

# RESPIRATORY CARE

## Resumen de trabajos originales

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SELECCIÓN DEL EDITOR

### **IMPLEMENTACIÓN DE UN PROTOCOLO DE BETA AGONISTAS Y LIMPIEZA DE LA VÍA AÉREA EN UNA UNIDAD DE CUIDADOS INTENSIVOS PEDIÁTRICOS**

Lowe, Gary (contacto); Willis, J; Bai, Shasha; Heulitt, Mark

**ANTECEDENTES:** Protocolos conducidos por terapia respiratoria has sido usado por más de 30 años para disminuir terapias innecesarias o peligrosas, costos de salud, y estada hospitalaria. Este estudio representa la evaluación de un protocolo de cuidados respiratorios original en una UCI pediátrica en el hospital de niños de Arkansas para intervenciones de beta agonistas y limpieza de vía aérea donde no existía uno. **MÉTODOS:** Este estudio fue dividido en dos partes: una encuesta administrada a los terapeutas respiratorios y practicantes independientes licenciados, y una revisión retrospectiva de los datos clínicos comparando el protocolo con una orden directa del médico tratante a terapia respiratoria en una población de pacientes ingresados por falla respiratoria aguda. **RESULTADOS:** La aceptación del protocolo fue evidente en las respuestas en las encuestas por todas las percepciones con respecto a la implementación del protocolo elevando el estatus e incrementando el valor de los terapeutas respiratorios. Para la comparación

Acceptance of the protocol was evident in the survey responses as overall perceptions surrounding the implementation of the beta-agonist/airway clearance protocol were positive, and responders perceived the protocol implementation elevated the status and increased the value of respiratory therapists. For the comparison of physician-directed orders to therapist-driven protocols, there were no significant differences between pre- and post-intervention groups for mean age, gender, mean daily acuity, or mean weighted daily acuity ( $p = .33, .19, > .99, .79$ ; respectively). There were also no differences in PIM 2, PIM 2 Rate of Mortality, PRISM 3 Probability of Death, and PRISM 3 scores ( $p = .63, .56, .19, \text{ and } .44$ ; respectively) between the two groups. When comparing physician-directed orders to therapist-driven protocols, all outcome measures (length of stay, beta-agonist therapies,

airway clearance therapies, and ventilator days) showed statistically and clinically significant reductions adjusting for patient characteristics ( $p < .001$ ) for the therapist-driven protocol group. CONCLUSION: In this institution, implementation of a beta-agonist/airway clearance protocol resulted in significant reductions of patient interventions, improved outcomes by decreasing length of stay and ventilator days, and contributes information where clinical evidence is scant; specifically, the pediatric intensive care unit.

## ORIGINAL RESEARCH

### Daily Goals Formulation and Enhanced Visualization of Mechanical Ventilation Variance Improves Mechanical Ventilation Score

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**Introduction:** The systematic implementation of evidence-based practice through the use of guidelines, checklists and protocols mitigates the risks associated with mechanical ventilation (MV), yet variation in practice remains prevalent. Recent advances in software and hardware have allowed for the development and deployment of enhanced visualization tool that identifies MV goal variance. Our aim was to assess the utility of daily goal establishment and a computer-aided visualization of variance.

**Methods:** This study was composed of 3 phases. A retrospective observational phase (Baseline) followed by two prospective sequential interventions. Phase I intervention comprised daily goals establishment of MV. Phase II intervention was the setting and monitoring of daily goals of MV with a web-based data visualization system (T3). A single score of MV (MVS) was developed to evaluate the outcome.

**Results:** The Baseline phase evaluated 130 patients, Phase I enrolled 31 patients and Phase II enrolled 36 patients. There were no differences in demographic characteristics between cohorts. 171 verbalization of goals of MV were completed in Phase I. The use of T3 increased by 87% from phase I. MVS improved by 8.4% in Phase I and 11.3% in Phase II from Baseline ( $P=0.032$ ). The largest effect was in the volutrauma-free category, with a 40.3% improvement from Baseline in Phase I which was maintained at 39% improvement from Baseline in Phase II ( $P=0.013$ ). MVS was 9% higher on average in those who survived.

