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## Clinical Radiology

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## Correspondence

## Re: Controversy in coronaViral Imaging and Diagnostics (COVID)

Sir—We read with interest the brilliant and witty correspondence from Hamilton and colleagues<sup>1</sup> regarding the use of computed tomography (CT) in screening patients for COVID-19. In their letter, the authors raised reasonable doubts about the value of this method, referring to its low specificity. As CT does not test for the virus, the pulmonary abnormalities, usually treated as manifestations of COVID-19, could be associated with other diagnoses, such as heart failure or air trappings. Although the arguments of Hamilton and colleagues are convincing, we would like to draw attention to the practical value of CT for triage of patients with suspected COVID-19, especially in densely populated areas.

At the time of writing, Russia was ranked third regarding the number of confirmed cases of COVID-19 infection globally,<sup>2</sup> and the most of the burden fell on its capital. Moscow is a large city with high population density: in some districts, it reaches 30,500 people/km<sup>2</sup>,<sup>3</sup> which is higher than Manhattan, New York, with 27,544 people/km<sup>2</sup>.<sup>4</sup> Given the reluctance of inhabitants to wear masks during the first weeks of the pandemic, grave consequences awaited Moscow. As of 8 June 2020, there were 197,018 patients with diagnosed COVID-19 in the city<sup>5</sup> (for comparison, the total number of cases in Italy was 235,278<sup>2</sup>).

In this situation, it is essential not only to diagnose the disease correctly, but also to make the right decision about the need for patient hospitalisation. The “reference standard” for COVID-19 clinical diagnosis is reverse transcription polymerase chain reaction (RT-PCR), which requires staff training, special conditions to avoid contamination, and takes hours, or even days, to perform, in addition to the requirement for specialised equipment and reagents. Notably, this approach has less than optimal sensitivity, as mentioned by Hamilton and colleagues.<sup>1</sup> When decision-making is urgent (i.e., during a pandemic), the use of alternative methods is fully justified.

CT has one significant advantage over RT-PCR: it is quick. The results are ready within 15 minutes, and the most crucial concern is to interpret them correctly. Radiologists' reports are prone to subjective identification and classification of lesions.<sup>6</sup> In Moscow, we addressed this problem using a simplified grading system “CT0–4” based on the degree of lung tissue damage<sup>7</sup> initially proposed by Xie and

colleagues.<sup>8</sup> We provided radiologists with standardised templates so that they could categorise patients by the extent of pulmonary involvement. As a rationale for mandatory hospitalisation, we used a threshold of pulmonary parenchymal involvement of >50% (CT3 category according to our grading system) combined with the symptoms of deteriorating acute respiratory infection. Patients with mild conditions were assigned to home care under telemedicine guidance. Moscow Radiology Reference Center (MRRC) was responsible for reducing the likelihood of incorrect interpretation of CT images. Here experienced radiologists provided a second opinion, remote consultations, and methodological support through the Unified Radiology Information System (URIS). URIS connected the scanners (449 X-ray, 94 mammography, 198 fluoroscopy, 146 CT, 78 magnetic resonance imaging [MRI], 16 integrated positron-emission tomography [PET]/CT), enabling remote communications and the delivery of CT images and radiology reports to the MRRC and Moscow city hospitals.

As of 8 June 2020, the network of 48 outpatient CT centres performed 158,179 CT examinations, diagnosing 77,831 cases of COVID-19 (U07.2 code of ICD-10). Of this number, just 8,536 patients were referred to hospital care, which significantly reduced the burden on hospitals. According to the results of subsequent CT examinations of patients who were assigned to home care, only 3.5% of the patients progressed to the CT3 category. Considering such cases as false-negatives for identifying admissions to hospital, the negative predictive value of the “CT0–4” grading system was 96.7% (95% confidence interval: 95.6, 99.6). Therefore, CT imaging, although not highly specific for the disease, provides a valuable tool for indicating the need for hospitalisation of patients with suspected COVID-19, especially in densely populated areas.

## Conflict of interest

The authors declare no conflict of interest.

## References

1. Hamilton MCK, Lyen S, Manghat NE. Controversy in coronaViral imaging and diagnostics (COVID). *Clin Radiol* 2020;**75**(7):557–8.

2. Worldometer. *Reported cases and deaths by country, territory, or conveyance*. 2020. Available at: <https://www.worldometers.info/coronavirus/#countries>. [Accessed 8 June 2020].
  3. Russian Federal State Statistics Service. *The population of the Russian Federation by municipal districts as of January 1, 2019*. 2019. Available at: [http://www.gks.ru/free\\_doc/doc\\_2019/bul\\_dr/mun\\_obr2019.rar](http://www.gks.ru/free_doc/doc_2019/bul_dr/mun_obr2019.rar). [Accessed 31 July 2019].
  4. Department of City Planning. NYC.gov. *Current population estimates: NYC*. 2017. Available at: <https://www1.nyc.gov/site/planning/planning-level/nyc-population/current-future-populations.page>. [Accessed 10 June 2017].
  5. Coronavirus-Control.ru *Map of coronavirus online — coronavirus control*. 2020. Available at: <https://coronavirus-control.ru/coronavirus-moscow/>. [Accessed 8 June 2020].
  6. Fitzgerald R. Error in radiology. *Clin Radiol* 2001;**56**:938–46.
  7. Morozov S, Andreychenko A, Pavlov N, et al. *MosMedData: chest CT scans with COVID-19 related findings dataset*. 2005:06465.
  8. Xie X, Zhong Z, Zhao W, et al. Chest CT for typical 2019-nCoV pneumonia: relationship to negative RT-PCR testing. *Radiology* 2020:200343.
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