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SYSTEMATIC REVIEW

COCHRANE CORNER

Rehabilitation and COVID-19: rapid living systematic review by Cochrane Rehabilitation Field – third edition. Update as of June 30th, 2021

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ABSTRACT

INTRODUCTION: This paper updates and summarizes the current evidence informing rehabilitation of patients with COVID-19 and/or describing the consequences of the disease and its treatment.

EVIDENCE ACQUISITION: Studies published from May 1st to June 30th, 2021 were selected, excluding descriptive studies and expert opinions. Papers were categorized according to study design, research question, COVID-19 phase, limitations of functioning of rehabilitation interest, and type of rehabilitation service involved. From this edition, we improved the quality assessment using the Joanna Briggs Institute checklists for observational studies and the Cochrane Risk of Bias Tool for randomized-controlled clinical trials (RCTs).

EVIDENCE SYNTHESIS: Twenty-five, out of 3699 papers, were included. They were three RCTs, 13 cross-sectional studies and nine cohort studies. Twenty studies reported data on symptom prevalence (N.=13) or disease natural history (N.=7); and five studies reported intervention effectiveness at the individual level. All study participants were COVID survivors and 48% of studies collected information on participants 6 months or longer after COVID-19 onset. The most frequent risks of bias for RCTs concerned weaknesses in allocation concealment, blinding of therapists, and lack of intention-to-treat analysis. Most analytical studies failed to identify or deal with confounders, describe or deal with dropouts or eventually perform an appropriate statistical analysis.

CONCLUSIONS: Most studies in this updated review targeted the prevalence of limitations of functioning of rehabilitation interest in COVID-19 survivors. This is similar to past review findings; however, data in the new studies was collected at longer follow-up periods (up to one year after symptom onset) and in larger samples of participants. More RCTs and analytical observational studies are available, but the methodological quality of recently published studies is low. There is a need for good quality intervention efficacy and effectiveness studies to complement the rapidly expanding evidence from observational studies.

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KEY WORDS: COVID-19; SARS virus; Coronavirus; Rehabilitation; Physical and rehabilitation medicine.

Introduction

Almost two years after the outbreak of the COVID-19 pandemic, the World Health Organization reports about 4.6 million deaths and more than 220 million confirmed cases.[1] COVID-19 related mortality and morbidity risks are now mitigated by public health campaigns including vaccination. To date more than 5.3 billion vac-

cine doses have been administered.[1] A high proportion of SARS-CoV-2 patients survive infection but the prevalence of chronic sequelae and resulting disability is increasing. These survivors need clinical management and rehabilitation to facilitate good health outcomes. The best available research evidence is required to inform management and rehabilitation decisions, interventions, and health systems for COVID-19 survivors with adverse clinical sequelae. Further evidence is warranted to estimate the resources needed to plan for setting appropriate and adequately delivered post-acute and long-term rehabilitation services. To date, the ClinicalTrials.gov website[2] of the National Library of Medicine has registered more than 6400 clinical studies targeting the epidemiology and management of COVID-19, but only 245 studies (188 of which are ongoing) address rehabilitation in COVID-19 survivors.[2] This rapid living systematic review on rehabilitation and COVID-19 was initiated in April 2020 as a component of the Cochrane Rehabilitation REH-COVER action.[3] Since its inception, it has been updated monthly, with the most recent update leading to a total of 319 papers up to April 30th, 2021. Most studies provided low-level descriptive evidence and we did not critically appraise their methodological quality. However, the recent increase in the number of analytical studies encouraged us to advance the methodology of the systematic review by adding critical appraisal of methodological quality to our narrative synthesis of evidence.

This paper aims to collate, critically appraise, and synthesize current best evidence relevant to the rehabilitation of patients with COVID-19, the consequences of the disease, and its treatment.

Evidence acquisition

The methodology of this systematic review updates the second edition published in June 2020.[4] It follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines[5] and the Interim Guidance from the Cochrane Rapid Reviews Methods Group.[6] The protocol has been updated in PROSPERO (CRD42021181202).

The database search was conducted on July 2nd, 2021 covering publication dates between May 1st and June 30th, 2021. The search strategy, screening, and data extraction criteria were not changed from the previous edition[4] except for the exclusion of case reports and case series. Additionally, to manage discrepancies encountered in past editions between the study design declared by the authors and the actual design of the study, we classified study designs according to the Agency for Healthcare Research and Quality[7] (Supplementary Digital Material 1: Supplementary Text File 1).

