## 381. Highlights in lung function 2011

**3415**

**Effectiveness of a telemedicine program in the quality of spirometries in primary care centres**

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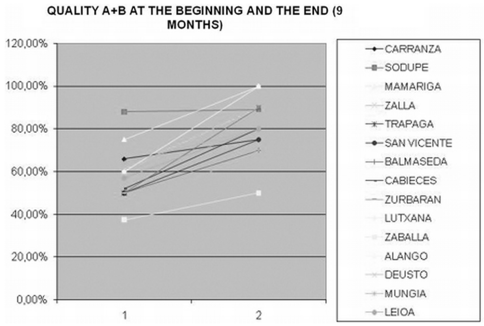
**Introduction:** Many studies have demostrated a low quality of S in primary care, carrying wrong diagnosis and treatment. Spirometry (S) quality control can be difficult because it is not an easy test.

**Aims:** 1.To evaluate the effectiveness of a Telemedicine Program to assure the S quality in Primary Care Centers (PCC). 2.To evaluate if there is agreement between functional diagnosis and clinical diagnosis.

**Material/Methods:** We included 15 PCC, with 2-3 nurses in each of them. We use a Telemedicine Program (Linkcare Spiro®). The quality of S was evaluated by the Functional Respiratory Laboratory according to standard guidelines and a report was given in high quality S. The quality was evaluated using a scale grade from D and F (poor quality) to A and B (excellent quality).

**Results:** During 9 months 1.894 S were collected. We observed an improvement in all PCC.

We have obtained clinical parameters in 640 patients, 321 with previous clinical diagnosis in PCC. 94/321 (29.3%) presented COPD diagnosis, with normal S in




24/94 (25.5%). In according to new diagnosis (319 patients), 119 patients presented anormal S, not only for parameters of obstruction but also for restriction.
**Conclusions:** 1. The Telemedicine Program improve the quality of S in all centers. 2. The Telemedicine Program is usefull as a continues training program for nurses. 3. We observed disagreement in 25.5% of COPD diagnosis.

**3416**
**Flow-volume loops in central airway obstruction**
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**Introduction:** Central airway obstruction (CAO) leads to significant morbidity and mortality. In the last 40 years flow-volume loops (FVL) have been used as a noninvasive method to evaluate this condition although bronchoscopy is the gold standard. Few studies were made to verify the sensitivity and specificity of FVL in detecting CAO, or to investigate the morphological and quantitative changes of the curve in relation to location, type and degree of obstruction.
**Methods:** Patients with an indication to perform bronchoscopy were selected consecutively. Bronchoscopy and FVL were carried out with a maximum interval of 7 days. Four experts, blinded to the quantitative data, were used to assess the morphology of FVL (suggestive or non-suggestive of CAO) and an independent element established the quantitative and morphological criteria (intra, extrathoracic variables and fixed).
**Results:** 82 patients were studied, 36 (44%) with CAO. The sensitivities and specificities in detecting CAO were, respectively: 91.3% and 88.9% for the quantitative criteria of FVL; 93.5% and 30.6% concerning the morphological criteria; 95.7% and 86.1%.if there was an aggregation of quantitative and morphological criteria. In patients with CAO the most common quantitative criteria were $FEF_{50}/FIF_{50} \geq 1$, (83%) and $FEV_1/PEF \geq 8$ (36%). They correlated with localization, degree and type of obstruction.
**Conclusions:** The morphology of the FVL has a good sensitivity but low specificity in detecting CAO. Quantitative criteria of the FVL have a high sensitivity and specificity. In clinical practice one should always use an aggregation between the morphological and quantitative criteria, since it maintains sensitivity, improving specificity.