**Conclusion:** Daily goal formation and computer enhanced visualization of MV variance was associated with an improvement in goals obtainment by evidence of an improved MVS. Further research is needed to determine if improvements in MVS through a targeted, process-oriented will lead to improved patient outcomes.

## The Future of Respiratory Care: Results of a New York State Survey of Respiratory Care Professionals

Smith, Stephen (contact); Endee, Lisa; Benz Scott, Lisa; Linden, Pamela

### Introduction

In the current healthcare environment, respiratory care may need to make significant changes to academic preparation and clinical practice. The purpose of this research was to assess current needs of Respiratory Therapists (RTs) in New York State (NYS) and to understand how RTs perceive their future clinical and academic roles.

### Methods

This study employed a descriptive, cross-sectional non-experimental design. Between October and December 2014, a 32 item online survey was distributed via email to the 2,170 members of the New York State Society of Respiratory Care. Descriptive statistics were used to summarize responses and bivariate analyses were assessed using Kruskal-Wallis and Mann-Whitney U tests.

### Results

The response rate was 22% and resulted in 435 valid surveys returned. Seventy percent (70%) of 415 respondents agreed the practice of respiratory care is at risk of losing practitioners. The most important incentive for retention of practitioners in the field was professional growth and an expanded scope of clinical practice. Specifically, the most important of these roles was gaining the ability to assess patients, develop a plan of care, and receive reimbursement for services. Sixty-four percent (64%) of 415 respondents strongly agreed that the minimum academic standard for respiratory therapists should be raised to the baccalaureate level. Of 408 respondents, the majority (80%) agreed that it is important for therapists to remain in the profession and to be an active member of the American Association for Respiratory Care (83%).

### Conclusion

These data are useful to the profession, notably for academic programs that must meet the need for a more highly prepared and skilled workforce. The findings emphasize that viability of the profession in the current health care environment calls for the evolution of a more autonomous RT who can be reimbursed for services and obtain salaries that are competitive with other health professions.

## Development, validity and reliability of the Londrina Activities of Daily Living (ADL) Protocol for patients with COPD

**Sant'Anna, Thaís;** Pitta, Fabio (contact); Donaria, Leila; Furlanetto, Karina; Morakami, Fernanda; Rodrigues, Antenor; Grosskreutz, Talita; Hernandez, Nidia; Gosselink, Rik

**Introduction:** To avoid symptoms, patients with chronic obstructive pulmonary disease (COPD) reduce the amount of activities of daily living (ADL). Then, the aim of the present study was to develop a standardized protocol to evaluate ADL performance in patients with COPD (Londrina ADL Protocol) and to assess the validity and reliability of the protocol in this population. **Methods:** The Londrina ADL Protocol was created based on activities included in previous studies aimed at investigating outcomes from ADL. Activities were included in the protocol since they could represent other activities of similar pattern and if they could be actually performed, not simulated. Twenty subjects with COPD (12 men,  $70 \pm 7$  years old,  $FEV_1 = 54 \pm 15\%$  predicted) wore two motion sensors while performing the protocol four times, two of them wearing a portable gas analyzer. Patients were also submitted to assessments of lung function, functional exercise capacity, functional status, impact on health status and physical activity in daily life. **Results:** The Londrina ADL Protocol was composed by five activities representing ADL involving upper limbs, lower limbs and trunk movements. Londrina ADL Protocol duration presented high values of intraclass correlation coefficient, even using a mask for gas analysis ( $ICC > 0.90$ ;  $P < 0.001$ ). Intensity of movement during the protocol performance was highly correlated to intensity of movement in daily life ( $r = 0.71$ ). The protocol duration was correlated with functional status and impact on health status variables from questionnaires ( $0.32 \leq r \leq 0.59$ ). There was also correlation between functional exercise capacity and the protocol duration ( $r = -0.64$ ). **Conclusions:** The Londrina ADL Protocol is a valid and reliable protocol to evaluate ADL performance in patients with COPD. It is a protocol which can be used in clinical practice and in future studies to investigate ADL outcomes, including those studies which require gas analysis and the need for wearing a mask.

