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Editorial

Microspirometers in the follow-up of COPD: advantages and disadvantages☆

El uso de los microespirómetros en el seguimiento de la EPOC: ventajas e inconvenientes

Chronic obstructive pulmonary disease (COPD) is a highly prevalent disease with a high global burden in terms of numbers of years lived with disabilities.[1] Despite its high prevalence, many patients remain undiagnosed and therefore do not receive the appropriate treatment.[2] This is the case in both developed and developing countries, underlining the fact that underdiagnosis is not a problem solely related to access to healthcare systems. Given the situation, the quest for screening methods to detect undiagnosed patients is a priority research area.

Currently, the GOLD recommendations strategy paper does not recommend generalized screening for COPD (performing spirometry on all comers, whether or not they have respiratory symptoms), choosing instead to recommend spirometries in individuals with respiratory symptoms and/or exposure to risk factors for developing the disease.[3] The GesEPOC Spanish COPD guidelines, however, advocate opportunistic screening (for example, when a patient attends the clinic for other reasons and the doctor takes advantage of the opportunity to detect patients at high risk of developing the disease by way of questionnaires and/or simple objective lung function measures; these patients would then be referred for diagnostic confirmation by spirometry, the gold standard for the diagnosis of COPD).[4]

Efforts to reduce COPD underdiagnosis have been ongoing for several years, based mainly on COPD screening measures in the general population, especially the at-risk population and patients with chronic respiratory symptoms.[5–7] These screening methods are based on the use of symptom questionnaires and/or simple measurements of lung function using microspirometers or peak expiratory flow meters.

Most of the microspirometers under study use a forced maneuver to obtain FEV_1 and FEV_6 results and the FEV_1/FEV_6 ratio as a marker of airflow limitation. Two models of microspirometers are available in Spain, the Piko-6® (nSpireHealth Inc., Colorado, USA) and the COPD-6® (Vitalograph Inc., Kansas, USA), both of which have been tested in studies in Spain and other countries.

The COPD-6 has shown a good correlation with forced spirometry values, with an area under the curve close to or slightly above 0.80, and a sensitivity of over 80%, although the optimal FEV_1/FEV_6 cut-off point, at between 0.75 and 0.80, is not well defined.[6,8,9] The Piko-6® microspirometer has also demonstrated its usefulness in screening patients with COPD, with an area under the curve close to 0.85 and a sensitivity greater than 80%, with an FEV_1/FEV_6 cut-off point of 0.7.[5,10]

Ideally, microspirometers should be used in the general population to capture patients with abnormal results that should then be confirmed by conventional spirometry. However, despite their ease of use and the reliability of their measurements compared to forced spirometry performed in a lung function laboratory,[11] these screening methods have not achieved widespread success among the medical community attending patients with respiratory diseases. This should compel us to wonder why these devices are so rarely used, and why they have not helped reduce COPD underdiagnosis.

One of the explanations for the scant use of microspirometers is probably that, like conventional spirometers, these devices are all under the responsibility of healthcare staff, so individuals need to contact the healthcare system in order to be able to perform the test. With this in mind, perhaps it is time to think out of the box and look for new solutions that allow us to obtain lung function measurements without the need to use an additional device or to come into contact with the healthcare system. An ideal solution might be to use the built-in microphone available on most smartphones, which, by analyzing the sound of an exhalation, could provide an estimate of lung function or, at least, airflow limitation. Some initiatives in this regard are already under development, but it may be some time before they can be expected to appear on the market.[12]

In the near future, smartphone lung function apps or microspirometers may be developed for use when access to lung function testing is limited due to the Covid-19 pandemic; such devices could become a valuable tool in telemedicine or respiratory disease screening.

Conflict of interests

Dr. Echave states that he has received personal honoraria and non-financial assistance and has conducted clinical trials in the last 5 years for AstraZeneca, Boehringer Ingelheim, GSK, Laboratorios Menarini, Novartis AG and Sanofi, unrelated with this article.

References

1. GBD Chronic Respiratory Disease Collaborators. Prevalence and attributable health burden of chronic respiratory diseases, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet Respir Med. 2020;8:585–96.
2. Lamprecht B, Soriano JB, Studnicka M, Kaiser B, Vanfleteren LE, Gnatiuc L, et al. Determinants of underdiagnosis of COPD in national and international surveys. Chest. 2015;148:971–85.
3. Vogelmeier CF, Criner GJ, Martínez FJ, Anzueto A, Barnes PJ, Bourbeau J, et al. Informe 2017 de la iniciativa global para el diagnóstico, tratamiento y pre-vención de la enfermedad pulmonar obstructiva crónica: resumen ejecutivo de GOLD. Arch Bronconeumol. 2017;53:128–49.
4. Grupo de Trabajo de GesEPOC. Guía de práctica clínica para el diagnóstico y tratamiento de pacientes con enfermedad pulmonar obstructiva crónica (EPOC) – Guía Española de la EPOC (GesEPOC). Versión 2017. Arch Bronconeumol. 2017;53 Suppl 1:2–64.
5. Hidalgo Sierra V, Hernández Mezquita MÁ, Palomo Cobos L, García Sánchez M, Castellanos RD, Jodra Sánchez S, et al. Usefulness of the Piko-6 portable device for early COPD detection in primary care. Arch Bronconeumol. 2018;54:460–6.
6. Represas Represas C, Botana Rial M, Leiro Fernández V, González Silva AI, del Campo Pérez V, Fernández-Villar A. [Assessment of the portable COPD-6 device for detecting obstructive airway diseases]. Arch Bronconeumol. 2010;46:426–32.
7. Martinez FJ, Mannino D, Leidy NK, Malley KG, Bacci ED, Barr RG, et al. A new approach for identifying patients with undiagnosed chronic obstructive pul-monary disease. Am J Respir Crit Care Med. 2017;195:748–56.
8. Represas-Represas C, Fernández-Villar A, Ruano-Raviña A, Priegue-Carrera A, Botana-Rial M. Study group of "Validity of COPD-6 in non-specialized healthcare settings." Screening for chronic obstructive pulmonary disease: validity and reliability of a portable device in non-specialized healthcare set-tings. PLoS One. 2016;11:e0145571.
9. Dickens AP, Fitzmaurice DA, Adab P, Sitch A, Riley RD, Enocson A, et al. Accuracy of vitalograph lung monitor as a screening test for COPD in primary care. Npj Prim Care Respir Med. 2020;30:2.
10. Guirguis-Blake JM, Senger CA, Webber EM, Mularski R, Whitlock EP. Screening for chronic obstructive pulmonary disease: A systematic evidence review for the U. S. Preventive Services Task Force. Rockville, MD: Agency for Healthcare Research and Quality, U. S. Department of Health and Human Services; 2016.
11. Ramos Hernández C, Núnez Fernández M, Pallares Sanmartín A, Mouronte Roibas C, Cedeira Domínguez L, Botana Rial MI, et al. Validation of the portable Air-Smart Spirometer. PLoS One. 2018;13:e0192789.
12. Larson EC, Goel M, Boriello G, Heltshe S, Rosenfeld M, Patel SN. SpiroSmart. Proc 2012 ACM Conf Ubiquitous Comput - UbiComp' 12. New York, New York, USA: ACM Press; 2012. p. 280.

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