We also expanded the evaluation of the quality of evidence using JBI checklists[8] to appraise the methodological quality of observational studies and the Cochrane Risk of Bias Tool (RoB 1) to appraise methodological quality for randomized-controlled clinical trials (RCTs).[9] Two review authors (C.A., V.I.) independently appraised the quality of studies and resolved disagreements by consensus; in the case of persistent disagreement, a third review author was consulted (P.C.) and the disagreement resolved by consensus.

To categorize participant samples, we adopted definitions agreed by the National Institute for Health and Care Excellence (NICE), Scottish Intercollegiate Guidelines Network (SIGN), and Royal College of General Practitioners (RCGP) that define acute COVID-19, ongoing symptomatic COVID-19, and post- COVID-19 syndrome, according to the duration of symptoms.[10, 11]

This third edition still provides a narrative synthesis of findings, as a meta-analysis is not applicable due to the high heterogeneity of the studies. New studies were added to the consolidated online table of papers of all editions and to the interactive living evidence map available on the Cochrane Rehabilitation REH-COVER action website (https://tr.im/rr_dyn).

Evidence synthesis

We identified 7496 citations (3699 after removal of duplicates) from the databases. After title and abstract screening, we evaluated 120 studies and included 25 in the narrative synthesis (Figure 1). Table I, II, and III synthesize the distribution of selected studies by geographical area (Table I), limitations of functioning of rehabilitation interest (LFRI), disease phase and rehabilitation setting (Table II), research question, and study design (Table III).[12-36]

Three papers presented RCTs,[12-14] 13 were cross-sectional studies[15-27] and nine were cohort studies.[28-36] Seventeen papers reported epidemiological data either on symptom prevalence (13 studies)[15-27] or disease natural history (seven studies),[30-36] whereas five studies[12-14, 28, 29] reported on intervention efficacy at the individual level. All study participants were COVID survivors and 48% of studies collected information on participants 6 months or longer after COVID-19 onset. Quality appraisal revealed the most frequent risks of bias for RCTs concerned weaknesses in allocation concealment, the lack of blinding of participants and providers, and the lack of intention-to-treat analysis

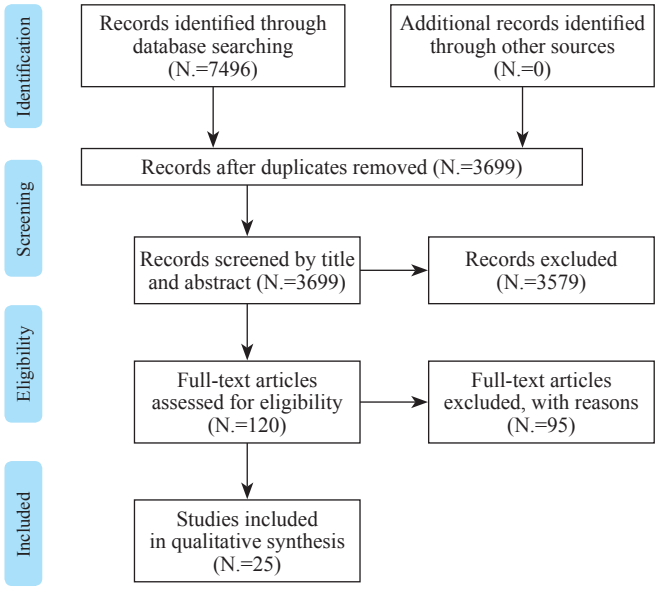

Figure 1.—PRISMA Flow Diagram.

