



COVID-19 follow-up planning: what will we be missing?

To the Editor:

Admissions to UK hospitals with novel coronavirus disease (COVID-19) are exponentially increasing, yet the healthcare community has not put much thought into follow-up of these patients who, in many cases, will be discharged early from hospital to ensure ongoing bed availability. There is currently no UK publication or guideline suggesting a criterion for safe discharge or follow-up advice for those testing positive for COVID-19. Severe acute respiratory syndrome (SARS) and viral pneumonia share symptoms and certain radiological findings with COVID-19. In 2003, the World Health Organization (WHO) advised that those with confirmed SARS were to self-isolate for 7 days post-discharge, and to have a chest radiograph and full blood count at day 7 [1], while the British Thoracic Society guidelines for community-acquired pneumonia (CAP) only recommend a chest radiograph at 6 weeks if the patient is still symptomatic or has a risk factor for lung cancer [2]. This therefore raises the question, what should be the optimal follow-up duration and imaging modality for hospital survivors of COVID-19? If no follow-up is deemed necessary, what could we be missing?

Increasing age, smoking and immunosuppression are common risk factors of pneumonia, and are thought to increase the severity of COVID-19. These are also risk factors for malignancy, and importantly, undiagnosed cancer can be a risk factor for pneumonia and potentially COVID-19 [3]. A cohort study looking at the incidence of cancer after hospital admission with CAP showed 28 496 (8.3%) out of 342 609 patients had cancer diagnosed in follow-up, suggesting that pneumonia increased the risk of all cancers but especially that of the lung [4]. Another study found 13 (1.3%) out of 1011 patients admitted with CAP had underlying lung cancer with eight being found on admission with chest radiography and the rest in convalescence [5]. Cancer cases identified in SARS follow-up are unknown.

From early stages of COVID-19 to recovery, computed tomography (CT) changes have been shown to progress from ground-glass opacity (GGO), to a crazy paving pattern, to consolidation and then gradual resolution of findings [6]. Another study of 98 confirmed COVID-19 patients from 4 to 88 years of age also found bilateral GGO present during infection that resolved after treatment [7]. It is also worth noting that lung adenocarcinomas present early on in CT with GGO, with the potential to advance into more solid components [8].

In addition to determining resolution of infection and excluding underlying malignancy, in the current pandemic, follow-up imaging will be useful to identify those with residual pulmonary fibrosis. The development of post-inflammatory fibrosis following viral pneumonia and adult respiratory distress syndrome has been well described [9]. The incidence and course are unclear, although it appears to be more common and debilitating in survivors of severe disease [10]. It would therefore be rational to limit follow-up imaging to patients who present with severe COVID-19 disease, particularly as a CT scan may be required for confirmation.

The increasing number of cases would undoubtedly overwhelm the radiology department. Especially as the infectious period is still unknown, extra precautions would have to be implemented to protect the staff and



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There is a real need for a discharge plan for COVID-19 survivors in the UK. Follow-up imaging could help assess the resolution of infection, exclude underlying malignancy and identify post-inflammatory fibrosis. <https://bit.ly/2YJ8hyg>

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other patients. With more knowledge being accrued in real time, commonly presenting symptoms and clinical test results are now known. Therefore, it maybe more practical to adopt similar guidelines as in pneumonia, in which a chest radiograph is only offered to those still symptomatic or who have risk factors for cancer. Where pulmonary fibrosis is a concern, a CT scan and specialist referral may be required. If cancer detection becomes the main reason for imaging follow-up in recovering COVID-19 patients, it may not be required in countries where lung screening is already offered to those deemed to be at high risk, preventing unnecessary radiation. Conversely, in less developed healthcare systems, COVID-19 may have inadvertently presented an opportunity to screen high-risk individuals.

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References

- 1 World Health Organization. WHO hospital discharge and follow-up policy for patients who have been diagnosed with Severe Acute Respiratory Syndrome (SARS). Geneva, WHO, 2003.
- 2 Lim W, Baudouin S, George R, *et al.* British Thoracic Society guidelines for the management of community acquired pneumonia in adults: update 2009. *Thorax* 2009; 64: Suppl. III, iii1–iii55.
- 3 Torres A, Peetermans W, Viegi G, *et al.* Risk factors for community-acquired pneumonia in adults in Europe: a literature review. *Thorax* 2013; 68: 1057–1065.
- 4 Sogaard K, Farkas D, Pedersen L, *et al.* Pneumonia and the incidence of cancer: a Danish nationwide cohort study. *J Intern Med* 2015; 277: 429–438.
- 5 Holmberg H, Kraggsbjerg P. Association of pneumonia and lung cancer: the value of convalescent chest radiography and follow-up. *Scand J Infect Dis* 1993; 25: 93–100.
- 6 Pan F, Ye T, Sun P, *et al.* Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. *Radiology* 2020: 200370.
- 7 Chen Z, Fan H, Cai J, *et al.* High-resolution computed tomography manifestations of COVID-19 infections in patients of different ages. *Eur J Radiol* 2020; 126: 108972.
- 8 Kobayashi Y, Mitsudomi T. Management of ground-glass opacities: should all pulmonary lesions with ground-glass opacity be surgically resected? *Transl Lung Cancer Res* 2013; 2: 354–363.
- 9 Mineo G, Ciccarese F, Modolon C, *et al.* Post-ARDS pulmonary fibrosis in patients with H1N1 pneumonia: role of follow-up CT. *Radiol Med* 2012; 117: 185–200.
- 10 Hui D, Joynt G, Wong K, *et al.* Impact of severe acute respiratory syndrome (SARS) on pulmonary function, functional capacity and quality of life in a cohort of survivors. *Thorax* 2005; 60: 401–409.