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# FEV<sub>1</sub>/FEV<sub>6</sub> AS A SURROGATE FOR FEV<sub>1</sub>/FVC FOR DIAGNOSIS OF COPD: RESULTS OF THE PLATINO STUDY

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## RATIONALE

- According to the GOLD criteria, airflow obstruction is established through spirometry, if a post BD FEV<sub>1</sub>/FVC ratio < 0.70 is documented<sup>1</sup>.
- Some authors have been suggesting that the shortening of the forced expiratory maneuver to a six seconds duration (also called FEV<sub>6</sub>) could replace the FVC maneuver both for airway obstruction<sup>2-6</sup> and a restrictive pattern diagnosis patients<sup>7-10</sup>.
- The PLATINO project was a COPD prevalence, randomized clustered sample, population-based study done in five large cities in Latin America (Sao Paulo -Brazil, City of Mexico-Mexico, Caracas-Venezuela, Santiago-Chile, and Montevideo-Uruguay), recently published in the literature<sup>11</sup>.

## OBJECTIVE

To evaluate the accuracy of the FEV<sub>1</sub>/FEV<sub>6</sub> in detecting airway-obstructed subjects in a population-based survey ( PLATINO study).

## METHODS

- The survey included adults with 40 years of age and older carried out in Sao Paulo-Brazil, City of Mexico-Mexico, Caracas-Venezuela, Santiago-Chile, and Montevideo-Uruguay.
- Its methodology has already been published elsewhere<sup>12</sup>.
- A total of 5,315 spirometries after 200 mcg of salbutamol with simultaneous measurement of FVC and FEV<sub>6</sub> was obtained.
- A portable spirometer (EasyOne™; Medizintechnik AG, 2004/www.ndd.ch), equipped with ultrasound flow sensors were used in the Platino study (Figure 1).



Figure 1: spirometer used in the survey)

## RESULTS

- In a linear regression, FEV<sub>1</sub>/FVC= (FEV<sub>1</sub>/FEV<sub>6</sub>\*1.24)-21.8 (R<sup>2</sup>=0.95).
- The FEV<sub>1</sub>/FEV<sub>6</sub> equivalent to FEV<sub>1</sub>/FVC=70 was 0.741 in this simple linear regression and 0.742 adjusting for city, current smoking, gender, height and BMI (R<sup>2</sup>=0.95). The area under the ROC curve was 98.7% (Figure 2).
- A FEV<sub>1</sub>/FEV<sub>6</sub> of 0.742 had a sensitivity of 83.4% and specificity of 98.5% to detect FEV<sub>1</sub>/FVC of 0.70 .
- Mean difference between FEV<sub>1</sub>/FVC and FEV<sub>1</sub>/FEV<sub>6</sub> was 2.5 (95%CI: 7.5 to 0).
- A FEV<sub>1</sub>/FEV<sub>6</sub> of 0.76 had both a sensitivity and specificity of 94.2% to detect FEV<sub>1</sub>/FVC of 0.70 (Figure 3).

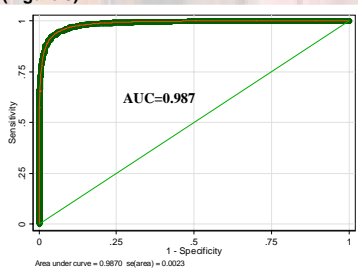


Figure 2 – ROC curve evaluating the performance of the FEV<sub>1</sub>/FEV<sub>6</sub> = 0.742, equivalent to FEV<sub>1</sub>/FVC = 0.70

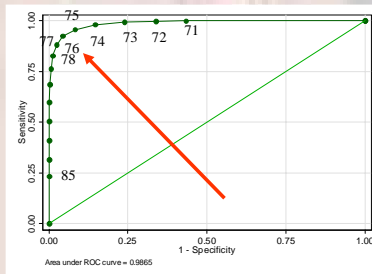


Figure 3 – ROC curve evaluating the performance of the FEV<sub>1</sub>/FEV<sub>6</sub> = 0.76, equivalent to FEV<sub>1</sub>/FVC = 0.70

- The scatterplot of FEV<sub>1</sub>/FVC vs FEV<sub>1</sub>/FEV<sub>6</sub> is shown in figure 4.
- Quadrants II and III represent agreement in classification between FEV<sub>1</sub>/FVC and FEV<sub>1</sub>/FEV<sub>6</sub> (cutpoint of 76).
- Quadrant I (upper left): are false positives, obstructed by FEV<sub>1</sub>/FEV<sub>6</sub> but with FEV<sub>1</sub>/FVC > 70 (4.9%).
- Quadrant IV (lower right): represent false negatives. Non obstructed by FEV<sub>1</sub>/FEV<sub>6</sub> but with FEV<sub>1</sub>/FVC < 70 (0.9%).
- Difference between FEV<sub>1</sub>/FVC and FEV<sub>1</sub>/FEV<sub>6</sub> increases with more severe airflow obstruction, figures 4 and 5.

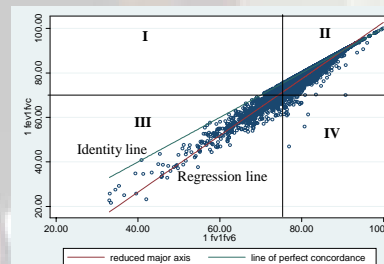


Figure 4- Overall plot of observed measures between FEV<sub>1</sub>/FVC and FEV<sub>1</sub>/FEV<sub>6</sub>. Vertical line is at FEV<sub>1</sub>/FEV<sub>6</sub> = 0.76 equivalent in several sense to a FEV<sub>1</sub>/FVC = 0.70

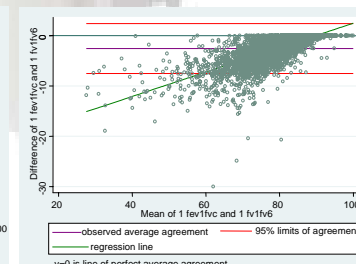


Figure 5- Bland & Altman display of FEV<sub>1</sub>/FVC and FEV<sub>1</sub>/FEV<sub>6</sub>

## DISCUSSION

- FEV<sub>1</sub>/FEV<sub>6</sub> has better reproducibility than FEV<sub>1</sub>/FVC and it is simpler.
- FEV<sub>1</sub>/FEV<sub>6</sub> predicts accurately FEV<sub>1</sub>/FVC, with a AUC =0.98.
- A FEV<sub>1</sub>/FEV<sub>6</sub> of 74 is equivalent to FEV<sub>1</sub>/FVC of 70 by regression.
- The best cut-off point based on a balance between sensitivity and specificity is 0.76. A different cutpoint can be chosen if either specificity or sensitivity is preferred.

## CONCLUSION

In a population-based COPD prevalence study the FEV<sub>1</sub>/FEV<sub>6</sub> was proved to be a simple and accurate lung function parameter in the diagnosis of airway obstruction.

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