

Reply

We thank Kirkpatrick and McKee for their interesting observations on the use of US in the current COVID-19 pandemic.¹ Ultrasound is an excellent modality for bedside investigations of numerous pulmonary diseases that have the characteristic of reaching the surface of the organ in areas that can be explored by intercostal scans.² In most cases, lung damage in COVID-19 is localized in the periphery³; therefore, the sensitivity of US in this disease can be very high. The ease with which a US examination can be performed outside the hospital, in remote and difficult-to-reach locations, is therefore an indisputable value. Nowadays, in many cases, a US diagnosis of pulmonary involvement in a febrile patient is strategic, especially in light of the current demonstrated low sensitivity of the swabs used to identify nasal or pharyngeal viral RNA.⁴

The specificity of the interstitial and consolidative US signs in COVID-19, although not yet studied, may be low, especially when diffuse or multifocal lung diseases (diffuse interstitial diseases, granulomatous diseases, and chronic heart failure) already exist. This problem is important in elderly populations, which are often affected by multiple diseases. However, the specificity of US could increase in young febrile patients, showing bilateral US findings indicating interstitial or consolidative patchy syndrome, as described in recent articles. Finally, the role of pulmonary US for monitoring of symptomatic patients without documented heavy pulmonary involvement to catch the first signs of structural deterioration of the lung is a realistic option.⁵




As the authors rightly say, one disadvantage of US is related to the contact of the machine and the operator with the potentially infected patient. We described some principles relating to instrumentation (a protected wireless transducer), the performer (a single protected operator), and the patient (dressing with adequate protection of the airways),⁶ which we consider essential to reduce the infectious risks. These risks are also present during the execution of radiography and computed tomography.

The possibility of the use of the remotely telementored LUS is an interesting option to improve some limitations of a traditional US examination performed with standard

machines and by dedicated operators. We agree that a standardized protocol and a scoring system may facilitate the implementation of operating instructions for telementoring during the US examination.

In our opinion, acquiring intercostal scans is not complex, once the chest anatomy is known to the performer or to the patient. For this purpose, a simplified scheme indicating the points at which to acquire images is particularly useful, also considering that the foot of a convex or linear transducer tends to adapt spontaneously to the intercostal spaces. We consider a scan system in 7 areas on each side optimal because it is able to cover most of the lung surfaces.⁶ In fact, in the case of a multifocal disease such as COVID-19, limited scans can produce false-negative results. We believe that any motivated and intelligent person could be capable of performing the illustrated scans if guided by an expert. The only drawback of a self-mentored examination would therefore be the failure to explore the scapulovertebral and suprascapular regions. However, these areas represent a limited percentage of the total lung fields. On the contrary, a self-examination can be conducted on the lateral and posterolateral basal regions with appropriate remote indications.

The representation of US signs in patients with COVID-19 is focused on the pleural line and the immediately subpleural space, where it is possible to highlight, on a limited extension of the scan field, normal areas, vertical artifacts, white lungs, and consolidations. The cases illustrated by Biegler et al⁷ for the diagnosis of residual pneumothorax after removal of the thoracostomy tube and analysis by telementored lung telesonography are not very different from an application of mentored telesonography in patients with COVID-19.

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References

1. Kirkpatrick A, McKee J. Re: “proposal for international standardization of the use of lung ultrasound for patients with COVID-19: a simple, quantitative, reproducible method”—could telementoring of lung ultrasound reduce health care provider risks, especially for paucisymptomatic home-isolating patients [published online ahead of print]. *J Ultrasound Med*. <https://doi.org/10.1002/jum.15390>
2. Soldati G, Demi M, Smargiassi A, Inchingolo R, Demi L. The role of ultrasound lung artifacts in the diagnosis of respiratory diseases. *Expert Rev Respir Med* 2019; 13:163–172.
3. Caruso D, Zerunian M, Polici M, et al. Chest CT features of COVID-19 in Rome, Italy [published online ahead of print April 3, 2020]. *Radiology*. doi:<https://doi.org/10.1148/radiol.2020201237>
4. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA* 2020; 323:1843–1844.
5. Soldati G, Giannasi GF, Smargiassi A, Inchingolo R, Demi L. Contrast-enhanced ultrasound in patients with COVID-19: pneumonia, acute respiratory distress syndrome, or something else [published online ahead of print May 12, 2020]. *J Ultrasound Med*. <https://doi.org/10.1002/jum.15338>
6. Soldati G, Smargiassi A, Inchingolo R, et al. Proposal for international standardization of the use of lung ultrasound for patients with COVID-19: a simple, quantitative, reproducible method. *J Ultrasound Med* 2020; 39:1413–1419.
7. Biegler N, McBeth PB, Tevez Mollina MC, et al. Just-in-time cost-effective off-the-shelf remote telementoring of paramedical personnel in bedside lung sonography: a technical case study. *Telemed J E Health* 2012; 18:807–809.