**3417**
**Survival analysis can help determine which TLco prediction equations to use for patient data**
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Choosing which prediction equation to use for lung function data can be a problematic. In Europe the ECCS equations are commonly used but more recent ones are available and may be more applicable. To help decide which TLco prediction equations would be best for our data we extracted the earliest results for subjects from our lung function database who had a full set of all tests and determined their survival up to 29/1/2009. We calculated TLco results as standardised residuals (SR) using equations from ECCS (1993), RO Crapo (1981), A Miller (1983) and CM Roberts (1991) and used deciles of these results and of age and included sex to predict survival. There were full data for 5626 subjects (48% women) with mean (SD) age 59.3 yrs (14.7), mean survival 4.4 yrs (SD 2.6, range 0 to 24) with 2049 deaths. Using the ECCS equations the mean (range) of SR values for $FEV_1$ was -1.6 (-7.3 to +3.4), for FVC was -0.8 (-6.3 to +3.6) and for TLco was -1.5 (-6.5 to +6.2). The best Cox survival prediction model (highest $Chi^2$ value) was with the Miller equations as shown in the table of hazard ratios (95% CI) for death associated with oldest age decile, worst TLco decile and sex.
We conclude that for our UK data the Miller equations from the USA for TLco are best related to subsequent survival and so should be considered for determining if results are abnormal.

| Equation | Chi-squared | Oldest Age Decile | Worst TLco Decile | Sex |
|---|---|---|---|---|
| Miller | 1508 | 5.2 (4.1–6.5) | 9.7 (7.6–12.4) | 1.5 (1.3–1.6) |
| ECCS | 1482 | 5.8 (4.6–7.3) | 8.9 (7.0–11.3) | 1.6 (1.4–1.7) |
| Crapo | 1422 | 6.3 (5.0–7.8) | 8.3 (6.5–10.5) | 1.4 (1.3–1.5) |
| Roberts | 1403 | 5.8 (5.0–7.8) | 10.1 (7.9–12.9) | 2.0 (1.8–2.2) |

**3418**
**Evaluating the FVC-reference equation for female**
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**Introduction:** At World Spirometry Day we measured lungfunction in hospital staff (n=99, m= 40, f=59) in Amersfoort, the Netherlands. We were struck by the high scores in FVC in the female group. In the group of healthy, never-smoking female (n=36) (Ages 18-64) we discovered that mean FVC was 114% pred. Other studies about this subject show that reference values for male have not enough correction for aging, but are quite correct for height.
**Aim:** Understand which element of the reference-equation for female doesn't fit properly, and search for alternatives.
**Methods:** First we analysed the ECCS reference equation for FVC in female: 4,43H – 0,026A – 2,89 (H=height in m, A=Age in y) (ERJ 1993.) Then we made a statistical analysis for FVC% pred. (y) and age (x) and FVC% pred. (y) and height (x).
**Analysis:** The statistics show that female from 18-44 ys. have a lower FVC% pred.(n=18,mean FVC = 106%pred) than female from 45-64 ys.(n=18, mean=120% pred.) We see that female between ages 45-64 with a moderate height (160-170cm) have the highest scores. There is a linear relation between age and FVC% pred.(p< 0,005) Concerning height: Only in female with real high FVC% pred. (>120%) we see a relation between height and FVC% pred.(p<0,009) Analyzing the equation we discovered that for tiny female a same volume is subtracted for aging as there is in taller female and even in male.
**Conclusion/Discussion:** Aging of the lung should be related to the volume of that specific lung. We have high expectations of the new reference equations introduced by taskforce Global Lungs Initiative. In the clinical setting there's a risk of underestimating restrictive patterns in tiny elderly female when applying the ECCS reference equations.

