



Rehabilitation for post-covid-19 condition

Improves quality of life in people experiencing the condition

Rana S Hinman,¹ Chris G Maher²

¹ Centre for Health, Exercise and Sports Medicine, Department of Physiotherapy, School of Health Sciences, Faculty of Medicine Dentistry and Health Sciences, University of Melbourne, Australia

² Institute for Musculoskeletal Health, School of Public Health, Faculty of Medicine and Health, University of Sydney, Australia

ranash@unimelb.edu.au

Cite this as: *BMJ* 2024;384:q20

<http://dx.doi.org/10.1136/bmj.q20>

Around 45% of people who survive covid-19 subsequently experience at least one unresolved symptom.^{1,2} Symptoms can be debilitating and may include fatigue, muscle pain, disturbed sleep, breathlessness, and impairments in physical, cognitive, and psychological function.^{1,2} Collectively, symptoms may adversely affect quality of life, be prolonged, and impose an economic burden on health systems.³ Few randomised controlled trials have evaluated non-drug treatments for post-viral syndromes,⁴ including after covid-19.⁵ Guidelines from the National Institute for Health and Care Excellence for managing long term effects of covid-19 recommend personalised rehabilitation that considers physical, psychological, and psychiatric needs.⁶ Recommendations were based on the expertise of panel members, patients' experience, and expert testimony, and the lack of evidence about rehabilitation for post-covid-19 condition meant that specific recommendations for rehabilitation could not be made. Studies investigating rehabilitation for improving patient reported outcomes are a key research priority.⁶

REGAIN programme

In the linked paper, McGregor and colleagues (doi:10.1136/bmj-2023-076506) report a multicentre superiority randomised controlled trial that evaluated the eight week Rehabilitation Exercise and psycholoGical support After covid-19 InfectioN (REGAIN) intervention, comprising an initial one-to-one advice session followed by eight supervised group exercise sessions and six group psychological support sessions.⁷ Sessions were about an hour long and provided online. The pragmatic design compared the intervention with best practice usual care—a 30 minute online one-to-one session of advice and support. Results showed that the intervention was effective for improving health related quality of life at three and 12 months (but not at six months) compared with usual care. At three months, 17% (n=39/237) of the intervention group reported that their overall health was “much better now” compared with 8% (n=20/250) in the usual care group. One serious adverse event (syncope and vomiting after exercise) was deemed possibly related to the intervention, and two adverse events were deemed definitely related (knee pain with exercise, and severe anxiety before exercise).

REGAIN is a large prospectively registered trial with follow-up of outcomes to 12 months post-randomisation and good participant retention (485 of 585 participants (83%) provided primary outcome data). Other strengths include the training of trial clinicians to deliver the intervention, the provision of detailed information on development of

the rehabilitation programme,⁸ and consulting people with post-covid-19 condition and clinical experts when developing the programme.⁸ Limitations included the inability to mask trial participants or REGAIN practitioners to treatment allocation, which could have biased treatment effect estimates, and some uncertainty about whether patients with post-covid-19 condition would consider the observed treatment effects clinically worthwhile.⁹ The latter limitation is hard to avoid when studying a new health condition and new treatment, as research examining the smallest worthwhile treatment effect has not been conducted. Until this occurs, a shared decision making framework may help clinicians and patients make informed decisions about the REGAIN programme.¹⁰

Clinical implications

Findings from this trial have important clinical implications. Improvements in quality of life were driven mostly by improved fatigue, pain interference, and depression, suggesting rehabilitation programmes for post-covid-19 condition should target these impairments. Safety data are noteworthy. Post-covid-19 condition affects numerous organ systems and is associated with increased risk of developing myalgic encephalomyelitis.¹¹ Post-exertional malaise features in both conditions, raising concerns about the safety of exercise for post-covid-19 condition.^{12,13} Regular monitoring in the REGAIN trial did not identify any episodes of post-exertional exacerbations of symptoms, providing reassurance that individualised exercise at home in online groups supervised by a trained physiotherapist or exercise physiologist is safe. Online methods to deliver the intervention helped to increase access to care, permitting national recruitment across England and Wales. Consultations and group sessions were delivered by videoconferencing, supported by a patient workbook, and prerecorded on-demand exercise, educational, and mindfulness videos.⁸ The planned process evaluation¹⁴ is not yet published; patients' and clinicians' experiences with the REGAIN intervention are therefore unknown. Although research in other health conditions can show that patients and allied health clinicians find videoconferencing convenient and acceptable,¹⁵ people living with post-covid-19 condition do not necessarily view telemedicine favourably and have asked for face-to-face assessments.¹⁶

Although not limitations of the trial, challenges to rolling out novel complex rehabilitation therapies such as REGAIN exist. Trial inclusion criteria required a history of hospital admission for covid-19, and it is unknown if findings can be generalised to patients with milder infection who do not require admission.

Participants' judgments about the severity and cause of their physical and mental health symptoms were also used to determine eligibility, rather than measurable criteria, which may make identifying appropriate rehabilitation candidates more difficult. Complier average causal effect analysis suggested that full adherence to the intervention improved treatment outcomes. With only 47% (n=141/298) of participants fully adherent, strategies are needed to improve attendance at the initial consultation and subsequent group sessions. Although participants were encouraged to access exercise videos for unsupervised exercise, most participants in the REGAIN intervention group (206 of 258 participants (80%)) did not watch any. From a workforce perspective, scalable methods are needed to train clinicians to competently deliver rehabilitation for post-covid-19 condition.¹⁷ Health service providers also need to consider if they will support delivery of new treatments—the planned REGAIN economic evaluation,¹⁴ which is not yet published, will provide useful data in this regard.