Londrina ADL Protocol (LAP): reproducibility, validity and reference values in physically independent adults aged 50 and older

**Paes, Thaís;** Pitta, Fabio (contact); Belo, Letícia; da Silva, Diego; Morita, Andrea; Donaria, Leila; Furlanetto, Karina; Sant'Anna, Thaís; Hernandes, Nidia

Introduction: It is important to assess activities of daily living (ADL) in older adults due to impairment of independence and quality of life. However, there is no objective and standardized protocol available to assess this outcome. Thus, the aim of this study was to verify the reproducibility and validity of a new protocol for ADL assessment applied in physically independent adults aged 50 and older, the Londrina ADL Protocol; and to establish an equation to predict reference values of the Londrina ADL Protocol. Methods: Ninety-three physically independent adults aged 50 and older had their performance in ADL evaluated by registering the time spent to conclude the protocol. The protocol was performed twice. The six-minute walk test (6MWT), which assesses functional exercise capacity, was used as validation criterion. A multiple linear regression model was applied, including anthropometric and demographic variables which correlated with the protocol, in order to establish an equation to predict the protocol's reference values. Results: In general, the protocol was reproducible (ICC: 0.91). The average difference between the first and second protocol was 5.3%. The new protocol was valid to assess ADL performance in the studied subjects, presenting a moderate correlation with the 6MWT ( $r=0.53$ ). The time spent to perform the protocol correlated significantly with age ( $r=0.45$ ), but neither with weight ( $r=-0.17$ ) nor with height ( $r=-0.17$ ). A model of stepwise multiple regression including gender and age showed that age was the only determinant factor to the Londrina ADL Protocol, explaining 21% ( $P<.0001$ ) of its variability. The derived reference equation was: Londrina ADL Protocolpred(sec)=135.618+(3.102\*age [years]). Conclusion: The Londrina ADL Protocol was reproducible and valid in physically independent adults aged 50 and older. A reference equation for the protocol was established including only age as independent variable ( $r^2=0.21$ ), allowing a better interpretation of the protocol's results in clinical practice.

## Microalbuminuria in Subjects with Chronic Obstructive Pulmonary Disease Relationship to the new version of global initiative for chronic obstructive lung disease staging

bozkus, fulsen (contact); dikmen, nürsel; samur, anıl

**Introduction:** Microalbuminuria used as a marker of endothelial dysfunction, is a predictor of mortality for any reason and of cardiovascular events. Recent research about the management of chronic obstructive pulmonary disease (COPD) has focused more on comorbidities including cardiovascular events. The objective of this study was to investigate the incidence of microalbuminuria and whether it is associated with physiological and clinical features in a subject group which was classified in line with the new version of the Global Initiative for Chronic Obstructive Lung Disease stages.

**Method:** The study included 105 stable subjects with mild to very severe COPD. The urinary albumin creatinin ratio (UACR) was calculated using a previously defined formula. The presence of microalbuminuria was accepted as a  $UACR \geq 20$  in males and  $\geq 30$  in females.