TABLE I.—*World Health Organization (WHO) regions and countries where studies were performed.*[12-36]

WHO Region	Country	N. (%)
European	Italy[25, 29, 31, 35]	4 (16%)
	Spain[21]	1 (4%)
	Netherlands[20, 23]	2 (8%)
	Sweden[26]	1 (4%)
	Turkey[15]	1 (4%)
Americas	Brazil[22, 27]	2 (8%)
	USA[16, 24, 28, 34, 36]	5 (20%)
Eastern Mediterranean	Pakistan[18]	1 (4%)
	Iran[12]	1 (4%)
Western Pacific	China[14, 19, 30, 32, 33]	5 (20%)
South-East Asia	India[13]	1 (4%)
	Bangladesh[17]	1 (4%)
Total		25 (100%)

(Figure 2). The application of JBI checklists for observational studies revealed that most cross-sectional and cohort studies failed to identify or deal with confounders (Figure 3A, B), most cohort studies failed to describe or deal with dropouts (Figure 3B), and most prevalence studies did not perform an appropriate statistical analysis nor did they provide information useful to rate the adequacy of sample size, response rate, or data analysis (Figure 3C). Supplementary Digital Material 2 (Supplementary Table I) describes the output of the quality appraisal of each included study, grouped by design, whereas Supplementary Digital Material 3 (Supplementary Table II) details the main features and findings from the 25 selected studies. Below, we report a narrative synthesis of the study content with respect to the research questions.

Epidemiology: prevalence of LFRI

Most cross-sectional studies described the prevalence of LFRI in COVID-19 survivors. There is a growing amount of information collected for up to one year after COVID-19 onset, in large samples of patients.

Ongoing symptomatic COVID-19

Seven papers[16, 22, 24, 27, 31, 32, 36] with cohort ranging from 23[31] to 938[22] participants (median value 71,5), described the clinical status and functioning of patients observed within 12 weeks from symptom onset. Among them, two studies[24, 27] reported perceived persistent respiratory symptoms in at least 80% of participants, irrespective of the results of the pulmonary function tests. One study[36] described persistent symptoms in 80% of participants presenting with COVID-19-related cardiomyopathy. One study[22] highlighted the protective role of vigorous physical activity towards the risk of hospitalization due to CO-

TABLE II.—*Distribution of studies by limitations of functioning of rehabilitation interest (LFRI), disease phase and rehabilitation setting.*[12-36]

Parameter	Classification	N. (%)
LFRI	Nervous system structures/functions[16, 25, 31, 35]	4 (16%)
	Respiratory structures/functions[13-15, 19, 20, 24, 27-29, 32]	10 (40%)
	Cardiovascular functions[33, 36]	2 (8%)
	Any other body structures and function[12, 17, 18, 21-23, 30]	7 (28%)
	Any activity limitation and participation restriction[26, 34]	2 (8%)
Disease phase	Acute covid-19 infection[12, 14]	2 (8%)
	Ongoing symptomatic COVID-19[13, 16, 22, 24, 27-29, 31, 32, 35, 36]	11 (44%)
	Post-COVID-19 syndrome[15, 17-21, 23, 25, 26, 30, 33, 34]	12 (48%)
Rehabilitation setting*	Rehabilitation in acute care[14]	1 (4%)
	Post-acute specialized[29]	1 (4%)
	Post-acute general[13, 21, 28, 35]	4 (16%)
	N/A[12, 15-20, 22-27, 30-34, 36]	19 (76%)

TABLE III.—*Distribution of studies by research question and study design.*

Research question	RCTs	Cross-sectional studies	Cohort studies	Total
Epidemiology				
Clinical presentation	0	0		0
Prevalence	0	13 (52%)	0	13 (52%)
Natural history, determining and modifying factors	0	0	7 (28%)	7 (28%)
Micro-level: individuals	3 (12%)	0	2 (8%)	5 (20%)
Meso-level: health services	0	0	0	0
Macro-level: health systems	0	0	0	0
Total	3 (12%)	13 (52%)	9 (36%	25 (100%)

