



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

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 be 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 surveyed⁷ 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 health-care 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.

References

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Bio-med* 2020;**91**(1):157–60. <https://doi.org/10.23750/abm.v91i1.9397>.
2. Choudhary OP, Priyanka, Singh I, et al. Second wave of COVID-19 in India: dissection of the causes and lessons learnt. *Travel Med Infect Dis* 2021 Jun 16;**43**:102126. <https://doi.org/10.1016/j.tmaid.2021.102126>.
3. Jirjees F, Saad AK, al Hano Z, et al. COVID-19 treatment guidelines: do they really reflect best medical practices to manage the pandemic? *Infect Dis Rep* 2021;**13**(2):259–84. <https://doi.org/10.3390/idr13020029>.

4. Garg M, Prabhakar N, Bhalla A, et al. Computed tomography chest in COVID-19: when & why? *Indian J Med Res* 2021;**153**(1):86–92. https://doi.org/10.4103/ijmr.ijmr_3669_20.
5. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72,314 cases from the Chinese center for disease control and prevention. *JAMA* 2020;**323**(13):1239–42. <https://doi.org/10.1001/jama.2020.2648>.
6. Pontone G, Scafuri S, Mancini ME, et al. Role of computed tomography in COVID-19. *J Cardiovasc Comput Tomogr* 2021;**15**(1):27–36. <https://doi.org/10.1016/j.jcct.2020.08.013>.
7. van der Veen S, National Health Commission, National Administration of Traditional Chinese Medicine. Translation: diagnosis and treatment protocol for novel coronavirus pneumonia (trial version 7). *Infect Microbe Dis* 2020;**2**(2):48–54. <https://doi.org/10.1097/im9.0000000000000022>.
8. Homayounieh F, Holmberg O, al Umairi R, et al. Variations in CT utilization, protocols, and radiation doses in COVID-19 pneumonia: results from 28 countries in the IAEA study. *Radiology* 2021;**298**(3):E141–51. <https://doi.org/10.1148/radiol.2020203453>.
9. Lee C. Managing radiation dose from chest CT in patients with COVID-19. *Radiology* 2021;**298**(3):E158–9. <https://doi.org/10.1148/radiol.2020204129>.
10. Waller JV, Kaur P, Tucker A, Lin KK, Diaz MJ, Henry TS, Hope M. Diagnostic Tools for Coronavirus Disease (COVID-19): Comparing CT and RT-PCR Viral Nucleic Acid Testing. *AJR Am J Roentgenol* 2020 Oct;**215**(4):834–8. <https://doi.org/10.2214/AJR.20.23418>. Epub 2020 May 15. PMID: 32412790.
11. Li K, Liu X, Yip R, et al. Early prediction of severity in coronavirus disease (COVID-19) using quantitative CT imaging. *Clin Imag* 2021;**78**:223–9. <https://doi.org/10.1016/j.clinimag.2021.02.003>.
12. Lin EC. Radiation risk from medical imaging. *Mayo Clinic Proc* 2010;**85**(12):1142–6. <https://doi.org/10.4065/mcp.2010.0260>.

R. Khashoo^a, S. Vimalasvaran^b, D. Tewari^a, S. Khashu^c, M. Khashu^d
^aUCMS & GTB Hospital, University of Delhi, India

^bKing's College Hospital NHS Trust, London, UK

^cBethpage High School, New York, USA

^dUniversity Hospitals Dorset NHS Foundation Trust, UK
 E-mail address: minesh.khashu@nhs.net (M. Khashu)

<https://doi.org/10.1016/j.crad.2021.12.021>

Crown Copyright © 2022 Published by Elsevier Ltd on behalf of The Royal College of Radiologists. All rights reserved.

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

DOI of original article: <https://doi.org/10.1016/j.crad.2021.12.021>.



discussed by BSTI at the beginning of the pandemic.¹ It is important to remember this was on the backdrop of not just availability but also timeliness of reverse transcriptase polymerase chain reaction (PCR) testing, (subsequently through 2021 we have seen the massive impact of widespread PCR testing and lateral flow testing).

