



## Editorial

## Impact of the COVID-19 Pandemic on Lung Function Laboratories: Considerations for “Today” and the “Day After”<sup>☆</sup>



### Impacto de la pandemia COVID-19 en los laboratorios de función pulmonar: consideraciones sobre el «hoy» y el «día después»

The first patient with pneumonia of unknown origin was admitted to Wuhan Hospital, China, on December 8th, 2019. On January 7th, 2020, a new coronavirus, SARS-CoV-2, was identified as causing this pneumonia (later defined as a characteristic of Covid-19 disease). On March 11th, the World Health Organization (WHO) declared Covid-19 a pandemic, with 118,319 cases and 4292 deaths worldwide. In a matter of days, by March 14th, the day on which the state of alarm was declared in Spain, the number of confirmed cases of Covid-19 had increased to 142,434, with 5392 deaths worldwide, of which 4232 cases and 120 deaths had been registered in Spain.<sup>1</sup>

The SARS-CoV-2 virus was so destructive on such a large scale that it was able to paralyze the world, including healthcare services: within 100 days, lung function laboratories (LFL) had become partially inactive. A survey of all pulmonology departments carried out by the Techniques and Transplantation area of the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR) found that 74% of the 108 LFLs that responded had changed their activity in March, at the height of the pandemic. Half of the laboratories had closed completely, and the other 50% continued some of their activities, spirometry in particular, while some still performed carbon monoxide transfer capacity (DLCO) testing. It was not until May, almost 2 months after the state of alarm was declared, that only 51% of these units cautiously resumed their activities, but 49% of LFLs still remain closed. This highlights the need to reorganize LFLs in a standardized fashion so that they can resume their services with sufficient guarantees for both patients and professionals.

Lung function tests entail a risk of infection for both patients and staff.<sup>2,3</sup> This risk is mainly indirect, via the equipment and consumables used, primarily due to the aerosolization that occurs during the tests. Prior to the SARS-CoV-2 pandemic, basic hygiene measures, such as proper hand washing, were recommended to prevent the transmission of infections.<sup>2,3</sup> The use of disposable antibacterial filters in lung function equipment was also recommended, provided, of course, that they did not create airflow resistance.

However, SARS-CoV-2 is still with us and has not yet been neutralized, so we need to rethink hygiene and safety measures in our LFLs. Initially, recommendations were distributed by various

medical societies, such as the Chinese Expert Consensus, the American Thoracic Society (ATS), the Thoracic Society of Australia and New Zealand (TSANZ/ANZSRS), the Sociedade Portuguesa de Pneumologia (SPP), the European Respiratory Society (ERS), the Irish Thoracic Society (IRS), and SEPAR, limiting or even banning lung function testing during the community transmission phase of the infection.<sup>4–10</sup> But this first wave of the Covid-19 has been overcome, and the time has come for LFL activity to begin again in both hospitals and primary care.

The recommendations of the SEPAR experts are based on two aspects: reorganizing LFLs and empowering health professionals,<sup>11</sup> and focus on both structural elements—such as the ideal size of rooms or the need for ventilation—and, primarily, a reorganization of activities. This includes patient flow management, a strategy that will revolutionize LFL activity. The clinical management of the new LFLs can only be carried out by empowering healthcare professionals with specific training on lung function testing.

Adapting LFLs to the SARS-CoV-2 pandemic will reduce the number of tests performed, making it necessary to reorganize lab working hours and increase operations. But now should also be the time for exploring new technologies in a wide range of studies. Research is needed on the design of safer lung function equipment to prevent the indirect transmission of infection without sacrificing the quality of respiratory determinations, while progress should also be made in communication technologies to improve LFL efficiency.

Covid-19 has massively accelerated the use of telemedicine. In the USA, the number of consumers using telemedicine has risen from 11% in 2019 to 46%.<sup>12</sup> This has led healthcare providers to rapidly scale up these services, and they are now seeing 50–175 times the number of patients via telehealth than they did before.<sup>13</sup> Lung function cannot be immune to these developments, and monitoring and telematic follow-up with forced spirometry will soon be implemented; the ATS, for example, has launched an initiative to standardize lung function data so that they can be integrated into electronic medical records.

Solutions for the management of respiratory diseases such as COPD, asthma, cystic fibrosis, and post-lung transplantation, that can be monitored remotely at home are available. Platforms with standardized, interoperable data can and should play a significant role, because they have great potential for improving adherence

<sup>☆</sup> Please cite this article as: Burgos Rincón F, Martínez Llorens J, Cordovilla Pérez R. Impacto de la pandemia COVID-19 en los laboratorios de función pulmonar: consideraciones sobre el «hoy» y el «día después». Arch Bronconeumol. 2020;56:611–612.

to medication and disease self-management, and for reducing healthcare costs.<sup>14</sup> The necessary organizational and infrastructure changes will inevitably force a radical rethink of the services offered by both hospitals and primary care, and this must be done now, before we are caught off guard again by a new episode of this or another pandemic. It seems very likely that the pandemic will accelerate innovations of this type and the rapid introduction of novel diagnostic techniques. As with all aspects of healthcare, today's challenges are tomorrow's opportunities. LFLs will have to address these challenges safely, rapidly and intelligently.

In short, Covid-19 has brought about a change in LFLs, which after an initial stoppage went on to gain momentum and improve in terms of quality and performance. LFLs must adapt to the times we live in and to the times to come. Every dramatic situation forces us to analyze our current position in order to eliminate uncertainty and put in practice the lessons learned for a better future. SARS-CoV-2 has come to stay, without a doubt, but it has provided us with the impetus to improve and to offer our patients better quality healthcare.

