

urine (noradrenaline 1208.4 µg/24 h, adrenaline 532 µg/24 h, normetanephrine 5748.6 µg/24 h, metanephrine 12,281.6 µg/24 h) confirmed the diagnosis of pheochromocytoma. The patient was treated with alpha blockers (phenoxybenzamine 10 mg/8 h), later combined with a beta blocker (propranolol 10 mg/8 h). After 7 days of progressive improvement, fiberoptic laryngoscopy revealed pharynx and larynx free of bleeding and bronchoscopy was normal. Bronchoalveolar lavage contained no malignant cells and abundant hemosiderophages (>20%). Anti-DNA, c-ANCA, anti-MPO and anti-GBM antibodies and cultures were negative. After the patient stabilized, left adrenalectomy was performed by laparoscopy; the pathology examination revealed pheochromocytoma with malignant histological features. During follow-up the patient remained asymptomatic and all tests requested were normal (2 months after the episode, the patient had a PaO<sub>2</sub> of 85 mmHg).

On rare occasions pheochromocytoma can present with atypical manifestations such as hemoptysis, acute coronary syndrome with normal coronary catheterization or dilated cardiomyopathy.<sup>1</sup> Pathophysiological mechanisms most often involved in hemoptysis are lung metastases and coagulation disorders.<sup>2,3</sup> When all of these have been ruled out, hemoptysis may be related to the hypertensive crisis triggered by cromaffin tumor secretion.<sup>4,5</sup> In these cases, the paroxysmic HT crises will produce pulmonary vein hypertension causing capillary rupture and the passage of erythrocytes to the alveolar space, resulting in hemoptysis. The interest in this

case is that the presence of pheochromocytoma should be considered in the differential diagnosis of DAH of unknown origin, and that failure to diagnose may be potentially fatal.

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## Quality Audit of Spirometries Carried Out in Primary Care in the Healthcare Region of Lleida: Espir-Audit<sup>☆</sup>



### *Auditoría de calidad de las espirometrías realizadas en atención primaria de la región sanitaria de Lleida: Espir-Audit*

To the Editor:

Spirometry is a keystone in the diagnosis and follow-up of respiratory diseases, and must be used at all levels of healthcare.<sup>1</sup> Nevertheless, one of the main drawbacks of this test is that results depend directly on the quality of the maneuver carried out by the patient and correct interpretation by the medical professional.

In the healthcare district of Lleida, a long-term effort has been made to provide spirometers and training to all primary care (PC) professionals.

We present the primary conclusions of a quality audit of spirometries performed in Lleida. The parameters of the maneuver and acceptability of the curves were evaluated using the Miller standardization as reference.<sup>2</sup> Each parameter was scored as correct or incorrect by consensus of participants.

A total of 273 spirometries were included in the study (4.8% of all those performed in 2012) from 16 PC centers (73% of the primary healthcare areas in the province of Lleida). The mean age of patients undergoing spirometry was 57.1 years

(SD: 16.3) and 172 (63%) were male. No statistical differences were observed in age or gender distribution between the centers. Bronchodilator testing was performed on 242 patients (88.6% of the study population). A total of 57 (20.9%) of the spirometries were classified as unacceptable, 84 (30.8%) were acceptable and 132 (48.4%) were correct. Accordingly, 216 (79%) were considered clinically acceptable/correct and 57 (20.9%) were not.

No significant differences were found between the proportion of acceptable/correct and unacceptable spirometries performed at the reference hospital and the PC centers overall. However, significant variability was found when individual centers were compared (unacceptability ranging from 5% to 62.5%) (Fig. 1).

A very high percentage of PC centers that had and used a spirometer took part in the study.<sup>3</sup> However, these devices may be used less than that in other borderline areas, since the rate of spirometries/100 inhabitants/year in the Lleida healthcare region is 1.01, lower than the mean rate in Catalonia (1.32).<sup>4</sup>

The audit was performed by consensus of participants; therefore, the number of spirometries audited varied greatly and there may have been cases of interindividual variability that were not controlled, a factor that could limit extrapolation of the results of this study.

Further studies are needed with a sample size appropriate to the activity recorded and based on a design that allows any changes after intervention to be measured. Moreover, wide variability in quality was detected between the different PC centers, suggesting that individual improvements need to be made. A continuous coordinated effort is required to ensure that technical resources are used efficiently once all centers have been suitably equipped.

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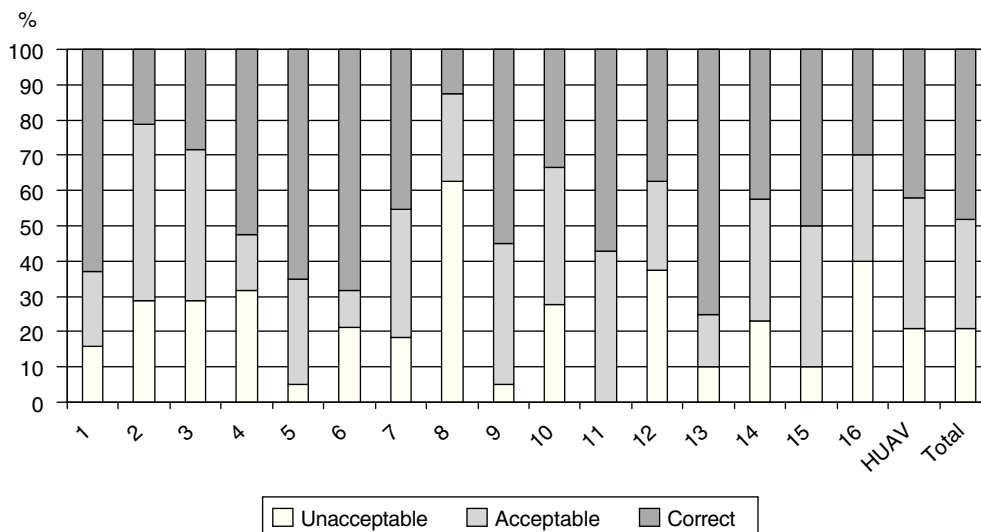


Fig. 1. Proportion of spirometries performed in each participating center by quality. HUAU: Hospital Universitari Arnau de Vilanova.

### Conflict of Interests

The authors declare that they have no conflict of interests.

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