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Reviews on Long COVID

A scope of the literature

November 2021

The NIHR Policy Research Programme Reviews Facility is a collaboration between the following:

Reviews on Long COVID: A scope of the literature

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Aim

We conducted a scoping exercise to identify existing and ongoing reviews on Long COVID. The term Long COVID was conceptualised broadly as any symptoms/effects that persist or develop after acute COVID-19 infection.

Identification of reviews

We searched three main sources to identify relevant reviews:

- 1) PROSPERO database (An International prospective register of systematic reviews). This was searched using the term long COVID, and records tagged as long COVID in the database were also screened.
- 2) Our living systematic map of Long COVID-19 evidence maintained by staff at the London-York NIHR Policy Reviews Facility.
- 3) PubMed. We first searched PubMed for the terms long COVID or post COVID in the title or abstract fields and then applied the PubMed filter for 'systematic reviews' and 'meta-analysis'. A second search was also conducted to identify records with the terms long COVID or post COVID in the title or abstract fields and the words 'review' or 'meta-analysis' in the title.

To be included, reviews needed to have a primary focus on Long COVID (however conceptualised and defined). Reviews could focus on adults and/or children and include primary studies of any design or other reviews (i.e. reviews of reviews). We included any form of systematic review. A review was considered systematic in nature if it reported some search terms and inclusion criteria and also reported the number of references retrieved and the number of studies included. We included one systematic review based on the abstract only as the full text paper was not readily accessible. We also included conference abstracts based on systematic reviews and preprints, the latter being a paper that is published online but has not yet been peer-reviewed.

We did not apply criteria relating to the length of the time period after acute infection owing to variation in how Long COVID has been defined in the literature. This enabled us to capture a broad range of potentially relevant publications.

Key findings

We screened approximately 300 records and identified 51 published reviews (including six pre-print papers and one conference abstract); nine completed reviews that are yet to be published; and 77 protocols for ongoing reviews focused on Long COVID. Table A (Appendix 1, page 31) provides a summary of all published and ongoing reviews by publication type and main outcomes of interest.

Published reviews

The published reviews identified by the searches are detailed in Table 1 (page 4). Of the 51 published reviews, we found:

- 1 review of reviews (a grey literature report published in Portuguese)⁽¹⁾
- 5 living reviews⁽²⁻⁶⁾ A living review is a review that is updated regularly to incorporate any new evidence.
- 45 standard systematic reviews/meta-analyses⁽⁷⁻⁵¹⁾

All but four of the published reviews had a primary focus on identifying the frequency of persistent symptoms or effects, and 13 also explored potential risk factors.^(4,8,9,13,14,18,27,36,38, 39, 42, 43, 46)

Three of the published reviews had a primary focus on treatment and/or rehabilitation of individuals with Long COVID. O'byrne et al. reported findings from a living Cochrane review that aimed to assess the effects of interventions, which have been used, or proposed, to treat persisting olfactory dysfunction following COVID infection.⁽⁵⁾ The review by Webber et al. reported recommendations for the rehabilitation assessment and treatment of patients who experienced post-acute signs and symptoms related to COVID-19.⁽⁴⁹⁾ Similarly, Lindsay et al. synthesised recommendations for returning athletes who have experienced Long COVID symptoms.⁽³⁰⁾ In addition, two further reviews included a short section on options and recommendations for Post COVID management and rehabilitation, in addition to having a main focus on symptoms/effects.^(8,9) One of these reviews also included short sections on nomenclature, diagnosis, and pathophysiology.⁽⁹⁾

We also identified another living Cochrane review by Webster et al. that had a prevention focus. This review assessed the effects of interventions that have been used, or proposed, to prevent persisting olfactory dysfunction due to COVID infection.⁽⁶⁾

There was variation both across reviews and between individual studies within reviews in terms of post COVID time periods. Overall, the post COVID follow up time of interest ranged from less than four weeks to several months post symptom onset, diagnosis, recovery, or hospital discharge. However, where reported, it appeared that all published reviews included a majority of studies that had a post COVID time follow up/assessment period of at least 3-4 weeks after symptom onset, diagnosis, recovery, or hospital discharge. Furthermore, it was possible to determine that at least 22 published reviews did not include any primary studies with a post COVID follow up period of less than approximately four weeks after symptom onset, diagnosis, recovery, or hospital discharge.^(2,4,5,7,8,13,15,22,24-26,29,31,33-36,39,41,42,45,51) In a further five reviews, all included primary studies focused on a post COVID time period of approximately three weeks or more weeks after symptom onset, diagnosis, recovery, or hospital discharge.^(14,19,21,27,48)

Five reviews only included primary studies of patients who had been hospitalised with COVID.^(15,26,31,33,34) In contrast, the review by Van Kessel et al. focused exclusively on patients who were managed in an outpatient setting.⁽⁴⁸⁾

Reviews awaiting publication

Table 2 (page 11) details nine protocols for potentially relevant reviews that were described in PROSPERO as being completed, but not yet published. Seven out of the nine reviews focused on the frequency of persistent symptoms and effects.^(52-55, 58-60) Another review explored the lived experiences of individuals with Long COVID,⁽⁵⁷⁾ and one review assessed the use of complementary and alternative medicine amongst individuals with acute COVID-19 infection or Long COVID.⁽⁵⁶⁾