Competing interests: The BMJ has judged that there are no disqualifying financial ties to commercial companies. The authors declare the following other interests: RSH is an investigator on grants funded by the National Health and Medical Research Council, Australian Research Council, Medibank, and Asics. RSH is an unpaid editorial board member of the *Journal of Physiotherapy*.

Provenance and peer review: Commissioned; not externally peer reviewed.

- 1 O'Mahoney LL, Routen A, Gillies C, et al. The prevalence and long-term health effects of Long Covid among hospitalised and non-hospitalised populations: A systematic review and meta-analysis. *EClinicalMedicine* 2022;55:101762. doi: 10.1016/j.eclinm.2022.101762 pmid: 36474804
- 2 Chen C, Hauptert SR, Zimmermann L, Shi X, Fritsche LG, Mukherjee B. Global prevalence of post-coronavirus disease 2019 (COVID-19) condition or long COVID: a meta-analysis and systematic review. *J Infect Dis* 2022;226:607. doi: 10.1093/infdis/jiac136 pmid: 35429399
- 3 Tufts J, Guan N, Zemedikun DT, et al. The cost of primary care consultations associated with long COVID in non-hospitalised adults: a retrospective cohort study using UK primary care data. *BMC Prim Care* 2023;24. doi: 10.1186/s12875-023-02196-1 pmid: 37986044
- 4 Chandan JS, Brown KR, Simms-Williams N, et al. TLC Study. Non-pharmacological therapies for post-viral syndromes, including long COVID: a systematic review. *Int J Environ Res Public Health* 2023;20. doi: 10.3390/ijerph20043477 pmid: 36834176
- 5 Fugazzaro S, Contri A, Esseroukh O, et al. Reggio Emilia COVID-19 Working Group. Rehabilitation interventions for post-acute COVID-19 syndrome: a systematic review. *Int J Environ Res Public Health* 2022;19. doi: 10.3390/ijerph19095185 pmid: 35564579
- 6 National Institute for Health and Care Excellence. COVID-19 rapid guideline: managing the long-term effects of COVID-19. <https://www.nice.org.uk/guidance/ng188/resources/covid19-rapid-guideline-managing-the-longterm-effects-of-covid19-pdf-51035515742>, version 1.20, 2022.
- 7 McGregor G, Sandhu H, Bruce J, et al. Clinical effectiveness of an online supervised group physical and mental health rehabilitation programme for adults with post-covid-19 condition (REGAIN study): multicentre randomised controlled trial. *BMJ* 2023;384:e076506.
- 8 Ennis S, Heine P, Sandhu H, et al. Development of an online intervention for the Rehabilitation Exercise and psycholoGical support After covid-19 Infection (REGAIN) trial. *NIHR Open Res* 2023;3. doi: 10.3310/nihropenres.13371.2 pmid: 37881468
- 9 Pitre T, Kirsh S, Jassal T, et al. The impact of blinding on trial results: a systematic review and meta-analysis. *Cochrane Ev Synth* 2023;1:e12015doi: 10.1002/cesm.12015.
- 10 Abdel Shaheed C, Mathieson S, Wilson R, Furrage AM, Maher CG. Who should judge treatment effects as unimportant? *J Physiother* 2023;69:-5. doi: 10.1016/j.jphys.2023.04.001 pmid: 37263906
- 11 Davis HE, McCorkell L, Vogel JM, Topol EJ. Long COVID: major findings, mechanisms and recommendations. *Nat Rev Microbiol* 2023;21:-46. doi: 10.1038/s41579-022-00846-2 pmid: 36639608
- 12 Décarý S, Gaboury I, Poirier S, et al. Humility and acceptance: working within our limits with long COVID and myalgic encephalomyelitis/chronic fatigue syndrome. *J Orthop Sports Phys Ther* 2021;51:-200. doi: 10.2519/jospt.2021.0106 pmid: 33930983
- 13 Wright J, Astill SL, Sivan M. The relationship between physical activity and long COVID: a cross-sectional study. *Int J Environ Res Public Health* 2022;19. doi: 10.3390/ijerph19095093 pmid: 35564488
- 14 McGregor G, Sandhu H, Bruce J, et al. Rehabilitation Exercise and psycholoGical support After covid-19 Infection (REGAIN): a structured summary of a study protocol for a randomised controlled trial. *Trials* 2021;22. doi: 10.1186/s13063-020-04978-9 pmid: 33407804
- 15 Hinman RS, Nelligan RK, Bennell KL, Delany C. "Sounds a bit crazy, but it was almost more personal:" a qualitative study of patient and clinician experiences of physical therapist-prescribed exercise for knee osteoarthritis via Skype. *Arthritis Care Res (Hoboken)* 2017;69:-44. doi: 10.1002/acr.23218 pmid: 28217864

- 16 Macpherson K, Cooper K, Harbour J, Mahal D, Miller C, Nairn M. Experiences of living with long COVID and of accessing healthcare services: a qualitative systematic review. *BMJ Open* 2022;12:e050979. doi: 10.1136/bmjopen-2021-050979 pmid: 35017239
- 17 Scheiber B, Spiegl C, Wiederin C, Schifferegger E, Schiefermeier-Mach N. Post-COVID-19 rehabilitation: perception and experience of Austrian physiotherapists and physiotherapy students. *Int J Environ Res Public Health* 2021;18. doi: 10.3390/ijerph18168730 pmid: 34444477

This article is made freely available for personal use in accordance with BMJ's website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.