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Increasing patient access to spirometry in the Unified Health System in Brazil: no longer a dream but a near reality

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Spirometry is a test that measures the volume and flow of air that an individual expires through a maximal effort after a full inspiration in a sealed system.[1] It was developed by John Hutchinson and his fellow, Charles Thackrah, in 1831, who later published a paper about the five measurements of modern spirometry.[2] Afterwards, spirometers evolved from simple mechanical devices to sophisticated computational systems. Later on, population-based studies established reference spirometric values, and publication of guidelines with requirements and standards assured reliability and quality control of the test.[1,3]

The indications of spirometry have been increasing in parallel with the refinement of other methods for diagnosis of prevalent respiratory diseases such asthma, COPD, and bronchiectasis, as well as of occupational, interstitial, and vascular pulmonary diseases. Spirometry is essential not only in monitoring disease progression and responsiveness to therapy, but also in clinical practice and in research, improving the quality and precision of health care.[4]

COPD is the third leading cause of death worldwide and the fourth in low- and middle-income countries. According to the PLATINO study,[5] 87.5% of individuals had never been diagnosed with the disease, and 82.3% had never received any pharmacological treatment in the city of São Paulo, Brazil. This picture is similar in other countries. Data derived from four epidemiological studies revealed that only 26.4% of participants reported undergoing a previous lung function test ever, and only 5.0% had received a diagnosis of COPD, resulting in a proportion of 81.4% of underdiagnosed individuals.[6]

Asthma causes significant morbidity to individuals of all ages and affects a large portion of the global population, and, in spite of the modern therapies available, the disease is still underdiagnosed and uncontrolled, resulting in significant morbidity, absenteeism, and a high risk of exacerbations, emergency department visits, and hospitalizations. In Latin America, only 51% and 38% of adults and children with asthma, respectively, had ever undergone spirometry, and two-thirds of them reported undergoing the test in the previous year.[7] These data depict spirometry underuse and a high rate of underdiagnosis of respiratory diseases in Brazil as well as in other low- and middle-income countries, owing to physicians' and patients' misperception on the diagnosis and monitoring of these diseases, as well as the poor availability of spirometry in the region. Making matters worse, the COVID-19 pandemic has led to an increased demand for respiratory care and use of health resources, including the use of spirometry and other tests.[8]

Considering the continental dimension of Brazil and the heterogeneity of the primary care health system, increasing access to spirometry is demanding. How could it be addressed? One of the possibilities would be to use electronics to cover large geographic areas throughout the country. Telehealth systems (TS) have been important tools in this context. The most important predictor for using digital technologies is their usability, while the main barriers are technological issues, poor connectivity, computational illiteracy, inability to perform physical examinations, among others. In general, availability of web-based remote support for primary health care units (PHCUs) involving technicians and specialists generates a positive impact on the quality of spirometry.[9]

In the city of Belo Horizonte, Brazil, the *Centro de Telessaúde* (Telehealth Center) of the *Hospital das Clínicas* of the Federal University of Minas Gerais has joined with the Brazilian Ministry of Health to implement the Telespirometry System Brazil (TS-BR) to a number of PHCUs in low-to-medium human development index cities in Brazil to support PHCU physicians in their routine practice through a reliable and easy-to-access tool.[10] The project has included several stages: composition of the team for the selection of municipalities, development of virtual and face-to-face training on spirometry, acquisition of spirometers, creation and validation of software for test transmission, selection of pulmonologists for interpretation of results, in-person training of PHCU staff, periodic re-training of technicians, and evaluation of quality of tests and reports. The municipalities were selected based on their participation in the Brazilian family health care strategy, availability of electronic medical records, burden of asthma and COPD, and high mortality from COVID-19. The municipalities had to select technicians to be trained, to guarantee the purchase of spirometer mouthpieces and filters, and to maintain a regular offer of spirometric tests. The TS-BR provided training to medical specialists selected for interpretation and report of spirometry results as well for asynchronous teleconsultation.

Implementation of TS-BR took place between January of 2022 and June of 2023. By the time this manuscript was submitted, 147 municipalities had the TS-BR program active, and more than 14,500 tests were carried out to that date (November of 2023). The quality of the tests was remotely addressed and it improved as the number of tests increased (currently, 80.62% are at A/B categories).

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A cost-effectiveness analysis of TS use has shown it to be 23% more expensive but 46% more effective, costs tending to decrease as the number of tests carried out increases.[11] However, as the quality of the TS may decrease over time, centralized quality control and a re-training program are mandatory.[12]

In conclusion, there is high demand for pulmonary function testing in PHCUs worldwide, and that has been aggravated after the outbreak of the COVID-19 pandemic in Brazil. The TS-BR has shown that it is possible to achieve a large-scale increase in the supply of spirometric tests in the country by means of a structured, agile, and well-monitored remote system using appropriate electronic resources.

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AUTHOR CONTRIBUTIONS

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CONFLICTS OF INTEREST

None declared.

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