Protocols for ongoing reviews

We found 77 protocols for ongoing reviews related to Long COVID in the PROSPERO database. These are listed on page 13, along with the key research questions from each protocol. The records have been organised by type of review and then by primary focus. It is possible that some of the protocols listed are for reviews that are now published but authors have not updated the PROSPERO record. An attempt was made to identify such papers, but it is not always a straightforward exercise as published reviews often have different titles and first authors to the original protocol. We identified protocols for:

- 1 review of reviews
- 5 living reviews
 - Key focus on treatment and rehabilitation (n=2)
 - Key focus on symptoms, effects & prevalence (n=3)
- 71 standard systematic reviews/meta-analyses
 - Key focus on health & economics (n=3)
 - Key focus on treatment and rehabilitation (n=13)
 - Key focus on risk factors; risk factors and prevalence (n=11)
 - Key focus on symptoms, effects, and prevalence (n=44)

A further 19 protocols for ongoing reviews from the PROSPERO database are listed on page 26. These are protocols for reviews that do not appear to have a predominant focus on Long COVID. However, details in some sections of the protocols suggest that the reviews, when published, might provide some relevant findings.

Summary and scope for further evidence synthesis work

This document provides a brief and high-level overview of published and ongoing reviews related to Long COVID. It is clear from our scoping exercise that there exists a large number of published reviews on Long COVID, including one review of reviews and five living systematic reviews.

Existing reviews have mainly addressed the prevalence of persistent symptoms/effects following COVID infection and associated risk factors. We identified only a small number of published reviews that focused primarily on treatment and/or rehabilitation, but we did find multiple ongoing reviews on this topic. Ongoing reviews relate largely to symptom/effect prevalence and risk factors for Long COVID.

It is unlikely that this rapid scope of the literature identified all potentially relevant publications as we focused on a small number of sources and search terms. One key observation arising from our initial exploration of the evidence base relates to the heterogeneity in terminology used in the literature. Notably, a broad range of terms have been used in existing primary studies and reviews to describe symptoms/effects that persist beyond the acute stage of COVID infection. In addition to Long COVID, this also included terms such as post-acute COVID; Post-acute COVID-19 syndrome (PCS); Post COVID Syndrome; Post-Acute Sequelae of SARS-CoV-2 infection (PASC); Long haulers; chronic COVID syndrome; long-term COVID-19; persistent post-COVID; post-COVID symptoms; post-infectious COVID-19 and persistent symptoms in 'recovered patients'. As highlighted earlier, there also exists notable variation in how previous research has been operationalised, especially in terms of post COVID time frames of interest.

Considering the large number of existing and ongoing reviews, it is doubtful that further reviews on Long COVID at this stage would add substantially to the knowledge base. If there is a specific and focused research question that has not been addressed by existing or ongoing reviews, it would be possible to use our living systematic map to identify relevant primary research and determine the feasibility of undertaking a new review.

Table 1: Published reviews on Long COVID

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
Review of reviews			
1. de Araújo (Report in Portuguese) https://bit.ly/3oTKQO8	To identify the persistent clinical manifestations, sequelae or complications of COVID-19	11 systematic reviews	<i>Frequency of persistent symptoms or effects</i> This included shortness of breath; fatigue; cough; headache; memory loss; depression; post-traumatic stress disorder; anxiety
Living systematic reviews			
2. Domingo (Pre-Print) https://bit.ly/3l9i3Eq	To summarise studies reporting the frequency of symptoms, sequelae, and difficulties in conducting usual activities experienced by individuals living with post COVID-19 condition at four weeks or more after initial COVID-19 diagnosis	84	<i>Frequency of persistent symptoms or effects</i> Main focus on functional outcomes. This included fatigue; general pain or discomfort; shortness of breath; cognitive impairment; mental health symptoms
3. Hoshijima (Pre-Print) https://bit.ly/3FMgrZ1	To determine long-term symptoms in COVID-19 survivors after infection	35	<i>Frequency of persistent symptoms or effects</i> This included pain-related symptoms such as chest pain & headache; muscle weakness; fatigue; insomnia; shortness of breath; change in sense of smell
4. Michelen https://bit.ly/3oWQi33	To regularly synthesise evidence on long COVID characteristics, to help inform clinical management, rehabilitation strategies and interventional studies to improve long-term outcomes	39	<i>Frequency of persistent symptoms or effects</i> This included a range of physical and psychological signs & symptoms such as weakness; general malaise; fatigue; concentration impairment; shortness of breath; impact on quality of life; impaired pulmonary function <i>Risk factors for Long COVID</i>
5. O'byrne (Cochrane review) https://bit.ly/3nOxsM7	To assess the effects (benefits and harms) of interventions that have been used, or proposed, to treat persisting olfactory dysfunction (4 weeks or more) due to COVID-19 infection	1	<i>Treatment & rehabilitation</i> Olfactory function at baseline, 20 and 40 days after intervention (a 15-day course of oral steroids combined with nasal irrigation)
6. Webster (Cochrane review) https://bit.ly/3cNy1iV	To assess the effects (benefits and harms) of interventions that have been used, or proposed, to prevent persisting olfactory dysfunction due to COVID-19 infection	1	<i>Prevention</i> Olfactory function following intervention (intranasal steroid spray) in participants who had symptoms for less than 4 weeks
Standard systematic reviews/meta-analysis			
7. Ahmad https://bit.ly/3r75tcl	To analyse and review the currently available published literature related to long COVID, understanding its pattern, and predicting the long-term effects on survivors	20	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; pain; cough; change in sense of smell & taste; cardiovascular events; depression; anxiety; cognitive difficulties; sleep disorders; diarrhoea
8. Aiyegbusi https://bit.ly/3oTFsdS	To summarise the current evidence on symptom prevalence complications & management of long COVID & highlight priority areas for research	27	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; pain; change in sense of smell & taste; diarrhoea; cognitive impairment; sleep

