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Indiscriminate use of CT chest imaging during the COVID-19 pandemic

Sir—The SARS-CoV2 virus related infection, COVID-19, was declared a pandemic by the World Health Organization (WHO) on 11 March 2020.[1] Many countries have been passing through devastating second or third waves with new variants coming into play with suggested high infectivity and adverse outcomes.[2] These new waves have brought to focus the limited healthcare infrastructure in the form of hospitals, intensive care beds, availability of oxygen, assisted ventilation, and skilled human resources in both Low and Medium Income countries (LMIC) as well as High Income countries (HIC). In India, for example, there have been nearly 389,302 reported deaths and 29,977,861 total reported infections (WHO Coronavirus (COVID-19) Dashboard) since the start of the pandemic, with a sharp increase between April to June 2021.[2] The extent of suffering seen in India as it dealt with the coronavirus pandemic shocked the world, whilst exposing weaknesses in the national healthcare infrastructure.[2] Although the chaos and horror of this pandemic continues to be heart wrenching, it has no doubt been heart-warming to see the laudable work performed by all healthcare and essential workers who have risen to the occasion and gone above and beyond their call of duty.

The lack of preparation on a global scale for the pandemic is obvious. The second wave in India and other countries has seen not only a shortage of intensive care beds, oxygen, drugs, and essentials, but also an increase in panic behaviour and unregulated prescriptions for antivirals, steroids, and a plethora of interventions that are not supported by evidence. One such intervention has been the use of computed tomography (CT) imaging of the chest at point-of-care for the diagnosis of SARS-CoV2 virus.[3] The reference standard test to confirm the diagnosis of COVID-19 is a reverse transcriptase polymerase chain reaction test;[3] however, in many regions, practice has included indiscriminate use and reliance on chest CT images rather than molecular biology for diagnosis of COVID-19 as well for early prognostication, both of which are fraught with risks.[3]

In China, during the early phase of the outbreak, CT chest was widely used as a supporting tool in the diagnosis of COVID 19;[4] however, current guidelines from China's National Health Commission do not include imaging findings in the diagnostic criteria.[5] The American College of Radiology also does not recommend chest CT as a first-line imaging method to screen for COVID-19 pneumonia due to significant overlap with other infections and lack of specificity, and instead, suggest using it for hospitalised symptomatic patients.[5,6]

Homayounieh *et al.* surveyed 62 healthcare sites from countries across four continents covering Africa, Asia, Europe, and Latin America between May and July 2020 to enquire about local prevalence of COVID-19, method of diagnosis, most frequent imaging method, indications for CT, and specific policies on the use of CT in COVID-19 diagnosis.[7] The study found that in 28 countries, 80% of the healthcare centres conducted single-phase non-contrast chest CT, whereas multiphase chest CT examinations were performed in 20% of the centres in the remaining four countries. Other authors have also reported that there is little to no role of contrast-enhanced CT images from multiphase scans in the diagnosis of COVID-19.[7] If a protocol, similar to that of a single-phase imaging, is used in each of the multiphase scans, additional phases would multiply the radiation dose delivered. They also reported there was an eightfold variation in median volumetric CT dose index, and a 10-fold variation in median dose–length product, which is a measure of CT tube radiation output/exposure. It should also be noted that many patients reported in this study also underwent multiple chest CT examinations in the 1-month duration. Some studies also suggest the usage of low-dose chest CT protocols, which did not lead to significant distortion of the final images, which would be achieved with general scan protocols.[8] The lowest median dose from the healthcare centres, surveyed by Homayounieh *et al.* was 4–5-times higher than that of the proposed low-dose protocols. Furthermore, this comparison shows that the low-dose chest CT protocols have not been widely adopted for COVID-19 patients. Only half of the healthcare facilities had a dedicated CT protocol for COVID-19 patients; however, the amount of the variability seen in these protocols in healthcare centres worldwide is considerable.[6,7]

Three main scenarios where imaging may be used as a primary diagnostic tool were identified in independent studies:[3] (1) patients with mild respiratory features consistent with COVID-19, but with risk factors for disease progression; (2) patients with moderate-to-severe features of COVID-19, regardless of RT-PCR test results; and (3) patients presenting with moderate-to-severe symptoms within a high prevalence of disease and with limited testing resources.

We wish to highlight that chest CT examinations are being done too early as a diagnostic test for COVID-19 in a large number of individuals who may not become unwell or require hospitalisation. Caution needs to applied when ruling out COVID-19 disease based on negative CT due to the high number of false negatives; especially when performed within 48 h of symptom onset. A recent study suggests that 5 days after the initial onset of symptoms, CT may be able to predict the patients who will later develop severe symptoms with 95% confidence.[9] If done too soon, it may be too early to see any lung changes, without significant value in prognostication of the disease process for the patient.[10] Further to this, patients who then develop severe disease are subject to multiple CT examinations. The usual protocol followed in majority of hospitals in India and other countries surveyed[7] is that of high-resolution CT, depending upon the equipment and thickness of the section. On average a dose of 7 mSv is delivered, which is equal to the radiation absorbed from approximately 100 radiographs.[11] The safety of performing imaging is also problematic, involving droplet precaution with appropriate protective gear, thorough cleaning of CT rooms and recirculation of air, given that COVID-19 is also an airborne disease.

In 2021, the Indian Radiological and Imaging Association (IRIA) released a statement saying, "that even though the RT-PCR test is the gold standard, CT scans help in cases where the test is negative due to mutant variant, technical errors or low viral load"; however, it should be kept in mind that CT exposes patients to harmful ionising radiation, which is carcinogenic. The effects of radiation above 100 mGy are well studied, and using this high dose of radiation should not be considered a viable option for the diagnosis of COVID-19 in patients with no to mild symptoms or those without additional risk factors, owing to its low sensitivity when using RT-PCR as a standard. This not only leads to an increased burden to radiological services in an already overstretched healthcare system, but also potentially exposes the general population to the unnecessary harmful effects of radiation. Research should be directed towards revising and implementing a low-dose CT protocol for diagnosis and prognosis monitoring in patients with COVID-19.[12] The use of CT as a primary diagnostic or prognostic technique for COVID-19 patients is a practice that needs to be urgently reviewed.

Conflict of interest

The authors declare no conflict of interest.

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Re: Indiscriminate use of CT chest imaging during the COVID-19 pandemic. A reply

Sir—We read with interest the comments by Professor Khashu and colleagues regarding the potential indiscriminate and heterogeneous use of computed tomography (CT) chest imaging during the COVID-19 pandemic. In the early part of 2020, two of the major considerations posed to the British Society of Thoracic Imaging (BSTI) were: "when should CT be used in patients who may have COVID-19 or have proven COVID-19?" and "should CT be used for diagnosis in COVID-19". These hypothetical scenarios were

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