In those initial weeks of the pandemic, there was pressure to consider using CT as a surrogate for a PCR, allowing patients to be appropriately managed in “COVID-19” versus “non-COVID-19” hospital areas and to advise on periods of isolation for those not needing admission. We talked to our colleagues in Italy, who were a few months ahead of the UK. There CT was used relatively widely, but, of course, healthcare systems are different (the UK has less CT capacity per head of population than many European neighbours) and we learn from each other’s experiences.

As highlighted in the letter by Professor Khashu, we believed widespread use of CT was not the answer to the questions posed principally because: (a) a normal CT does not exclude COVID-19 infection and cannot be used to reliably manage “isolation” versus “non-isolation,” and (b) there is a fundamental lack of specificity (areas of ground-glass opacity at the bases do not necessarily equate to COVID-19). Subsequent systematic reviews have since further supported the adequate sensitivity, but moderate specificity, at best, of chest CT for COVID-19.²

Additionally, we felt there was a risk of the scanners themselves acting as a disease vector if used indiscriminately, to both subsequent patients, but also to the radiography staff. By a similar token, there was also potential risk to porters, other staff, and patients of transferring “hundreds” around the hospital and through radiology departments. For these reasons and with a national multidisciplinary discussion, the BSTI/National Health Service England (NHSE) radiology decision tool was published.³ This attempted to place CT in a pragmatic position for the UK system, largely for patients who were seriously ill. At that time (and again largely due to low PCR availability and result turnaround), we proposed that CT may have a role in the very specific situation of high clinical suspicion but repeated negative PCR.⁴ Through subsequent waves, the BSTI/NHSE advice has not significantly changed: we should use CT as part of “routine clinical care”, that is, for patients who have been admitted with COVID-19 and who are not taking an expected clinical course. For these patients, we would advocate unenhanced CT of the

thorax. For more seriously ill patients, especially those with “disproportionate hypoxia” or a “sudden clinical deterioration” a CT pulmonary angiogram may be considered.

In summary, we agree with many of the points raised by Professor Khashu and colleagues. The indiscriminate use of CT in COVID-19 in some areas did not meet scientific scrutiny and should be cautioned against, but we must also be mindful of differing healthcare challenges outside the UK.

Conflict of interest

The authors declare no conflict of interest.

References

1. Nair A, Rodrigues JCL, Hare SS, *et al.* A British Society of Thoracic Imaging statement: considerations in designing local imaging diagnostic algorithms for the COVID-19 pandemic. *Clin Radiol* 2020 May;**75**(5):329–34.
2. Islam N, Ebrahimzadeh S, Salameh J-P, *et al.* Thoracic imaging tests for the diagnosis of COVID-19. *Cochrane Database of Systematic Reviews* 2021 Nov 26;**11**:CD013639. 2021.
3. BSTI. Radiology decision tool for suspected COVID-19. Available at: https://www.bsti.org.uk/media/resources/files/NHSE_BSTI_APPROVED_Radiology_on_CoVid19_v6_modified1_-_Read-Only.pdf. Accessed 10 January 2022.
4. Tavare A, Braddy A, Brill S, *et al.* Managing high clinical suspicion COVID-19 inpatients with negative RT-PCR: a pragmatic and limited role for thoracic CT. *Thorax* 2020 Jul;**75**(7):537–8.

G.R.E. Robinson^{a,*}, A. Edey^b, S. Hare^c, B. Holloway^d, J. Jacob^e,
A. Johnstone^f, R. McStay^g, A. Nair^e, J. Rodrigues^a

^a Royal United Hospital, Bath, United Kingdom

^b North Bristol NHS Trust, Bristol, United Kingdom

^c Royal Free Hospital, London, United Kingdom

^d University of Birmingham, Birmingham, United Kingdom

^e University College London, London, United Kingdom

^f Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

^g Newcastle Upon Tyne Hospitals NHS Trust, Newcastle Upon Tyne,
United Kingdom

* Guarantor and correspondent: G.R.E. Robinson.
E-mail address: grobins1@nhs.net (G.R.E. Robinson)

<https://doi.org/10.1016/j.crad.2022.01.042>

Crown Copyright © 2022 Published by Elsevier Ltd on behalf of The Royal College of Radiologists. All rights reserved.