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
			disorders; anxiety; impact on quality of life & employment; lived experience <i>Risk factors for persistent symptoms or effects</i> <i>Options for treatment & rehabilitation</i>
9. Akbarialiabad https://bit.ly/3nQsoH1	To synthesize what is known about persistent COVID-19, its signs and symptoms, its pathophysiology, and the current management recommendations	120 (not all primary research)	<i>Frequency of persistent symptoms or effects</i> Focused on general symptoms; cardiovascular; respiratory; musculoskeletal; neurologic; mental health <i>Risk factors for developing long COVID</i> <i>Nomenclature & diagnostic criteria</i> <i>Pathophysiology</i> <i>Options for treatment & rehabilitation</i>
10. Amdal https://bit.ly/3CVsXn8	To identify all relevant health-related quality of life (HRQoL) issues associated with COVID-19	339 (not all primary research). Included 16 studies on long COVID	<i>Frequency of persistent symptoms or effects</i> This included respiratory symptoms; fatigue; anxiety; depression; cognitive impairment; impact on quality of life
11. Anaya https://bit.ly/3rbwLPO	To report a case series of patients with Post COVID syndrome and conduct a systematic review and meta-analysis on the topic	40	<i>Frequency of persistent symptoms or effects</i> This included fatigue; muscle weakness; shortness of breath; pain & discomfort; anxiety/depression; cognitive impairment
12. Badenoch (Pre-print) https://bit.ly/32yovhP	To estimate the prevalence of neuropsychiatric symptoms in survivors of COVID-19	51	<i>Frequency of persistent symptoms or effects</i> This included sleep disturbance; fatigue; cognitive impairment; anxiety; post-traumatic stress
13. Behnood https://bit.ly/3DSELbl	To assess evidence on long-term post-COVID symptoms in children and young people examining prevalence, risk factors, type and duration	22	<i>Frequency of persistent symptoms or effects</i> This included cognitive impairment; headache; fatigue; diarrhoea; change in sense of smell <i>Risk factors for post-COVID symptoms</i>
14. Cabrera Martimbianco https://bit.ly/3HN7osN	To critically evaluate the available information on the frequency of long COVID-19 and the characteristics of its clinical manifestations	25	<i>Frequency of persistent symptoms or effects</i> This included chest pain; fatigue; shortness of breath; cough; cognitive & memory impairment; sleep disorders; functional impairment

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
			<i>Risk factors for the development of long COVID-19</i>
15. Cares-Marambio https://bit.ly/3HSrXE9	To determine the prevalence of respiratory symptoms in survivors of hospital admission after COVID-19 infection	10	<i>Frequency of persistent symptoms or effects</i> Focused on respiratory symptoms. This included fatigue; shortness of breath; chest pain; cough
16. Chakraborty https://bit.ly/3nZovij	To describe the prevalence of prolonged symptoms of COVID-19 post-recovery	11 related to post COVID	<i>Frequency of persistent symptoms or effects</i> This included fibrosis; cardiac abnormalities; cognitive & neurological impairment
17. Daroische https://bit.ly/3xvD416	To review the literature on cognitive impairment after COVID-19 infection	12	<i>Frequency of persistent symptoms or effects</i> Focused on global cognitive function; attention and executive function; memory; language & visuospatial function
18. d'Ettorre https://bit.ly/3xragqy	To assess both occurrence and risk factors for sequelae of COVID in recovered patients	13	<i>Frequency of persistent symptoms or effects</i> This included shortness of breath; fibrosis; neurological & cognitive impairment; anxiety; depression; post-traumatic stress <i>Risk factors for the development of post COVID syndrome</i>
19. De la Rosa-Martinez (Pre-Print) https://bit.ly/3cLNxSK	To summarize published data on Post-acute COVID-19 syndrome characterizing the clinical presentation, prevalence, and modifiers of prevalence estimates	29	<i>Frequency of persistent symptoms or effects</i> This included fatigue; weakness; shortness of breath; muscle pain; change in sense of smell & taste; cognitive impairment; anxiety; post-traumatic stress
20. Fahrani https://bit.ly/2ZsZrYs	To estimate the prevalence of persistent long COVID symptoms among COVID-19 survivors and to discuss the potential pathogeneses	14	<i>Frequency of persistent symptoms or effects</i> This included anxiety; depression; dizziness; chest pain; sleep disorders; hair loss; palpitations
21. Fernández-de-Las-Peñas (2021a) https://bit.ly/3HRQZ6g	To analyse the prevalence of post-COVID-19 symptoms in hospitalized and non-hospitalized patients recovered from COVID-19	33	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; cough; change in sense of smell & taste; joint pain
22. Fernández-de-Las-Peñas (2021b) https://bit.ly/3HN855n	To synthesize the prevalence of post-COVID headache in hospitalized and non-hospitalized patients recovering from SARS-CoV-2 infection	35	<i>Frequency of persistent symptoms or effects</i> Focused on headache pain at onset or hospital admission and 60 days, 90 days & 180 days or more after onset/discharge
23. Fernández-de-Las-Peñas (2021c) (Abstract only) https://bit.ly/3HQWoKN	To synthesize the prevalence of post-coronavirus disease (COVID) pain symptoms of musculoskeletal origin in hospitalized or nonhospitalized patients recovered from SARS-CoV-2 infection	33	<i>Frequency of persistent symptoms or effects</i> Focused on musculoskeletal pain at onset or hospital admission and 60 days, 90 days & 180 days or more after onset/discharge. Included post-COVID myalgia, joint pain and chest pain
24. Groff https://bit.ly/3r6Qe3d	To estimate the overall and organ system-specific frequency of post-acute sequelae of COVID-19	57	<i>Frequency of persistent symptoms or effects</i> This included chest imaging abnormality; difficulty concentrating; anxiety; functional impairment; fatigue; muscle weakness