**Results:** UACR values were significantly higher in subjects grouped as having more symptoms and high future risk than in those with fewer symptoms and low future risk. In addition, significant differences were observed when the subjects were grouped based on  $PaO_2$  ( $\leq 65$  vs  $>65$  mmhg),  $PaCO_2$  ( $\leq 41$  vs  $>41$  mmhg),  $SaO_2$  ( $\leq 92$  vs  $>92$  %) and median split CRP ( $\leq 4.6$  vs  $>4.6$  mg/L). Pearson correlation analysis revealed that, UACR was significantly inversely correlated with FEV1% ( $r = -0.56$ ,  $p = .001$ ),  $SaO_2\%$  ( $r = -0.48$ ,  $p = .001$ ) and  $PaO_2$  ( $r = 0.60$ ,  $p = .001$ ). A positive correlation was also found between UACR and CAT scores ( $r = 0.53$ ,  $p = .001$ ).

**Conclusion:** The results of this study indicate a strong relationship between microalbuminuria and cardiovascular events in COPD subjects, particularly in subjects with more symptoms and high future risk. Therefore, microalbuminuria should be regularly monitored in this subgroup of COPD subjects for risk of cardiovascular morbidity or mortality.

Low volume whole body vibration training improves exercise capacity in subjects with mild to severe COPD

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**Introduction:** The objective of this study was to investigate the benefits of a low volume outpatient whole body vibration training (WBVT) program on exercise capacity in comparison to a calisthenics training program (CTG) in subjects with chronic obstructive pulmonary disease (COPD).

**Methods:** In this single-centre randomized controlled trial twenty-nine subjects with mild to severe COPD were randomized to WBVT or to calisthenics training including relaxation and breathing retraining in combination with calisthenics exercises. Both groups equally exercised for duration of 3 months with 2 session/30min per week). Outcome parameters were 6-minute walk distance (6MWD, primary outcome), 5 Repetition sit-to-stand test (STST), leg press peak force, Berg-Balance scale (BBS), St. George Respiratory Questionnaire (SGRQ) and COPD-Assessment-Test (CAT).

**Results:** Twenty-seven subjects completed the study (WBVT: n=14, CTG: n=13). Baseline characteristics between groups were comparable. Subjects in the WBVT group significantly improved 6MWD (+105±88m; p=.001), STST (-2.3±1.8 sec.; p=.001), peak force (28.7±16.6 kg; p=.001) and BBS (1.5±4.0 pts; p=.05). Changes in 6MWD, STST and leg press peak force were also found to be significantly different between groups in favor of the WBVT-group. Only the between-group difference of the CAT score was in favor of the CTG (p=.024).

**Conclusion:** A low volume WBVT program resulted in significantly and clinically relevant larger improvements in exercise capacity compared to calisthenics exercises in subjects with mild to severe COPD.

Alternative indexes to estimate the functional capacity from the six-minute walk test in children and adolescents with cystic fibrosis.

**Okuro, Renata;** Minsky, Rafaela (contact); Ribeiro, Maria Angela; Ribeiro, José; Schivinski, Camila

Background: Cystic fibrosis is a multi-systemic disease related to reduced functional capacity. The distance covered in six-minute walk test (6MWT) has been known to assess functional capacity but little is known about other indices that can be derived from 6MWT. We sought to compare the performance during the 6MWT and the estimated indexes of functional capacity from the 6MWT between cystic fibrosis (CF) patients and healthy individuals, as well as to assess the relationship among these indexes and disease severity, pulmonary function and nutritional status in CF. Methods: This cross-sectional study was carried out at a University Referral Center for CF. It included a group of 55 non-oxygen-dependent CF patients (CFG) with no acute pulmonary exacerbations and a group of 185 healthy controls (CG). All subjects were submitted to a 6MWT and anthropometric measurements. Results: Regarding performance during the 6MWT, the mean value of work (W), physiological cost index (PCI), average velocity (AV) and distance walked (DW) were significantly lower in the CFG than in the CG (W:  $21690.58 \pm 10427.77$  vs.  $26057.51 \pm 11228.49$  m.kg ( $p < .01$ ); PCI:  $0.31 \pm 0.19$  vs.  $0.37 \pm 0.17$ ; AV:  $94.71 \pm 12.89$  vs.  $104.55 \pm 9.13$  m/min ( $p < 0.001$ ) and DW:  $568.02 \pm 76.31$  vs.  $627.54 \pm 54.81$  m ( $p < .001$ )). Patients with less severe CF had higher DW, W and AV during the 6MWT, compared to patients with more severe CF ( $p < .01$ ;  $p < .05$ ;  $p < .01$ , respectively). There was a correlation between DW, W, AV and disease severity and pulmonary function. Conclusions: Considering the importance of standard measure (distance walked) in 6MWT, alternative indices can be useful as complementary outcomes and to provide a better understanding of limiting factors of exercise response in children and adolescents with CF.