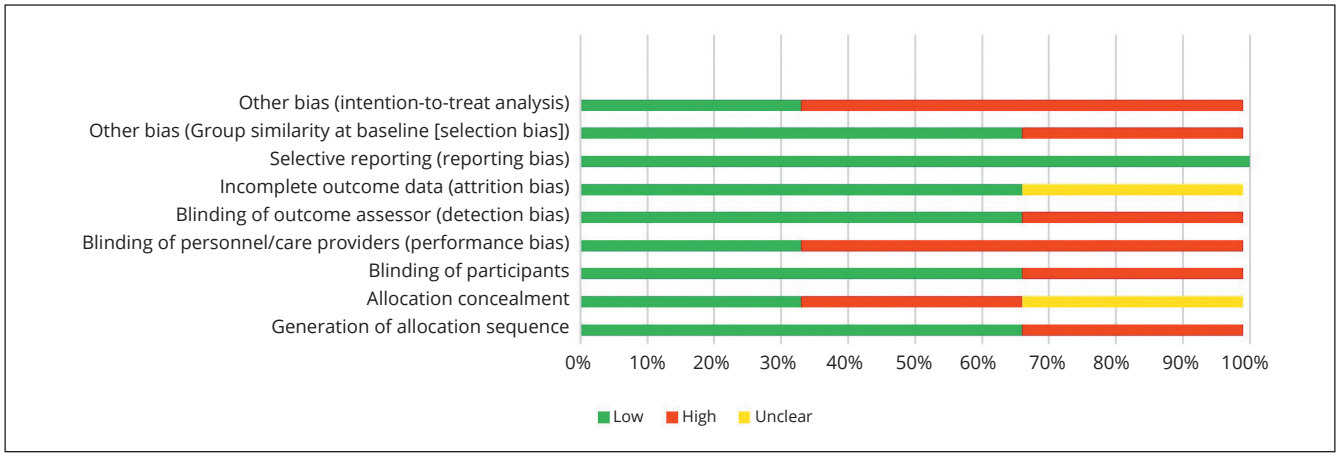

Figure 2.—Distribution of Risks of Bias in the included Randomized Controlled trials, according to the Cochrane Risk of Bias (RoB 1) tool.

VID-19. In this study, the following factors were associated with significant adverse outcomes: age >65 years, obesity, pre-existing disease, three or more symptoms, and using two or more medications.

Post-COVID-19 condition

Ten studies[15, 17-21, 23, 25, 26, 30] with cohort sizes ranging from 30[21] to 3677 participants[30] (median sample size: 238.5) reported on people presenting with the post-COVID-19 condition between 12 weeks and one year post symptom onset.[19]

Among them, four studies[17, 18, 20, 30] described persistence of at least one of the following post-COVID-19 symptoms (fatigue; sleep disturbance; lack of concentration; breathing difficulty; headache or muscle pain) in 25% to 70% cases. Specifically, Sultana[17] and Kashif[18] reported that female sex and comorbid conditions were risk factors for long post-COVID symptoms.

Two studies[23, 26] described activity limitations/participation restrictions and, more specifically, problems walking >1 km, in 25% of patients more than four months after hospital discharge. Three studies confirmed the high prevalence of affective impairments (anxiety and depressive symptoms) as components of the post-COVID-19 syndrome[21, 25, 26] Finally, one study[19] found that about 40% of participants described persistent lung function impairment, likely due to pulmonary fibrosis, one year after recovering from COVID-19.

Epidemiology: natural history of LFRI

Two studies investigated the six-month level of functioning of people with COVID-19 who had survived neurological[34] or cardiac complications.[33] While Frontera[34] reported modified Rankin and Barthel index scores to be significantly worse in patients with neurological complications, no statistically significant differences were observed in terms of the quality of life and exercise capacity between the patients with and without cardiac injury.[33]

One study suggests that severe COVID-19 survivors,

Figure 3.—Distribution of criteria for quality appraisal of observational studies according to JBI checklists for cross-sectional (A), cohort (B) and prevalence (inception cohort) (C) studies.

admitted to a COVID-19 rehabilitation unit, and assessed 10 days after symptom onset, showed lower scores in Mini Mental State Examination (MMSE) subtests of language and in several Montreal Cognitive Assessment (MoCA) subtests than people with mild and moderate disease, who, in contrast, reported significantly higher levels of distress, compared to the severe COVID-19 group.[35]

Micro-intervention

Three RCTs[12-14] reported on the effectiveness of rehabilitation interventions in COVID-19 patients. Two studies were conducted in the acute phase. One[14] supported the greater effectiveness of short-wave diathermy (SWD) for recovering pulmonary symptoms when compared to placebo SWD; the other study[12] reported guided imagery therapy in addition to routine care was more effective than routine care alone on anxiety, muscle pain, and vital signs. The remaining RCT was conducted in the post-acute phase[13] and concluded that any combination of breathing exercises including pursed-lip breathing and the Bhastrika pranayama, performed at home, was effective at relieving ongoing respiratory symptoms.