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
25. Hayes https://bit.ly/3HWw5Tt	To conduct a systematic search of the published literature concerning long COVID symptoms and their prevalence	50	<i>Frequency of persistent symptoms or effects</i> This included shortness of breath; change in sense of smell; fatigue; anxiety; depression; post-traumatic stress; cognitive impairment
26. Huntley (Pre-Print) https://bit.ly/3lbo3MP	To define respiratory physiological and thoracic radiological sequelae / complications following SARS, MERS & COVID-19 infection	56, 27 of which focused on COVID-19	<i>Frequency of persistent symptoms or effects</i> Focused on pulmonary function; lung exercise capacity; radiological findings (x-ray, CT, MRI & ultrasound)
27. Iqbal https://bit.ly/30YJ99Y	To detail the prevalence of clinical features and identify potential predictors for acute and chronic post-COVID syndrome	43	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; sleep disorders <i>Risk factors for post-COVID symptoms</i>
28. Iwu https://bit.ly/3l7Aijk	To synthesise evidence on the long-term effects of the SARS-CoV-2 infection among survivors	11	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; cough; sleep disorders; depression & anxiety disorders; impact on daily living
29. Jennings (Pre-Print) https://bit.ly/3l8iYoA	To compare the two phases of long COVID, namely ongoing symptomatic COVID-19 (signs & symptoms from 4 to 12 weeks from initial infection) and post-COVID-19 syndrome (beyond 12 weeks) with respect to symptomatology, abnormal functioning, psychological burden, and quality of life	39	<i>Frequency of persistent symptoms or effects</i> This included fatigue; sleep disorders; shortness of breath; cough; chest imaging; cognitive impairment; anxiety; depression; impact on quality of life
30. Lindsay https://bit.ly/3cKdvzM	To synthesise the recommendations for returning athletes who have experienced long COVID symptoms	8	<i>Treatment & rehabilitation</i> Recommendations for managing “long-term effects” and “ongoing” or “prolonged” symptoms and COVID-19 complications among athletes
31. Long https://bit.ly/3xp5TMH	To explore existing data about post-acute COVID-19 Syndrome	16	<i>Frequency of persistent symptoms or effects</i> This included impaired lung function; fatigue; memory impairment; anxiety; depression; sleep disorders; shortness of breath
32. Lopez-Leon https://go.nature.com/3r7u5Sz	To estimate the frequency of symptoms, signs or abnormal laboratory parameters extending beyond the acute phase of COVID-19	15	<i>Frequency of persistent symptoms or effects</i> This included fatigue; headache; attention disorders; hair loss; shortness of breath
33. Malik https://bit.ly/3HWCvSz	To evaluate the pooled prevalence of poor quality of life in patients post COVID-19 . Also, to conduct a meta-regression to evaluate the effects of persistent symptoms and intensive care unit (ICU) admission on the poor quality of life	12	<i>Frequency of persistent symptoms or effects</i> This included impaired quality of life; fatigue; shortness of breath; change in sense of smell; sleep disorders; mental health
34. Mejía-Zambrano https://bit.ly/3l8BQUC	To determine radiological and functional pulmonary complications in	19	<i>Frequency of persistent symptoms or effects</i> Focused on pulmonary function and CT scan findings