## The integrative weaning index in ICU elderly subjects

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**Introduction:** With increasing life expectancy, ICU admission of elderly subjects, mechanical ventilation and weaning trials have increased worldwide.

**Methods:** We evaluated a cohort with 479 subjects in the intensive care unit. Subjects younger than 18 years, tracheostomized and with neurologic diseases were excluded, resulting in 331 subjects. Subjects 70 years old or more were considered elderly, while those less than 70 years old, nonelderly. Besides the conventional weaning indexes, we evaluated the performance of the integrative weaning index (IWI). The study was approved by the Ethics Committee of Pedro Ernesto University Hospital (2206-CEP). The probability of successful weaning was investigated using relative risk and logistic regression. The Hosmer-Lemeshow Goodness-of-fit test was used to calibrate and the C statistic was calculated to evaluate the association between predicted probabilities and observed proportions in the logistic regression model.

**Results:** Prevalence of successful weaning in the total population was 83.7%. There was no difference in mortality between elderly and nonelderly subjects ( $p = 0.16$ ), in days of mechanical ventilation ( $p = 0.22$ ) and days of weaning ( $p = 0.55$ ). In elderly subjects, the IWI was the only respiratory variable associated with mechanical ventilation weaning in this population ( $p < 0.0001$ ).

**Conclusion:** The IWI was the independent variable found in weaning of elderly subjects which may contribute to the critical moment of this population in intensive care.

## Optimizing PEEP by electrical impedance tomography (EIT) in a porcine animal model of acute lung injury

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**Introduction:** Mechanical ventilation is necessary in diverse clinical circumstances. Especially in the context of ARDS, so-called protective ventilation strategies must be ensured. It is already known that PEEP might enhance oxygenation in ARDS. However, determining the optimal PEEP settings in clinical routines is challenging. Electrical impedance tomography (EIT) is a promising technique with which to adjust ventilator settings. We investigated whether or not the combination of different EIT parameters, namely the global inhomogeneity and hyperdistension indices, may lead to a feasible and safe PEEP setting.

**Methods:** An acute lung injury was induced by a double-hit approach in 18 pigs weighing, on average, 34.8 ( $\pm$  3.97) kg. First, a surfactant washout was conducted; second, the tidal volume was increased to 20 ml kg<sup>-1</sup> body weight, triggering a ventilator-induced lung injury. Subsequently, pigs were randomized to either the EIT or control groups, followed by an observation time of 24 hours. In the control group, PEEP was set according to the ARDS network table. In the EIT group, a PEEP trial was conducted to determine an appropriate PEEP. At defined time points, hemodynamic measures, ventilation parameters and EIT recordings, as well as blood samples, were taken. After euthanization, lungs were removed for subsequent histopathological and cytological examination.

**Results:** The combination of PEEP and FiO<sub>2</sub> differed between groups, although respiratory compliance, gas exchange and histopathological examinations, as well as hemodynamics, did not show any statistical differences between the EIT and control groups. However, in the control group, the PEEP/FiO<sub>2</sub> settings followed the given coupling; in the EIT group, divergent individual combinations of PEEP and FiO<sub>2</sub> ranges occurred.

