



Editorial

ALAT 2023 Recommendations for Performing Respiratory Function Studies



Pulmonary function tests (PFT) are indispensable in the diagnosis, treatment and follow-up of respiratory patients and in individuals with risk factors. Now that the most active phases of the COVID-19 pandemic are behind us, we must return to these procedures for the treatment and monitoring of respiratory patients, while implementing protection measures for both patients and medical staff. The COVID-19 crisis has prompted research into routes of contagion, dissemination, and ways of preventing infection that can be extrapolated to other microorganisms.^{1,2} The Pathophysiology Department of the Latin American Thoracic Association (ALAT) has updated and adapted its recommendations^{3–7} based on the state of the knowledge and the opinion of the directors of regional PFT laboratories.

The current epidemiological climate (March 2023) is characterized by a high proportion of immunized individuals, awareness of the need to use protective equipment among health personnel, and closer adherence to existing safety recommendations for conducting these tests. Since SARS-CoV-2 continues to circulate and acute respiratory diseases (ARD) caused by other pathogens have increased in some places, the following recommendations have been issued.

PFTs are not recommended for patients with suspected or confirmed ARD with onset of symptoms within the last 3 weeks or in patients unvaccinated for SARS-CoV2 who have been in close contact with COVID-positive patient within the last 10 days.⁸ PFTs are recommended for all subjects if indicated for clinical purposes or research, and in all individuals if indicated in the context of occupational medicine, and, in general, in any subject whose condition warrants it. Each PFT laboratory should use their own criteria for performing tests in line with active clinical suspicion (e.g., PCR for SARS-CoV-2, other tests for viruses, bacteria or mycobacteria).

In all clinical, occupational medicine and research contexts, PFTs will be conducted according to the following biosafety measures: health personnel should wash their hands or use disinfecting solution before and after the study, wear a mask, ideally N-95 or as recommended by their local infection committee, wear work clothes and personal protective items in accordance with local regulations, keep their hair short or tied back, and use gloves (only staff with broken skin) and eye protection.⁹

The patient should arrive wearing a mask (according to local regulations), wash their hands or use disinfectant solution before and after the examination, and be seen alone, except for children or special cases (patients who require assistance to communicate or collaborate or who have a disability).

The equipment and all surfaces that come in contact with the individual should be cleaned at the start of the day and after the performance of all PFTs, according to the recommendations of the equipment manufacturer and local infection committee. Bronchodilators should be administered using the appropriate interface, which should be disinfected after use, as recommended by the manufacturer and the local infection committee. All PFT equipment must be fitted with a specifically designed antimicrobial filter. The filter should be used only once per visit per patient. Due to the length of time that the patient is connected to the interface during the cardiopulmonary stress test, the use of filters is not recommended, since the exhaled water vapor saturates the filter membrane and can alter the measured flows by increasing resistance.¹⁰ Remember, the equipment should always be calibrated with the filter in place, if required for the test.

Washable and reusable material, for example, noseclips, some sensors and bronchodilator interfaces, should be washed in accordance with the manufacturer's recommendations.

Non-washable and non-reusable material should be disposed of, e.g., antimicrobial filters, mouthpieces, disposable materials from ultrasonic equipment and any other material not recommended for re-use by the manufacturer.

The room where the test is performed should be equipped with sufficient ventilation to eliminate aerosols. The recommended methods include use of a continuous air recirculation system equipped with ultraviolet light or filters (connected to the extractor fans) and cross ventilation via doors and windows that open to the outside,¹¹ a negative pressure air exchange system that guarantees at least 6 exchanges per hour, or high efficiency HEPA filters (only recommended if maintenance is performed according to the manufacturer's instructions). There is no evidence to support the use of screens or other means of physical separation between the operator and the patient, and these may prevent patient-physician interaction. They are not recommended.^{11,12}

The intercalation of patients between pre- and post-bronchodilator phases in spirometry helps optimize time and workflow, but the persistence of aerosols produced in the first phase could affect the next patient. This operating procedure may be defined by the director of each PFT laboratory, according to ventilation conditions, the circulation of viruses in the community, and other factors.

In the future, PFT laboratory managers should ensure that their facilities are correctly ventilated and comply with these recommendations.¹³ The use of carbon dioxide (CO₂) monitors has

been successfully evaluated in different areas.¹⁴ These sensors can be used in PFT laboratories to objectively measure air exchange, plan patient rotation, determine the need to interrupt the workflow, and limit the number of people present during a study. The normal level of CO₂ in open areas is 400 ppm. Levels higher than 700–800 ppm indicate poor environmental ventilation¹⁵ and may be associated with a greater risk of contamination.

To summarize, the 4 basic rules for reducing biological risk during tests in PFT laboratories are: hand washing before and after the test, both by the operator and the patient; good ventilation; use of antimicrobial filters; and use of personal protective equipment, according to current regulations. These recommendations may vary depending on the local epidemiological situation. All personnel must be fully aware of the measures implemented in each department, and they must be properly trained in their use and application.

NOTE: By the time this article is in press, the World Health Organization (WHO) announced the end of the emergency by COVID-19. Nevertheless, these recommendations are valid within the appropriate epidemiologic context, by whatever agent.

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Conflict of interest

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.arbres.2023.04.004.

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