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
	patients recovered from COVID-19		
35. Nasserie https://bit.ly/3p31ATg	To examine the frequency and nature of persistent symptoms after COVID-19 infection	45	<i>Frequency of persistent symptoms or effects</i> This included shortness of breath; fatigue or exhaustion; sleep disorders; change in sense of smell & taste; cough; anxiety; depression; cognitive impairment; impact on quality of life
36. Poudel https://bit.ly/3nPK1Xl	To assess the impacts of COVID-19 on health-related quality of life and explore the risk factors for reduced HRQoL of COVID-19 patients	12 (11 had data on long COVID)	<i>Frequency of persistent symptoms or effects</i> Focused on health-related quality of life (HRQoL) and persistent physical & mental symptoms. Comparison of the HRQoL of acute COVID & long COVID patients <i>Risk factors for reduced HRQoL in long COVID</i>
37. Ramadan https://bit.ly/3xri93o	To assess the range of cardiac sequelae after COVID-19 recovery	35	<i>Frequency of persistent symptoms or effects</i> Focused on cardiac abnormalities & related symptoms such as pain; shortness of breath
38. Rao https://bit.ly/3OWw7K8	To evaluate the prevalence of fatigue in post-recovery from SARS-CoV-2 infection	41	<i>Frequency of persistent symptoms or effects</i> Focused on persistent fatigue <i>Risk factors/predictors for post COVID fatigue</i>
39. Renaud-Charest https://bit.ly/3xo3yRR	To determine the frequency of depressive symptoms and clinically significant depression more than 12 weeks following SARS-CoV-2 infection	8	<i>Frequency of persistent symptoms or effects</i> Focused on depressive symptoms <i>Risk factors for depression in post-COVID-19 syndrome</i>
40. Salamanna https://bit.ly/3DXwbba	To assess the current evidence on the long-term symptoms in COVID-19 patients	145 (not all primary research)	<i>Frequency of persistent symptoms or effects</i> This included lung function impairment; neurological effects; change in sense of smell & taste; fatigue; shortness of breath
41. Sanchez-Ramirez https://bit.ly/3FQy3mr	To explore post COVID-19 effects on patients	24	<i>Frequency of persistent symptoms or effects</i> This included CT abnormalities; lung function impairment; fatigue; shortness of breath; impact on health-related quality of life; ability to return to work
42. Sandler https://bit.ly/3r6a5Qh	To conduct a systematic review on the emerging data on the epidemiology of fatigue after COVID-19 infection	21	<i>Frequency of persistent symptoms or effects</i> Focused on persistent fatigue and functional outcomes such as return to work <i>Risk factors for post COVID fatigue</i>
43. Schou https://bit.ly/3p32IX0	1) To provide an overview of the current evidence of psychiatric complications in long-COVID after primary symptoms of acute	66	<i>Frequency of persistent symptoms or effects</i>

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
	COVID-19 have ceased. 2) To identify risk factors and molecular mechanisms which could give rise to psychiatric symptoms		Focused on psychiatric & neuropsychiatric effects including anxiety; depression; post-traumatic stress; cognitive impairment; fatigue; sleep disorders <i>Risk factors for psychiatric & neuropsychiatric complications</i>
44. Shanbehzadeh https://bit.ly/32DIM6V	To review studies that evaluated physical and mental health problems post-COVID-19	34	<i>Frequency of persistent symptoms or effects</i> This included fatigue; pain; joint stiffness; impaired physical capacity & daily functioning; anxiety; depression; post-traumatic stress
45. So https://bit.ly/30Wx8BW	To clarify the characteristics of radiological and functional lung sequelae of COVID-19 patients described in the follow-up period after COVID-19	15	<i>Frequency of persistent symptoms or effects</i> Focused on CT scan findings and pulmonary function
46. Soriano-Moreno (Conference abstract) https://bit.ly/3nPJncq	To summarize what is known about long term sequelae among patients who were hospitalized for severe COVID-19 pneumonia	12	<i>Frequency of persistent symptoms or effects</i> This included shortness of breath; cough; joint pain; myalgia; headache; chest pain <i>Risk factors for persistent symptoms</i>
47. Torres-Castro https://bit.ly/3l6Njni	To determine the prevalence of restrictive pattern, obstructive pattern and altered diffusion in patients post-COVID-19 infection and to describe the different evaluations of respiratory function used with these patients	7	<i>Frequency of persistent symptoms or effects</i> Focused on pulmonary function
48. Van Kessel https://bit.ly/3HVViewU	To create an overview of the nature and frequency of persistent symptoms experienced by patients after mild COVID-19 infection	9	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; cough; chest pain; headache; impaired mental and cognitive status; olfactory dysfunction; ability to work and daily functioning
49. Webber https://bit.ly/3nNa9SN	To synthesize outpatient rehabilitation assessment and treatment recommendations for adults in post-acute COVID-19 stages	48	<i>Treatment & rehabilitation</i> Focused on 1) the processes used to develop rehabilitation recommendations 2) recommended outcomes/outcome measures and treatments for patients experiencing post-acute signs and symptoms related to COVID-19
50. Willi https://bit.ly/30XVXh1	To evaluate the available evidence of all intermediate and long-term COVID-19 sequelae affecting formerly healthy adults	31	<i>Frequency of persistent symptoms or effects</i> This included fatigue; shortness of breath; decreased quality of life; impaired pulmonary function; cardiac abnormalities
51. Wong https://bit.ly/3raB0dM	To conduct a systemic review of the research available into the symptomatology of long COVID, and compared them with known	21 including 5 case reports	<i>Number of long COVID symptoms reported by the included studies compared to ME/CFS symptoms.</i>

First Author	Aim(s) of review	Number of included studies /publications	Outcomes reported*
	symptoms of myalgic encephalomyelitis/ chronic fatigue syndrome (ME/CFS)		Symptoms/effects examined including: fatigue; reduced daily activity; post-exertional malaise; neurologic symptoms/pain; neurocognitive/ psychiatric; neuroendocrine; autonomic manifestations

* Not all the symptoms/effects reported in each review are listed in the table. NB: The full reference for all published reviews is provided in Appendix 1, page 32.

Table 2: Protocols in the PROSPERO database for reviews related to Long COVID, which are reported to be completed but not yet published.