**3419**
**How many forced spirometry efforts are useful in moderate to severe COPD patients?**
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The 2005 ERS/ATS guidelines on spirometry have established a maximum number of 8 efforts in a forced spirometry test. The aim of this work was to evaluate which effort produces the highest value for $FEV_1$, FVC, PEF, and $FEV_6$ in COPD patients.
We used the data collected in a phase II multicenter clinical trial (TESRA, sponsored by F. Hoffmann – La Roche Ltd) to evaluate the parameter trend in multiple efforts of forced spirometry in moderate to severe COPD patients with emphysema. All of the 73 test centers in 12 countries were equipped with the identical device (MasterScreen PFT, CareFusion, Hoechberg, Germany). The data was collected electronically and reviewed for quality and acceptability by a central overread. 6 075 test sessions (screening and treatment) with 20 482 valid efforts from 1 183 patients were evaluated. On average 3.4 valid efforts were performed per test.
The per effort parameter values were expressed as a percentage of the highest (best) value per test session. The median values per effort number across all tests ranged from 95% to 99% for $FEV_1$, FVC and $FEV_6$. The highest median values were achieved in efforts 3 and 4. For PEF the median values ranged from 92% to 98%, with the highest values in the first effort. $FEV_1$ and PEF showed a marked decrease in late efforts.
The drop in the PEF and $FEV_1$ values illustrates the increasing fatigue of the COPD patients. The relative $FEV_1$ values were lower than the relative FVC values, indicating that it is more complicated for patients to sustain good $FEV_1$ values. Unless errors in the technique are observed, it is unlikely to achieve higher values after the 5th effort.

**3420**
**Vital capacity after lung transplantation**
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**Introduction:** The size of the Vital Capacity (VC) is determined by powers between thorax and lung. After lung transplantation it will take some time before an equilibrium is settled between thorax mobility and lung compliance. VC therefore increases over time until a maximum is reached (VCmax).
**Aims:** The aim of our study was to investigate how long it takes to reach VCmax. Also we wanted to find out if age at transplantation, pre transplantation value of FEV1/VC, single or double lung transplantation and gender influenced the duration to reach VCmax.

**Methods:** We analysed data of 29 patients who underwent a lung transplant in the Erasmus Medical Center Rotterdam and had at least 2.5 years of lung function data after transplantation. We determined the number of days necessary to reach 95% of the highest post transplant VC (TimeVC).

**Results:** 15 males and 14 females, with ages at transplantation ranging from 31 to 63 years were studied. 19 underwent a bi- and 10 a unilateral lung transplantation. 22 were transplanted because of obstructive lung disease and 7 because of other reasons. Patients were obstructive if FEV1/VC $< -1.64$SD of the predicted values. Average TimeVC was 537 days (SD=281 days). In the obstructive group TimeVC was on average 470 days and in the non-obstructive group 750 days.

We only found a significant regression coefficient (R=0.46, p=0.012) between TimeVC and pre transplantation FEV1/VC in SD of predicted.

**Conclusion:** In our study we found that a more severe obstruction before transplantation leads to an earlier reach of maximum VC after transplantation. An explanation might be that the pre transplant thorax in obstructive patients had been in a hyperinflated state, enabling the transplanted lungs to expand sooner.

**3421**

**Reasons for referral for pulmonary function testing: An audit of four Australian adult lung function laboratories**

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Pulmonary function (PF) testing provides a cornerstone for diagnosis and management of most respiratory conditions and accurate interpretation of test results is an important component of the final report. As part of developing a structured approach to interpretation of PF results we wished to characterise primary reasons for referral for testing in a range of PF laboratories.

**Methods:** Three public, university-affiliated PF labs and one private lab using similar PF databases participated. Reasons for performance of PF tests were extracted from the databases and collated for analysis. Over 5,000 consecutive tests were evaluated from each lab.

**Results:** Identifiable reason for referral was found in 83% of 24,602 test results and categorised. The major categories were follow-up of known respiratory disease (53% of 20,308 tests), investigation of specific symptoms (18%), possible specific lung disease (13%), possible induced lung disease (5%), investigation of lung function in known other diseases (5%) and pre-operative evaluation (5%). Testing in known disease and/or assessing for PF change was the primary reason for testing in 60% of tests performed.

**Discussion:** These data highlight the predominance of ongoing assessment of PF and the importance of access to previous test results to provide clinically useful test reports. They also emphasize the need for having valid criteria describing what constitutes a real change in the various PF parameters.

**Conclusion:** Since the majority of PF tests are performed to follow disease progress or response to treatment, there is a great need for defining clinically important change in pulmonary function.