## References

1. WHO. Coronavirus disease (COVID-19) situations reports-54, 2020. Available from: [https://www.who.int/docs/defaultsource/coronaviruse/situation-reports/20200307-sitrep-47-covid-19.pdf?sfvrsn=27c364a4\\_4](https://www.who.int/docs/defaultsource/coronaviruse/situation-reports/20200307-sitrep-47-covid-19.pdf?sfvrsn=27c364a4_4).
2. García-Río F, Calle M, Burgos F, Casan P, Galdiz JB, Giner J, et al. Espirometría. Arch Bronconeumol. 2013;49:388–401.
3. Miller MR, Crapo R, Hankinson J, Brusasco V, Burgos F, Casaburi R, et al. General considerations for lung function testing. Eur Respir J. 2005;26:153–61.
4. Task Force of Pulmonary Function Testing and Clinical Respiratory Physiology, Chinese Association of Chest Physicians; Pulmonary Function Testing Group, Respiratory Therapeutics Group, Chinese Thoracic Society. [Expert consensus on pulmonary function testing during the epidemic of coronavirus disease 2019]. Zhonghua Jie He He Hu Xi Za Zhi. 2020;43:302–7. <http://dx.doi.org/10.3760/cma.j.cn112147-20200225-00175>.
5. TSANZ/ANZSRS. Peak Respiratory Bodies recommend suspension of lung function testing 2020. [https://www.anzsrs.org.au/images/anzsrs/peak-respiratory\\_bodies\\_recommend\\_suspension\\_of\\_lung\\_function\\_testing\\_002.pdf](https://www.anzsrs.org.au/images/anzsrs/peak-respiratory_bodies_recommend_suspension_of_lung_function_testing_002.pdf).
6. Irish Thoracic Society Guidance on Lung Function Testing: SARS COVID-19. <https://irishthoracicsociety.com/wp-content/uploads/2020/03/ITS-Guideline-on-lung-function-testing-24.03-FINAL.pdf>.
7. American Thoracic Society. Pulmonary Function Laboratories: Advice Regarding COVID-19. <https://www.thoracic.org/professionals/clinical-resources/disease-related-resources/pulmonary-function-laboratories.php>.
8. Italian Respiratory Society. SIP-IRS. Esami di funzionalità respiratoria nel contesto COVID-19 Position Paper. Date last updated: 12 May 2020. Date last accessed: 17 May 2020; Available from: <https://irn.sipirs.it/storage/61/Documento-EsamiFunzionalit%C3%A0Res-CovidVers.112.05.2020.pdf>.
9. Recommendation from ERS Group 9.1 (Respiratory function technologists /Scientists) Lung function testing during COVID-19 pandemic and beyond The. Actualización 9 May 2020 [Accessed 17 May 2020]. Available from: <https://ErsAppBoxCom/s/Zs1uu88w51monr0ewd990itoz4tsn2h>.
10. Guerra A, Torralba Y, Díaz-Pérez D, Angulo M, López V, Negrón A, et al. SEPAR. Recomendaciones de prevención de infección por coronavirus en las unidades de función pulmonar de los diferentes ámbitos asistenciales; 2020. p. 1–7 <https://drive.google.com/file/d/1JPyCj0.qiewcUTybJd0sxkruij-lbr8Z9/view>
11. Sánchez MP. <https://neumoped.org/wp-content/uploads/2020/05/Recomendaciones-de-prevenci%C3%B3n-de-infecci%C3%B3n-por-coronavirus-en-las-unidades-de-funci%C3%B3n-pulmonar-de-los-diferentes-%C3%A1mbitos-asistenciales-20-Mayo-2020-v2.pdf>, 2020.
12. Telehealth: A quarter-trillion-dollar post-COVID-19 reality? 2020. <http://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality?cid=eml-web>.
13. Medicare telemedicine health care provider fact sheet March 17, 2020. <https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet>.
14. Tupper OD, Gregersen TL, Ringbaek T, Brøndum E, Frausing E, Green A, et al. Effect of tele-health care on quality of life in patients with severe COPD: a randomized clinical trial. Int J Chron Obstruct Pulmon Dis. 2018;13:2657–62.

Felip Burgos Rincón,<sup>a,b,c,\*</sup> Juana Martínez Llorens,<sup>d,e</sup>  
Rosa Cordovilla Pérez<sup>f,g</sup>

<sup>a</sup> Centro de Diagnóstico Respiratorio, Hospital Clínic, Barcelona, Spain

<sup>b</sup> Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS),  
Barcelona, Spain

<sup>c</sup> Centro de Investigación en Red de Enfermedades Respiratorias  
(CIBERES)-Madrid CIBERES, ISCii, Madrid, Spain

<sup>d</sup> Servicio de Neumología, Hospital del Mar – IMIM, Parc de Salut  
Mar, Barcelona, Spain

<sup>e</sup> DCEXS, Universitat Pompeu Fabra, Barcelona, Spain

<sup>f</sup> Servicio de Neumología, Complejo Asistencial Universitario de  
Salamanca, Salamanca, Spain

<sup>g</sup> Instituto de Investigación Biomédica de Salamanca (IBSAL),  
Salamanca, Spain

\* Corresponding author.

E-mail address: [fburgos@clinic.cat](mailto:fburgos@clinic.cat) (F. Burgos Rincón).