First Author	Protocol title	Review question(s)	Population/Follow up	Main outcome of interest
52. Bal https://bit.ly/3l7Op45	COVID-19 disease severity to predict persistent symptoms: A systematic review and meta-analysis	1) How does disease severity affect the prevalence rates and risk of persistent symptoms amongst COVID-19 patients? 2) Does the severity of the disease change the risk of symptoms for up to 12 weeks post-COVID-19 infection and beyond?	Post COVID patients with persistent symptoms at least 1 month after hospital admission /symptom onset or 3 weeks after hospital discharge	Prevalence of persistent symptoms in patients with differing outcomes following COVID infection Risk of developing persistent symptoms in patients with differing outcomes following COVID infection
53. Ceban https://bit.ly/30Ovan7	Fatigue and cognitive impairment in post-COVID-19 syndrome: a systematic review and meta-analysis	1) What is the incidence of fatigue and cognitive impairment following COVID-19 infection? 2) Do individuals exhibit elevated markers of inflammation 12+ weeks following COVID-19 infection? 3) Do individuals exhibit functional impairment 12+ weeks following COVID-19 infection?	Diagnosed COVID patients. Median/mean follow-up of 12+ weeks since COVID diagnosis	Incidence rates of fatigue and cognitive impairment Levels of inflammatory parameters and prevalence of functional impairment (including activity, occupational, & social limitations; quality of life)
54. Dal Curtivo dos Passos https://bit.ly/2ZjYhOJ	Persistent sensory symptoms in COVID-19 patients. A systematic review	What is the profile of patients with COVID-19 who have lasting symptoms of loss of smell and taste?	Diagnosed COVID patients with lasting symptoms of smell and taste loss	Prevalence of persistent symptoms relating to loss of taste and smell
55. Jones https://bit.ly/3lqkAdF	A systematic review of the prevalence of long-term symptoms and clinical manifestations that may	To quantify the prevalence of long-term symptoms and clinical manifestations of COVID-19 that have the	Patients more than 4 weeks post-diagnosis of COVID and not showing evidence of active infection	Prevalence of persistent symptoms with the potential to impact physical activity (e.g. fatigue, myalgia, joint pain, malaise, dyspnoea)

	impact (return to) physical activity in people following active COVID-19 infection	potential to impact (return to) physical activity		Prevalence of persistent clinical manifestation with the potential to impact physical activity (e.g./ changes to the cardiovascular, respiratory, metabolic, endocrine, immune, renal, musculoskeletal & nervous systems)
56. Kim https://bit.ly/3CLr8sP	Usage of complementary and alternative medicine for COVID-19: a systematic review of observational studies	To assess usage of complementary and alternative medicine (CAM) interventions for COVID-19 patients worldwide	Individuals diagnosed with COVID acute infection or with long COVID status	Prevalence of CAM intervention usage among patients with acute COVID-19 infection or long COVID
57. Macdonald https://bit.ly/3CNb360	Exploring people's lived experience of Long COVID: a systematic review	What are people's lived experiences of long covid symptoms?	Adults who speak about or reflect on their lived experience of long COVID symptoms	Views, impact, and lived experience of people who experience symptoms of long COVID
58. Park https://bit.ly/3l4zyG2	Lung function and chest CT findings after recovery from COVID-19: systematic review and meta-analysis	How common are sequelae after recovery from COVID-19, demonstrated by pulmonary function tests or chest CT scans?	Diagnosed COVID patients, who have recovered from acute infection	Prevalence of persistent pulmonary sequelae. e.g. diffusion restriction, lung fibrosis & other radiographic lesions
59. Premraj https://bit.ly/3l09Pyn	Neurological and neuropsychiatric manifestations of post-COVID-19 syndrome: a meta-analysis	What are the symptoms of neurological/ neuropsychiatric symptoms of post-COVID-19 syndrome and their prevalence in hospital and community cohorts?	Patients who experience effects of COVID 12 weeks after the initial illness	Prevalence of persistent of neurological/ neuropsychiatric symptoms
60. Rungjirajittranon https://bit.ly/3xhV1A1	Thrombotic and hemorrhagic incidences in patients after discharge from COVID-19 infection: a systematic review and meta-analysis	To assess thrombotic and hemorrhagic incidences in patients after discharge from COVID-19 infection	Patients discharged from COVID hospitalization	Incidence of VTE (venous thromboembolism), bleeding, mortality after discharge

Protocols of ongoing reviews related to Long COVID from the PROSPERO database

The following records are protocols for reviews tagged in the PROSPERO database as currently ongoing. The records are organised below by type of review and then by primary focus.

Review of Reviews

1. Paterson et al. What are the longer-term holistic health consequences of COVID-19 among survivors? An umbrella systematic review protocol.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021284508

Review question(s): Among COVID-19 survivors, what are the physical, psychological, social, and spiritual impacts of the illness which extend beyond the acute phase?

Living reviews

Treatment & rehabilitation

2. Décary et al. A living systematic review of care models for long COVID/post COVID-19 condition. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021282266

Review question(s): What is the best-available evidence about care models for long COVID (e.g. care pathways, structured clinics)?

3. Godbolt et al. Post covid - treatment and rehabilitation. Living review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021276717

Review question(s): What treatment and rehabilitation are effective for symptoms of post COVID?

Symptoms, effects & prevalence

4. O'Mahoney et al. A living systematic review of the prevalence and long-term health effects of ongoing symptomatic COVID 19 and post COVID 19 syndrome among hospitalised and non-hospitalised patients by age, sex, ethnicity and deprivation.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021238247

Review question(s): 1) What is the overall prevalence of ongoing symptomatic COVID 19 and post COVID 19 syndrome and associated health complications among hospitalised and non-hospitalised patients? 2) What is the prevalence of ongoing symptomatic COVID 19 and post COVID 19 syndrome and associated health complications among hospitalised and non-hospitalised patients when stratified by age, sex, ethnicity and deprivation?

