



## Monitoring COVID-19 patients in an internal medical ward: chest radiography, chest CT or POCUS?

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Dear Editor,

The use of chest radiography (CXR), chest CT and lung ultrasound in patients affected by COVID-19 pneumonia has been extensively covered in the literature. These imaging modalities are known to play an important role in initial evaluation of patients with clinical suspicion of SARS-CoV-2 infection. Moreover, several authors suggested the prognostic value of imaging in predicting COVID-19-related complications. However, relatively little is known about the role of imaging in monitoring the progression of confirmed coronavirus infection in hospitalised patients. We would, therefore, like to share our experience from a tertiary referral center for infectious diseases in Northern Italy.

During the first pandemic wave between February 28th and April 28th 2020, 276 patients have been admitted to our two medium-intensity Internal Medicine departments, following the initial work-up in the Emergency room, where the clinical suspicion of COVID-19 pneumonia was confirmed by a positive naso-pharyngeal swab and by lung ultrasound or CXR. Twenty percent of patients needed CPAP ventilator support and 5% were transferred to ICU. The in-ward mortality amounted to approximately 13% [1]. There were no cases of patient death following the discharge from the hospital.

Following admission to the ward, thoracic imaging (CXR or CT) was only used in selected cases; in particular, about 18% of patients underwent only one chest radiography whereas 2% of them underwent more than one chest radiography. About 8% of them underwent a chest CT.

This approach was based on experience as well as guidelines, which do not support repeating CXR or chest CT imaging before the discharge in the presence of clinical improvement [2]. In particular, urgent CT angiography was requested in suspicion of pulmonary embolism, in patients with a significant rise in D-dimer or with new-onset respiratory worsening that was inconsistent with the course of coronavirus infection and/or ultrasound findings. Moreover, CXR or chest CT was requested in case of suspected pneumothorax, due to the immediate importance of this finding for the management of the patient. CXR or chest CT was also requested in suspected bacterial superinfection and in patients with severe pneumonia and history of emphysema, bearing in mind that the latter deserves particular attention in ventilatory parameters management in case of intubation.

At the same time, considering the novelty of the pathological condition, we decided to perform lung ultrasound in every patient at admission and after 72 h. LUS was performed using a convex probe of portable devices (Philips CX50, GE Logiq F6 and Vinno 8; setting: low mechanical index  $-0.7$  or less, a single focus, positioned on the pleural line; no harmonic modality; no persistence). The protocol consisted of the evaluation of six regions in each hemithorax (two anterior, two lateral, two posterior); a scoring system (0–3) was used to evaluate and grade the presence of interstitial pattern (score 1 or 2) or consolidation (score 3) in each region. Data regarding the value of LUS in predicting the evolution toward ARDS and/or death have been recently published by our [3] and other groups [4]. The examination was repeated again if clinically indicated, mainly in the presence of worsening respiratory condition.

Among the important advantages offered by this technique, we would like to underline the possibility to extend the field of view to the heart and inferior vena cava and/or to the abdominal organs, especially in the context of clinical worsening or non-improvement (for example, in new-onset heart failure or pneumothorax) [5]. Moreover, using POCUS

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eliminates the need to transport critically ill and potentially contagious patients to and from the radiology department.

The approach to follow-up imaging differs slightly in case of critically ill patients requiring an admission to the intensive care unit. In such cases, the information provided by CXR and chest CT findings could significantly impact the management of the patient, which is not guaranteed by the ultrasound imaging. However, the number of imaging exams ordered for COVID-19 ICU patients has been shown to decrease, similar to the previous experiences in the pre-COVID-19 era [6, 7].

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

**Human and animal rights** Ethical approval was waived by the local Ethics Committee of ASST Fatebenefratelli Sacco of Milan in view of the retrospective nature of the study and all the procedures being performed were part of the routine care.

**Informed consent** Informed consent was obtained (Protocol Number 16088/2020).

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