Two cohort studies[28, 29] described the outcome of COVID-19 patients admitted to inpatient rehabilitation facilities. The main findings were that COVID-19 participants with neurological or orthopedic complications showed the same functional recovery as people without COVID-19,[28] and that functional recovery in COVID-19 patients may not be affected by pre-existing comorbidities.[29]

No study focused on intervention effectiveness at the service or system level.

Discussion

This third edition of the rapid living systematic review from the Cochrane Rehabilitation Field extends our knowledge about the consequences of COVID-19 and rehabilitation

management of sequelae across acute, ongoing symptomatic, and post-COVID-19 phases.

The review demonstrates an increased proportion of analytic observational studies focused primarily on the prevalence of respiratory and neurological impairments up to one year after COVID-19 onset. Most research is conducted in the European region, followed by the Americas and China; clinical populations include adults whose mean age varies from 35 to 66 years across studies. While three RCTs were identified, these, like all other included studies, revealed low methodological quality in critical appraisals. Overall, the impact of rehabilitation interventions on health outcomes could not be determined because meta-synthesis was not possible due to study heterogeneity.

The literature search was comprehensive with the search strategy replicating previous review editions that, to date, have been the most complete investigations of rehabilitation evidence related to COVID in health literature. In this third edition, one modification was introduced to the selection criteria to narrow the breadth of findings and increase the level of evidence sought by excluding case reports and case series. From a content point of view, it was clear that there was saturation of evidence on the clinical description of COVID-19 survivors in the literature – our clinical information need was about prevalence, natural history, and interventions. The applicability of findings was not affected by this change. Further, the use of a proven search strategy, screening, and interpretation of findings by a multidisciplinary rehabilitation team also support applicability to the clinical information need.

The methodological quality of the included studies was low with high risk of bias which limits generalizability and replication. This problem is not specific to rehabilitation and reported across many areas of COVID-19 biomedical research.[37] For example, Honarmand *et al.*[38] showed that 82.4% of trials had high or probably high risk of bias, 82.4% due to deviations from the intended intervention (including blinding) and 52.7% due to the randomization process (including allocation concealment and adequacy of the randomization procedure). The consequences are a production of low-quality evidence, which may be uninformative at best and may cause harm to patients. Therefore, it is becoming mandatory to consider the impact of trial quality to generate reliable, high quality evidence. The changes of our methodology highlight the needs to improve the quality of evidence, to be sure to guide the clinical decision-making on the management of COVID-19 disease.[39]

From a clinical perspective, this systematic review confirms that COVID-19 is associated with disability in a high proportion of survivors one year after symptom onset. This disability is related to the persistence of respiratory dysfunctions, neurological and mental disorders. There is emerging evidence about the effectiveness of specific rehabilitation interventions at relieving respiratory symptoms and reducing the burden of disability

Conclusions

This rapid living systematic review of LFRI experienced by COVID-19 patients confirms the important impact of the disease on rehabilitation needs. The information gap about the course of functional recovery after the resolution of symptoms in people with and without complications is being filled by the increasing number of studies reporting on outcomes 6-12 month after COVID-19 onset. However, we still lack high-quality studies reporting on the efficacy and effectiveness of rehabilitation at the individual level, but more importantly at the service and system levels.

References

1. World Health Organization. Weekly epidemiological update on COVID-19 - 10 August 2021; 2021 [Internet]. Available from: https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---10-august-2021 [cited 2021, Oct 4].

2. ClinicalTrials.gov. Home page; 2021[Internet]. Available from: https://clinicaltrials.gov [cited 2021, Oct 4].

3. Ceravolo MG, de Sire A, Andrenelli E, Negrini F, Negrini S. Systematic rapid "living" review on rehabilitation needs due to COVID-19: update to March 31st, 2020. Eur J Phys Rehabil Med 2020;56:347–53.

4. Ceravolo MG, Arienti C, de Sire A, Andrenelli E, Negrini F, Lazzarini SG, *et al.*; International Multiprofessional Steering Committee of Cochrane Rehabilitation REH-COVER action. Rehabilitation and COVID-19: the Cochrane Rehabilitation 2020 rapid living systematic review. Eur J Phys Rehabil Med 2020;56:642–51.

5. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Syst Rev 2021;10:89.

6. The Interim Guidance from the Cochrane Rapid Reviews Group. 2020 [Internet]. Available from: https://methods.cochrane.org/rapidreviews/sites/methods.cochrane.org.rapidreviews/files/public/uploads/cochrane_rr_-_guidance-23mar2020-final.pdf [cited 2021, Oct 4].