5. Rycroft et al. A living systematic review of the impacts of COVID-19 on the health-related quality of life across Black, Asian and minority ethnic (BAME) groups.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021238645

Review question(s): 1) What is the impact of COVID-19 on the health-related quality of life among BAME groups? 2) How does the impact of COVID-19 on health-related quality of life differ across BAME groups? 3) What is the relationship between the reported secondary diagnosis of COVID-19 and impact of the health-related quality of life among BAME groups?

NB: Population of interest is people of a BAME ethnicity with active COVID-19 or who had recovered; both primary research studies and systematic reviews will be included.

6. Welsh et al. Long term COVID-19 (Long COVID) in children and young people: a living systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020226624

Review question(s): 1) What is the prevalence of Long COVID in children and young people? 2) What symptoms and symptom patterns are seen in Long COVID in children and young people? 3) What are the physical, psychological, and social consequences of Long COVID in children and young people? 4) What are the lived experiences of children and young people, and their families? 5) What are the prognostic factors associated with the development and adverse outcomes of Long COVID (in terms of duration, severity and impact)?

Standard systematic reviews

Health & economics

7. Campbell et al. Predictors of COVID-19 outcomes: an individual participant meta-analysis:

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020224323

Review question(s): 1) What are the long-term outcomes of people after COVID-19 in relation to the ICF (International Classification of Functioning, Disability and Health)? 2) What are the predictors of long-term outcomes? 3) What are the direct and indirect costs associated with long-COVID-19?

8. Ceban et al. The global economic burden of COVID-19: a systematic review and meta-analysis of national DALYs.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021274063

Review question(s): (1) What is the pooled global disability-adjusted life years (DALYs) estimate of COVID-19? (2) What are the most notable socioeconomic implications and productivity losses associated with COVID-19 sequelae in different regions of the world?

NB: Population of interest is individuals with symptoms persisting beyond the resolution of the acute phase, defined as at least 4 weeks following initial diagnosis (long COVID).

9. Thompson et al. The burden of long COVID: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021288753

Review question(s): This systematic review aims to identify and summarise available evidence on the burden of long COVID. This aim is to understand the prevalence, morbidity and mortality associated with long COVID, including the economic impact and indirect costs.

Treatment & rehabilitation

10. Cardoso da Silva et al. Physical exercise with post-COVID-19 syndrome in older adults: systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021270400

Review question(s): What are the effects of physical exercise on older adults affected by COVID-19?

11. Chandan et al. Post-viral syndromes: a systematic review of symptoms, health impacts, treatments and their implications for the management of Long COVID.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021282074

Review question(s): This systematic review will (1) summarise the symptoms and health impacts (clinical complications and impacts on quality of life and work capability) of previous post-viral

syndromes that follow acute infections (2) summarise evidence on non-pharmacological treatments for previous post-viral syndromes and long COVID.

NB: Protocol indicates that both primary research studies and secondary analyses including systematic reviews will be included.

12. Lopes Sauers et al. Rehabilitation outcome measures used in patients with post COVID-19 syndrome: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021286714

Review question(s): a) What rehabilitation outcome measures have been used in the literature in patients with post COVID-19 syndrome? b) Are the outcome measures used in these studies consistent with the American Physical Therapy Association (APTA) COVID-19 core outcome measures recommendations? c) What are the measurement properties of the outcome measures used in patients who underwent rehabilitation for post COVID-19 syndrome?

13. Mandini et al. Physical activity for the management of anxiety and depression in adults and elderly subjects: systematic review and meta-analysis for the application in long COVID-19 patients. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021254823

Review question(s): Could a physical activity program be effective in reducing anxiety and depression in long-Covid-19 affected individuals?

14. Marotta et al. Effects of rehabilitation on reduction of post-COVID-19 fatigue: a systematic review. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021284058

Review question(s): Not stated.

15. Marshall-Andon et al. A Systematic Review of Post-COVID-19 Rehabilitation Guidelines. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021236049

Review question(s): What do available clinical guidelines recommend for the rehabilitation of patients following COVID-19?

16. Nna et al. Long COVID: A protocol for a systematic review and meta-analysis of symptomatology and treatment approaches.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021236457

Review question(s): a) What are the pooled prevalences of various symptoms of long COVID? b) What are the various reported treatment approaches to long COVID? c) How do factors such as geographic location, race, age, social class, and gender influence symptoms of and treatments to long COVID?

17. Ruberti et al. Recommendations for the respiratory rehabilitation of discharged COVID-19 patients. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021254192

Review question(s): What are the recommendations and best respiratory rehabilitation treatment for post COVID-19 patients? What is the gold standard of respiratory rehabilitation in patients with pulmonary sequela?

18. Sepúlveda-Loyola et al. Physical rehabilitation in adults with post-COVID syndrome on important clinical outcomes: systematic review and metanalysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021259740

Review question(s): What is the effect of physical rehabilitation in patients with Post-COVID syndrome on important clinical outcomes?

19. Servais et al. Systematic review on the role of physical therapy and rehabilitation management for patients with COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021245320

Review question(s): What is the role of physical therapy and rehabilitation management in patients with COVID-19 ?

NB: Population of interest is COVID-19 patients at any stage of the disease.

20. Sharma et al. Recent advances in chest rehabilitation among individuals with COVID-19: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021284940

Review question(s): Are chest rehabilitation techniques effective in managing COVID-19?

