

Evaluation of a health screening protocol for recovered COVID-19 patients before “return-to-play” and strenuous physical activity

Dear Editor,

We conducted a prospective, single-centre cohort study to develop guidance for military personnel returning to strenuous activities following SARS-CoV-2 infection. The patients underwent a clinical review followed by a protocol to screen for cardiac, respiratory, haematological, endocrine/renal and neurological complications after recovery from infection.

Both the study and screening protocol were developed in consultation with Headquarters Medical Corps, Singapore Armed Forces and physicians at National University Hospital, Singapore. The protocol was developed based on evidence available in August 2020.

The patients who underwent the clinical review were Singapore military personnel infected with SARS-CoV-2 from February to September 2020. The “entry review” was performed for all patients at the start of the protocol, where signs and symptoms of sequelae after recovery from SARS-CoV-2 infection were assessed. This was repeated 6 months later at the “exit review”. Following the entry review, individuals were excused from duties involving strenuous physical activity for 6 months, up to the date of their exit review. Before the planned appointment date for the exit review, individuals underwent a comprehensive screening for subclinical abnormalities. Individuals with no abnormalities on their exit review were returned to their premorbid level of physical activity within their job scope. Individuals with abnormalities continued to be excused from physical activity until further workup ordered by the attending physician was completed.

In March 2021, 25 patients (96% male sex) completed the screening protocol at a median interval of 203 days (interquartile range [IQR] 176–277) after the first positive polymerase chain reaction (PCR) test during the acute illness episode. The mean age was 23 years old (range 17–49). Severity of infection was determined in accordance with the National Institutes of Health clinical spectrum of SARS-CoV-2 infection.¹

A majority of 22 patients (88%) experienced asymptomatic to mild infection. Two (8%) experienced moderate infection due to lower respiratory tract involvement without desaturation below oxygen saturation of 94%. One (4%) experienced critical illness due to bilateral pneumonia complicated by type 1

respiratory failure, requiring high-flow nasal cannula oxygen therapy in the intensive care unit.

Of the 25 patients, 7 (28%) had completely normal investigation results (Table 1). All abnormal cardiac screening results were either incidental or artefactual. This low prevalence of true cardiac-related complications due to coronavirus disease 2019 (COVID-19) was also seen in other real-world studies that operationalise a screening protocol for return-to-play.^{2,3} Only 1 patient had an abnormal chest X-ray that was deemed to be artefactual after computed tomography of the chest. Other investigations were largely unremarkable. Electrolyte and creatinine levels remained normal within our cohort, and none had significant neurological complications.

In screening for haematological complications, our study showed that 11 patients (44%) had non-negative (10 indeterminate, 1 positive) anticardiolipin immunoglobulin M (IgM) antibodies. None of these individuals had signs or symptoms of arterial or venous thrombosis or thromboembolism. We rechecked their anticardiolipin antibodies 4–5 months later to check for resolution and all of them demonstrated declining titres, suggesting that the phenomenon was transient, with no apparent clinical significance. We suggest that findings of isolated, transiently abnormal anticardiolipin IgM following SARS-CoV-2 infection are probably not useful in predicting future thromboembolic events. This has been demonstrated in other contemporary studies.⁴

Our study did not uncover any cardiac or respiratory abnormalities attributable to SARS-CoV-2 infection and none of our patients experienced long-lasting effects or complications after their acute disease course. Although this study examined a small sample size of COVID-19 patients, extensive and advanced investigations were organised for all patients so as to rule out subclinical complications. Our study suggests that organisations can be prudent in the use of specialised investigations for persons with asymptomatic or mild COVID-19 disease.

There is a need to balance safe return to physical activity against the risk of sequelae following acute COVID-19 infection. Return-to-play protocols should tailor the extent of clinical investigations to an individual's baseline characteristics and disease severity, and be balanced against a gradual and phased return to physical

Table 1. Results of first-line screening investigations at the exit review^a

	Time of test from date of infection, median (IQR), days	Abnormal screening investigations, no. (%) N=25
Cardiac investigations		
12-lead electrocardiogram	203 (194–223)	1 (4)
Troponin T, ng/L	203 (195–223)	0
Treadmill electrocardiography	203 (195–223)	4 (16)
Resting transthoracic echocardiogram	203 (195–223)	4 (16)
Overall first-line cardiac investigations		
Any abnormal tests		7 (28)
2 abnormal tests		2 (8)
1 abnormal test		5 (20)
Respiratory investigations		
Chest X-ray	203 (194–223)	1 (4)
Haematological investigations		
D-dimer, µg/mL	203 (195–223)	0
Lupus anticoagulant	203 (195–223)	0
Anticardiolipin IgM, MPL	203 (195–223)	Indeterminate: 10 (40) Positive: 1 (4)
Anticardiolipin IgG, GPL	203 (195–223)	0
Anti-beta-2-glycoprotein IgM, SMU	203 (195–223)	0
Anti-beta-2-glycoprotein IgG, SGU	203 (195–223)	0
Endocrine/renal investigations		
Serum sodium, mmol/L	203 (195–223)	0
Serum potassium, mmol/L	203 (195–223)	0
Serum creatinine, µmol/L	203 (195–223)	1 (4)
Lipid panel, mmol/L	203 (195–223)	6 (24)
Glycated haemoglobin, %	203 (195–223)	2 (8) 1 with known type 2 diabetes mellitus
Neuropsychiatric investigation		
Symptom screen and full neurological examination	203 (194–223)	0

IgG: immunoglobulin G; IgM: immunoglobulin M; IQR: interquartile range

^a Exit review was conducted 6 months after the entry review. Entry review was undertaken when individuals have recovered from acute COVID-19 infection and returned to the workplace.

activity.⁵ There have been several “return to physical activity” consensus guidelines^{6–9} built on expert opinion, but few published studies on real-world experience using a screening protocol.³ All patients in our study were able to return safely to premorbid activity levels regardless of their initial disease severity.

Our study demonstrated that individuals may remain well 6–10 months after an acute SARS-CoV-2 infection. It is not clear whether there is COVID-19-related morbidity and mortality beyond this time frame. Further research is required to better inform clinicians of the long-term sequelae of SARS-CoV-2 infection.

Acknowledgements

The authors thank Dr James Kwek, Dr Lim Shir Lynn, Dr Lin Weiqin, Dr Robin Cherian and Dr Yap Eng Soo for their contributions to this study.

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