7. Hartling L, Bond K, Harvey K, Santaguida P, Viswanathan M, Dryden D. Developing and Testing a Tool for the Classification of Study Designs in Systematic Reviews of Interventions and Exposures. Rockv Agency Healthc Res Qual 2010.

8. Joanna Briggs Institute (JBI). Critical appraisal tools - checklist; 2021 [Internet]. Available from: https://jbi.global/critical-appraisal-tools [cited 2021, Oct 4].

9. Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, *et al.*; Cochrane Bias Methods Group; Cochrane Statistical Methods Group. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ 2011;343:d5928.

10. UK National Institute for Health and Clinical Excellence. Overview -

COVID-19 rapid guideline: managing the long-term effects of COVID-19; 2020 [Internet]. Available from: https://www.nice.org.uk/guidance/ng188 [cited 2021, Oct 4].

11. Shah W, Hillman T, Playford ED, Hishmeh L. Managing the long term effects of covid-19: summary of NICE, SIGN, and RCGP rapid guideline. BMJ 2021;372:n136.

12. Parizad N, Goli R, Faraji N, Mam-Qaderi M, Mirzaee R, Gharebaghi N, *et al.* Effect of guided imagery on anxiety, muscle pain, and vital signs in patients with COVID-19: A randomized controlled trial. Complement Ther Clin Pract 2021;43:101335.

13. Srinivasan V, Kandakurti PK, Alagesan J. Efficacy of pursed lip breathing with Bhastrika Pranayama versus incentive spirometry in rehabilitating post Covid 19 follow up – a randomized control study. Turk Fizik Rehabil Derg 2021;32:402–7.

14. Tian F, Wang J, Xi X, He M, Zhao C, Feng F, *et al.* Efficacy and safety of short-wave diathermy treatment for moderate COVID-19 patients: a prospective, double-blind, randomized controlled clinical study. Eur J Phys Rehabil Med 2021. [Epub ahead of print]

15. Bardakci MI, Ozturk EN, Ozkarafakili MA, Ozkurt H, Yanc U, Yildiz Sevgi D. Evaluation of long-term radiological findings, pulmonary functions, and health-related quality of life in survivors of severe COVID-19. J Med Virol 2021;93:5574–81.

16. Liyanage-Don NA, Cornelius T, Sanchez JE, Trainor A, Moise N, Wainberg M, *et al.* Psychological Distress, Persistent Physical Symptoms, and Perceived Recovery After COVID-19 Illness. J Gen Intern Med 2021;36:2525–7.

17. Sultana S, Islam MT, Salwa M, Zakir Hossain SM, Hasan MN, Masum AA, *et al.* Duration and Risk Factors of Post-COVID Symptoms Following Recovery Among the Medical Doctors in Bangladesh. Cureus 2021;13:e15351.

18. Kashif A, Chaudhry M, Fayyaz T, Abdullah M, Malik A, Anwer JM, *et al.* Follow-up of COVID-19 recovered patients with mild disease. Sci Rep 2021;11:13414.

19. Yan X, Huang H, Wang C, Jin Z, Zhang Z, He J, *et al.* Follow-up study of pulmonary function among COVID-19 survivors 1 year after recovery. J Infect 2021;83:381–412.

20. Vaes AW, Goërtz YM, Van Herck M, Machado FV, Meys R, Delbressine JM, *et al.* Recovery from COVID-19: a sprint or marathon? 6-month follow-up data from online long COVID-19 support group members. ERJ Open Res 2021;7:00141–02021.

21. Albu S, Zozaya NR, Murillo N, García-Molina A, Chacón CA, Kumru H. What's going on following acute covid-19? Clinical characteristics of patients in an out-patient rehabilitation program. NeuroRehabilitation 2021;48:469–80.

22. de Souza FR, Motta-Santos D, Dos Santos Soares D, de Lima JB, Cardozo GG, Guimarães LS, *et al.* Association of physical activity levels and the prevalence of COVID-19-associated hospitalization. J Sci Med Sport 2021;24:913–8.

23. Delbressine JM, Machado FV, Goërtz YM, Van Herck M, Meys R, Houben-Wilke S, *et al.* The impact of post-covid-19 syndrome on self-reported physical activity. Int J Environ Res Public Health 2021;18:6017.