## Radiographic Mastoid and Middle Ear Effusions in the Intensive Care Unit Patient

Huyett, Phillip (contact); Raz, Yael; Hirsch, Barry; McCall, Andrew

### Objectives

To determine the incidence of and risk factors associated with the development of radiographic mastoid and middle ear effusions (ME/MEE) in ICU patients.

### Methods

Head CT or MRI imaging of 300 subjects admitted to the University of Pittsburgh Medical Center neurologic ICU from April 2013 through April 2014 was retrospectively reviewed. Images were reviewed for absent, partial or complete opacification of the mastoid air cells and middle ear space. Exclusion criteria were temporal bone or facial fractures, transmastoid surgery, prior sinus or skull base surgery, history of sinonasal malignancy, ICU admission less than 3 days or inadequate imaging.

### Results

3.7% of subjects had radiographic evidence of ME/MEE at the time of admission. 10.3% (n=31) of subjects subsequently developed new or worsening ME/MEE during their ICU stay. ME/MEE was a late finding and was found to be most prevalent in subjects with a prolonged length of stay ( $P < .001$ ). Variables associated with ME/MEE included younger age, the use of antibiotics and development of radiographic sinus opacification. The proportion of subjects with ME/MEE was significantly higher in the presence of an endotracheal tube (22.7% vs. 0.6%,  $P < .001$ ) or nasogastric tube (21.4% vs. 0.6%,  $P < .001$ ).

### Conclusions

Radiographic ME/MEE was identified in 10.3% of ICU subjects and should be considered especially in patients with prolonged length of stay, presence of ETT or NGT and concomitant sinusitis. ME/MEE is a potential source of fevers and sensory impairment that may contribute to delirium and perceived depressed consciousness in ICU patients.

## Veteran Preferences Regarding Wireless Management of Positive Airway Pressure for Obstructive Sleep Apnea at a Tertiary Health Care System

**He, Ken;** Parsons, Elizabeth (contact); Palen, Brian; Mattox, Elizabeth

**Introduction:** Timely monitoring of OSA therapy can be a challenge amidst conflicting pressures of rising patient volume and shortage of sleep providers. PAP devices with wireless modem technology have potential to improve patient access to care and streamline workload. Yet little is known about patient attitudes toward telehealth integration among veterans with sleep apnea. As part of a larger quality improvement initiative at the Veterans Affairs (VA) Puget Sound Health Care System, we elicited veterans' preferences toward modem versus traditional PAP data download, including patient attitudes and factors affecting those preferences.

**Methods:** We conducted an anonymous survey of veterans without previous CPAP experience presenting for initial device setup and training at VA Puget Sound PAP clinics. Surveys assessed patient demographics, PAP download preferences (modem vs. mail), and Likert-type scale ratings of importance placed on factors including convenience and information privacy. Using multinomial logistic regression, we examined the association between convenience rating and download preference, adjusting for information privacy rating, age, and commute time.

**Results:** Of 444 surveys analyzed, respondents were primarily male with mean age of 52 years. Most respondents reported taking at least 30 minutes to commute to the PAP clinic. Convenience was rated as the most important factor affecting download preferences. Veteran preferences regarding PAP download method were mixed, with 47% preferring modem, 37% preferring memory card mail-in, and 15% undecided. A higher rating of convenience was significantly associated with modem preference, both before and after adjustment for information privacy rating, commute time, and veteran age (adjusted RRR 1.67,  $p < 0.001$ , 95% CI 1.40 – 1.99).

**Conclusions:** PAP data download preferences were mixed among new veteran users. Veterans placed a high value on the potentially competing concerns of convenience and information privacy. Veterans preferring modem factored convenience as important in their decision-making, independent of privacy concerns.

