian Centre of Excellence for Home Mechanical Ventilation, Thoracic Department, Haukeland University Hospital, Bergen, Norway; ²Department of Physiotherapy, Haukeland University Hospital, Bergen, Norway; ³Department of Pediatrics, Haukeland University Hospital, Bergen, Norway; ⁴Department of Otolaryngology/Head and Neck

Surgery, Haukeland University Hospital, Bergen, Norway; ⁵Section for Pediatrics, Institute of Clinical Medicine, University of Bergen, Bergen, Norway; ⁶Institute of Surgical Science, University of Bergen, Bergen, Norway

Introduction: Mechanical insufflation-exsufflation (MI-E) is the most effective approach to increase peak cough flow in patients with neuromuscular diseases, thereby potentially augmenting airway clearance. Co-ordinated movements of the glottis are probably crucial for effect, but laryngeal response patterns to MI-E have not been studied.

Aims: Visualize laryngeal response patterns to MI-E in healthy subjects.

Methods: Ten healthy volunteers (21-26 years) were examined with video recorded flexibel transnasal fiberoptic laryngoscopy during MI-E (Cough Assist®, Respiroics, USA) according to a standardized protocol at pressures of ±20 to 50 cmH₂O. Participants were instructed to inhale during insufflation and to cough or actively exhale during exsufflation. Laryngeal patency and movements during MI-E was assessed from video recordings according to a pre-set scheme.

Results: In all subjects and regardless of the applied pressure and instructions, the vocal cords abducted during insufflation and exsufflation. Coordinated glottic closure and opening on instruction to cough was found in 10/10. At exsufflation pressures of -40 to -50 cmH₂O, hypopharyngeal obstruction was observed in 6/10. Cough presented as sequential glottic closures in the majority. Retroflex movement of the epiglottis, partially occluding the laryngeal entrance, was observed in three subjects during insufflation, irrespective of pressures.

Conclusion: The laryngeal response patterns to MI-E in healthy subjects was as described for spontaneous cough. Negative pressures may cause temporary hypopharyngeal obstruction, and retroflex movement of the epiglottis may obstruct airflow. The examination was well tolerated and may be considered for use in patients.

P1283

Alteration in heart rate variability in response to rnspiratory pressure loads and pursed lips breathing in healthy subjects

Ingrid Guerra Azevedo, Fernando Henrique Fernandes Macedo, Vanessa Resqueti, Fernando Augusto Lavezzo Dias, Guilherme Augusto de Freitas Fregonezi. Physical Therapy Department, Federal University of Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil

Objective: To study the acute effects of low and moderate inspiratory pressure loads and pursed lips breathing maneuver on heart rate variability in healthy young subjects.

Methods: Twenty nine subjects (15 male, mean age: 22.7±0.8 years, IMC: 23.4±0.3 kg/cm²) with normal lung function assessed by spirometry and maximal inspiratory pressure were randomized in three groups and performed the pursed lips breathing (PLB) or breathing against inspiratory pressure loads corresponding to 20% of maximal inspiratory pressure (IL20%) or 50% of maximal inspiratory pressure (IL50%). Heart rate variability (HRV) was assessed in a sited position for a period of 5 minutes before and during intervention.

Results: During PLB we found a significant increases in LF (m/s²) (773±176.3 vs. 4360±1236, p< 0.022) and total power (m/s²) (2302±391.2 vs. 7375±1149, p<0.001). Subjects in the IL20% group had an increase in mean heart rate (78±2.0 vs. 89.2±1.8, p<0.001) and a decrease in total power (m/s²) (5552±1425 vs 2617±594.8 p<0.021). During breathing at IL50% subjects had an increase in LF (m/s²) (1048±252.2 vs. 4586±1327 p<0.026), LF/HF index (2.43±0.55 vs. 6.80±1.80 p<0.009), mean heart rate (78.4±3.3 vs. 87.5±4, bpm, p<0.009) and total power (m/s²) (2504±730 vs. 6976±1678, p< 0.036).

Conclusion: In healthy young subjects pursed lips breathing tends to increase LF values without changes in sympathovagal balance. Breathing at high inspiratory pressure load (IL50%) induces increase and predominance of sympathetic drive and may be seem as a precaution when used in patients with arrhythmias or ectopy. Financial Support: CNPq

P1284

Use of breath stacking technique as a strategy for redistribution of regional chest wall volume in obese women

Jacqueline Barcelar¹, Talita Lourdes Melo¹, Camila Dornelas¹, Daniella Brandão¹, Cyda Reinaux¹, Guilherme Fregonezi², Selma Bruno², Andrea Aliverti³, Arnele Dornelas¹. ¹Departamento de Fisioterapia, Universidade Federal de Pernambuco, Recife, Brazil; ²Departamento de Fisioterapia, Universidade Federal do Rio Grande do Norte, Natal, Brazil; ³Dipartimento di Bioingegneria, Politecnico di Milano, Milano, Italy

The effects of obesity on pulmonary function can affect the chest expansion and induce restrictive mechanisms. Maneuvers of respiratory expansion improve the lung ventilation.

Aims: To analyze the effects of breath stacking (BS) on compartmental analysis of breathing in obese females.

Methods: Clinical blind, randomized controlled trial involving 32 obese women (BMI ≥ 40kg/m²) separated into two groups: control (CG) n=16, mean age 41.94±9.38 and intervention (GBS) n= 16, mean age 40.38±10.16. Optoelectronic Plethysmography (OEP) was performed to assess total and regional tidal volume during a breath stacking. For statistical analysis used paired t tests and unpaired.

Results: GBS showed an increase in contribution in the rib cage pulmonar (p =