24. Chun HJ, Coutavas E, Pine AB, Lee AI, Yu VL, Shallow MK, *et al.* Immunofibrotic drivers of impaired lung function in postacute sequelae of SARS-CoV-2 infection. JCI Insight 2021;6:148476.

25. Gramaglia C, Gambaro E, Bellan M, Balbo PE, Baricich A, Sainaghi PP, *et al.*; NO-MORE COVID Group. Mid-term Psychiatric Outcomes of Patients Recovered From COVID-19 From an Italian Cohort of Hospitalized Patients. Front Psychiatry 2021;12:667385.

26. Divanoglou A, Samuelsson AP, Sjödahl PE, Andersson C, Levi PR. Rehabilitation needs and mortality associated with the Covid-19 pandemic: a population-based study of all hospitalised and home-healthcare individuals in a Swedish healthcare region. EClinicalMedicine 2021;36:100920.

27. Polese J, Sant'Ana L, Moulaz IR, Lara IC, Bernardi JM, Lima MD, *et al.* Pulmonary function evaluation after hospital discharge of patients with severe COVID-19. Clinics (São Paulo) 2021;76:e2848.

28. Groah SL, Pham CT, Rounds AK, Semel JJ. Outcomes of patients with COVID-19 after inpatient rehabilitation. PM R 2021;22:10.

29. Maniscalco M, Fuschillo S, Ambrosino P, Martucci M, Papa A, Matera MG, *et al.* Preexisting cardiorespiratory comorbidity does not preclude the success of multidisciplinary rehabilitation in post-COVID-19 patients. Respir Med 2021;184:106470.

30. Mei Q, Wang F, Yang Y, Hu G, Guo S, Zhang Q, *et al.* Health Issues and Immunological Assessment Related to Wuhan's COVID-19 Survivors: A Multicenter Follow-Up Study. Front Med (Lausanne) 2021;8:617689.

31. Scarpino M, Bonizzoli M, Lazzeri C, Lanzo G, Lolli F, Ciapetti M, *et al.*; NeuCOV Study Group†. Electrodiagnostic findings in patients with non-COVID-19- and COVID-19-related acute respiratory distress syndrome. Acta Neurol Scand 2021;144:161–9.

32. Wang X, Xu H, Jiang H, Wang L, Lu C, Wei X, *et al.* Clinical features and outcomes of discharged coronavirus disease 2019 patients: a prospective cohort study. QJM 2020;113:657–65.

33. Wu X, Deng KQ, Li C, Yang Z, Hu H, Cai H, *et al.* Cardiac Involvement in Recovered Patients From COVID-19: A Preliminary 6-Month Follow-Up Study. Front Cardiovasc Med 2021;8:654405.

34. Frontera JA, Yang D, Lewis A, Patel P, Medicherla C, Arena V, *et al.* A prospective study of long-term outcomes among hospitalized COVID-19 patients with and without neurological complications. J Neurol Sci 2021;426:117486.

35. Pistarini C, Fiabane E, Houdayer E, Vassallo C, Manera MR, Alemanno F. Cognitive and Emotional Disturbances Due to COVID-19: An Exploratory Study in the Rehabilitation Setting. Front Neurol 2021;12:643646.

36. Finn A, Jindal A, Selvaraj V, Authelet N, Gutman NH, Dapaah-Afriyie K. Presentations and Outcomes of Severe Cardiac Complications in COVID-19: rhode Island Experience. R I Med J (2013) 2021;104:8–13.

37. Armstrong K, Horwitz R. COVID-19 and the future of clinical epidemiology. J Clin Epidemiol 2021;S0895-4356(21)00217-1. [Epub ahead of print]

38. Honarmand K, Penn J, Agarwal A, Siemieniuk R, Brignardello-Petersen R, Bartoszko JJ, *et al.* Clinical trials in COVID-19 management & prevention: A meta-epidemiological study examining methodological quality. J Clin Epidemiol 2021;139:68–79.

39. Negrini S, Ceravolo MG, Côté P, Arienti C. A systematic review that is "rapid" and "living": A specific answer to the COVID-19 pandemic. J Clin Epidemiol 2021;S0895-4356(21)00177-3. [Epub ahead of print]

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