

# Post-infection rehabilitation of COVID-19 patients: Findings and prospects



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As the COVID-19 pandemic continues, approximately 2 million people in the UK and nearly 19% of adults with COVID-19 in the U.S have reported long COVID, or post COVID-19 condition after infection, which is defined as sequelae that persist for at least 4 weeks after acute infection or 3 months after infection for at least 2 months and cannot be explained by other known causes.<sup>1-4</sup> The diverse clinical manifestations of long COVID, which reduce activity ability and health-related quality of life (HRQoL), and impose considerable socioeconomic and health burdens, have attracted widespread attention. Severe patients or those received treatment in intensive care unit (ICU) are susceptible to long COVID with complaints of decreased activity ability, cognition, and psychological function, similar to postintensive care syndrome (PICS), requiring medical rehabilitation services to alleviate disability. Given the continuation of the coronavirus pandemic, the need for rehabilitation aiming to improve functional levels has increased. As recommended by the National Institute for Health and Care Excellence (NICE) and the European Respiratory Society (ERS) and American Thoracic Society (ATS), long COVID patients require early assessment to guide the selection of rehabilitation sites and determine targeted multidisciplinary rehabilitation in the post-discharge phase.<sup>2,5</sup> However, the outcomes of COVID-19 survivors undergoing different rehabilitation pathways are unclear.

In the current issue of *The Lancet Regional Health – Europe*, Berentschot and colleagues provided results of a prospective multicenter cohort study (CO-FLOW) in

the Netherlands revealing the changes of physical function across four different rehabilitation pathways within 12 months after discharge. The median age of patients enrolled in this study was 60 years, nearly 97% received supplemental oxygen, 40.7% were treated in ICU and 70.4% treated with steroids during hospitalization, indicating high risk for long COVID and rehabilitation training needs.<sup>6</sup> Different from previous studies, this study not only focused on the rehabilitation of cardiopulmonary function, but also focused on changes in muscle strength and mobility. Among the three dimensions of assessed physical function, cardiorespiratory fitness and muscle strength improved most significantly within the first 6 months after discharge, suggesting that the first 6-month post-discharge is the optimal recovery period for COVID-19 patients. The findings also confirmed their hypothesis that patients who require more intensive rehabilitation have more impaired physical function at 3 months after hospital discharge and that these differences in physical function reduce over time. Although the improvement of physical function from 6-month to 1-year was not significant, it continued to improve till to 1-year, which means that the functional status requires longer follow-up observation.

Physical function, HRQoL, symptom, disability, activities of daily living and return to work have been identified as important recovery targets for long COVID rehabilitation, and a comprehensive assessment should be conducted before and after rehabilitation to provide more evidence for developing an appropriate plan for patients with long COVID or other illnesses.<sup>7,8</sup> The current study was an interim analysis and approximately one-third of enrolled patients completed 3 visits; however, it is unclear which characteristics of patients should be treated by medical professionals and whether rehabilitation is feasible and beneficial for mild patients, who also reportedly have sequelae of long COVID. With the prevalence of the Omicron variants, the number of severe or critical COVID-19 patients has decreased, and the trajectory of rehabilitation may differ from that found in current study, so well-designed prospective cohort or randomized research focusing on recovery outcome of COVID-19 patients with various variants or severities is

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needed in the future to address the above gaps. In the context of limited medical resources, identifying patients who need rehabilitation treatment and classify them into appropriate rehabilitation sites will benefit for improving patients function level and allocating medical resources rationally. Due to the similarities between long COVID and other post-acute infection syndromes and PICS, appropriate control group needs to be considered in future study design to better elucidate the recovery characteristics of COVID-19 patients.<sup>9</sup> In addition to focusing on the characteristics of patients with improved physical function, more attention should be paid to those patients without improvement or even declined continuously, and further study is crucial to uncover the underlying mechanism of long COVID in the future.

### Contributors

Hui Zhang and Bin Cao drafted the comment together.

### Declaration of interests

No potential conflict of interest exists for all the authors.

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