Introduction and Purpose

The medium-long impact of coronavirus disease 2019 (COVID-19) on active populations is yet to be fully understood. The M-COVID study was set up to investigate cardiopulmonary, functional, cognitive, and mental health post-COVID-19 outcomes in a young, physically active working-age population, across the spectrum of acute COVID-19 severity.

Material and Methods

Observational cohort study of 4 groups; hospitalised, community illness with on-going symptoms (community-symptomatic), community illness now recovered (community-recovered) and controls. Participants underwent extensive clinical assessment involving cardiopulmonary imaging, submaximal and maximal exercise testing, pulmonary function, cognitive assessment, blood tests, electrocardiogram and questionnaires on mental health and physical function (Figure 1).

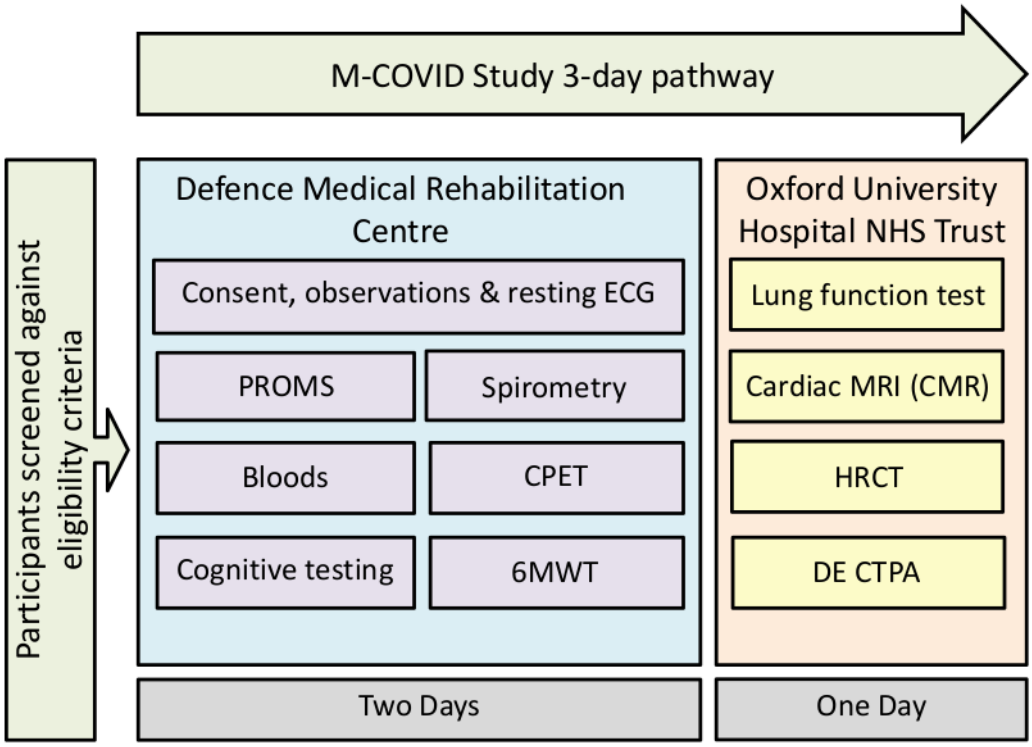
Results

113 participants (aged 39±9 and 86% male) were recruited into four groups, Hospitalised (n=35), community-symptomatic (n=34), community-recovered (n=18) and control (n=26), at 159±72days following acute illness. Hospitalized and community-symptomatic groups were older, with a higher body mass index, and worse mental health, fatigue, and quality of life scores. Hospitalised and community-symptomatic participants also performed less well on sub-maximal and maximal exercise testing (Figure 2). Hospitalised individuals had impaired ventilatory efficiency (higher $\dot{V}E/\dot{V}CO_2$ slope), achieved less work at the anaerobic threshold and at peak than other groups and had a significantly reduced forced vital capacity. Clinically significant abnormal cardiopulmonary imaging findings were present in 6% of hospitalised participants, lower than those seen in other studies. Those who recovered from community-based, mild-moderate COVID-19 had no significant differences when compared with controls.

Conclusion

Recovered individuals who suffered mild-moderate COVID-19 do not differ from an age, sex and job-role matched control population in any study parameter. This is reassuring for the vast majority of individuals who have had acute COVID-19 not requiring hospital management. Individuals who were hospitalised or continue to suffer symptoms require a specific, comprehensive assessment prior to a return to full physical activity.

Figure 1. Diagrammatic description of study design.



Abbreviations: ECG, electrocardiogram; PROMS, patient reported outcome measure; CPET, cardiopulmonary exercise test; 6MWT, six-minute walk test; MRI, magnetic resonance imaging ; CMR, cardiac magnetic resonance imaging; HRCT, high-resolution computed tomography; DE CTPA, dual-energy computed tomography pulmonary angiogram.

Figure 2. Cardiopulmonary exercise test (CPET) variables: a) percentage predicted VO2 at VT1 and peak, b) V̇E/V̇CO2 slope, c) workload (watts per kilogram) at VT1 and peak, d) resting heart rate.