## The Concave Shape of the Forced Expiratory Flow-volume Curve in 3 Seconds is a Practical Surrogate of the FEV<sub>1</sub>/FVC for the Diagnosis of Airway Limitation in Inadequate Spirometry

Li, Hao (contact); Liu, Chunhong; Zhang, Yi; Xiao, Wei

**Background:** Spirometry is important for the differential diagnosis of dyspnea. However, some patients cannot exhale for at least 6 seconds to achieve the American Thoracic Society and European Respiratory Society (ATS/ERS) criteria. The aim of this study was to demonstrate the reliability of a new parameter to define airway limitation as a surrogate for the FEV<sub>1</sub>/FVC.

**Methods:** Four hundred spirometry test results were selected through complete random sampling. The new parameter was calculated as the area under the descending limb of the expiratory flow-volume curve before the end of the first 3 seconds (AUC<sub>3</sub>) divided by the area of the triangle before the end of the first 3 seconds (AT<sub>3</sub>). The AUC<sub>3</sub>/AT<sub>3</sub> was compared with the FEV<sub>1</sub>/FVC using Pearson's correlation analysis. The level of agreement between the AUC<sub>3</sub>/AT<sub>3</sub> and the FEV<sub>1</sub>/FVC in the detection of airway obstruction was analyzed using the kappa statistic. We also compared the diagnostic accuracy of the new index with that of the FEV<sub>1</sub>/forced expiratory volume in the first 3 seconds (FEV<sub>3</sub>).

**Results:** There was a strong correlation ( $r = 0.88$ ) between the AUC<sub>3</sub>/AT<sub>3</sub> and the FEV<sub>1</sub>/FVC. There was also strong agreement between the AUC<sub>3</sub>/AT<sub>3</sub> and the FEV<sub>1</sub>/FVC in the detection of obstruction with kappa indices of 0.72 (Global Initiative for Chronic Obstructive Lung Disease (GOLD) criterion) and 0.67 (lower limit of normal (LLN) criterion), and these values were greater than those obtained for the FEV<sub>1</sub>/FEV<sub>3</sub>. The diagnostic accuracies of the AUC<sub>3</sub>/AT<sub>3</sub> were 86.3% (GOLD criterion) and 83.8% (LLN criterion), which were greater than the 76.0% and 74.0% obtained for the FEV<sub>1</sub>/FEV<sub>3</sub>, respectively.

**Conclusions:** The AUC<sub>3</sub>/AT<sub>3</sub> can be utilized as a surrogate parameter for the FEV<sub>1</sub>/FVC when patients cannot complete a 6-second expiratory effort. Additionally, the performance of this index is better than that of the FEV<sub>1</sub>/FEV<sub>3</sub> in the identification of airway limitations.

## Beliefs and Attitudes Associated with Waterpipe Smoking Among a US College Population

Martinasek, Mary (contact); Haddad, Linda; Wheldon, Chris; Barnett, Tracey

**Introduction:** This study serves to explore the differences among smokers of waterpipe tobacco in a college population to better inform campaigns to curb waterpipe use.

**Methods:** Participants included undergraduate and graduate students attending a liberal arts university in Florida. Email-based, cross-sectional surveys were collected in two sequential years.

**Results:** The majority of respondents (64%) reported ever having smoked hookah even if just one to two puffs. Of those who ever smoked hookah, 34% reported smoking hookah within the previous 30 days. Constructs from the TRA were all correlated with smoking behavior. The range of beliefs endorsed by smokers were more strongly associated with hookah-related attitudes compared to subjective norms. Concerns about health were stronger among never-smokers.

**Conclusion:** Young adult college students continue to engage in waterpipe tobacco smoking at high rates. Campaigns need to focus on subsets of smokers and nonsmokers, independently.

## EDITORIALES

### **El mango de la escoba**

Wheeler, Derek

### **Medicina conducida por datos: un uso significativo de los datos de los pacientes para mejorar el cumplimiento y los resultados clínicos de los pacientes ventilados mecánicamente**

Verbrugge, Walter (contacto); Jorens, Philippe

### **La profesión de la Terapia Respiratoria en la entrecrucijada**

Kacmarek, Robert (contacto); Walsh, Brian

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