21. Silva et al. Effects of inspiratory muscle training on Post-COVID-19 syndrome.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021261507

Review question(s): Is inspiratory muscle training effective compared to placebo for increasing ventilatory muscle strength, functional capacity, and quality of life in patients with Post-COVID-19 syndrome?

22. Zhang et al. The effectiveness of respiratory rehabilitation for patients with coronavirus-related pneumonia (COVID-19, SARS, MERS): a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020202011

Review question(s): Which respiratory rehabilitation approaches are effective in improving the health status of COVID-19 patients?

Risk factors; risk factors & prevalence

23. Bachion et al. Fatigue predictors in adults and elderly after the acute phase of COVID-19: systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021272377

Review question(s): What factors predict fatigue in adults and elderly individuals after the acute phase of COVID-19?

24. Caminiti et al. Prognostic factors for persistent symptoms and quality of life after hospitalization for COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021253467

Review question(s): In patients hospitalized for COVID-19, which factors, already present or emerging during hospitalization, are associated with an increased risk of exhibiting new or persisting symptoms, worse quality of life and worse psychosocial health beyond 12 weeks?

25. Hahne et al. Pre-existing autoimmune and allergic diseases as risk factors for Long-COVID symptoms: protocol for a rapid review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021247612

Review question(s): Are pre-existing autoimmune and allergic diseases risk factors for Long-COVID symptoms?

26. Hamada et al. Risk of admission among COVID-19 patients after initial acute episode of COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021244348

Review question(s): 1) What are the rates and risk of admission among COVID-19 patients after the index episode of COVID-19? 2) What are the risk factors for admission after recovery from the index episode?

27. Hu et al. Risk factors for hospital readmission among discharge patients with COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021272310

Review question(s): 1) What are the estimates for readmission rate following hospitalisation for COVID-19? 2) What are the characteristics and risk factors for those participants who are readmitted compared to those who are not readmitted?

NB: Discharge duration of interest is within 14, 30, 60 and 60+ days.

28. Narain et al. Characterizing the relationship between Long COVID, inflammation and mood disorders: a systematic review

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021257503

Review question(s): What is the relationship of Long COVID to mood disorders and inflammation?

29. Pillay et al. Risk factors and preventive interventions for post-COVID-19 condition: protocol for systematic reviews.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021270354

Review question(s): 1) Among people who have had COVID-19, what are the associations between pre-existing and clinical risk factors and development of post-COVID-19 condition? 2) Among people in the acute (symptom onset to 4 weeks) or early post-acute phase (4-8 weeks) of COVID-19 what are the effects of interventions to prevent post-COVID-19 condition?

30. Thung Sen et al. Systematic review and meta-analysis of post-acute COVID-19 symptoms and risk based on infection severity.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021241778

Review question(s): 1) What are the rates of post-acute COVID-19 symptoms and pathological changes? 2) How does the risk differ between mild-moderate COVID-19 cases to severe-critical cases? 3) Are there difference across the life-span/age spectrum, i.e., children vs adults vs elderly?

31. Zakia et al. Systematic review and meta-analysis of prevalence and risk factors for psychiatric symptoms in long COVID patients

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021240776

Review question(s): 1) What is the prevalence of psychiatric symptoms (depression, anxiety, PTSD, and others) in long COVID patients? 2) What are the risk factors of psychiatric symptoms (depression, anxiety, PTSD, and others) in long COVID patients?

32. Zhang et al. The prevalence, incidence, risk factors and clinical outcome of neuropsychiatric complications associated with SARS-CoV-2: systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021245371

Review question(s): 1) What is the prevalence and incidence of neuropsychiatric complications following SARS-CoV-2? 2) What are the main risk factors associated with neuropsychiatric complications following SARS-CoV-2? 3) What is the clinical outcome of neuropsychiatric complications following SARS-CoV-2?

33. Zheng et al. Prevalence of and risk factors for post-COVID breathlessness in COVID-19 survivors: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021285733

Review question(s): 1) To determine the prevalence of post-COVID breathlessness in COVID-19 survivors by different follow-up lengths, population characteristics and methodological approaches. 2) To determine the risk factors or mechanisms of post-COVID breathlessness. 3) To investigate the therapies for the prevention or treatment of post-COVID breathlessness.

Symptoms, effects & prevalence

34. Alves et al. Sleep quality post-covid-19: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021279192

Review question(s): Can COVID-19 infection lead to changes in the quality of sleep of individuals after infection?

35. Austhof et al. Symptom profile, frequency, duration, and severity of post-acute and chronic sequelae of COVID-19: a rapid systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021278166

Review question(s): To determine the prevalence, frequency, duration, and severity of post-acute and chronic sequelae after COVID-19 infection.

36. Ávila Cabral et al. Long-term impact of COVID-19 on executive functions: A systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021262961

Review question(s): 1) What is the prevalence of neurocognitive disorders and neurologic manifestations that affect executive functions in post-COVID-19 syndrome patients? 2) How does neurologic manifestations during ongoing symptomatic COVID-19 correlates with executive functions impairment in post-COVID-19 syndrome?

37. Awan et al. What is the lived experience of long COVID in ethnic minorities in the UK? A systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021266236

Review question(s): What is the lived experience of long COVID in ethnic minorities in the UK?

38. Ayuzo-del-Valle et al. Long-term effects of COVID-19 in Children : A systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021275408

Review question(s): 1) What is the prevalence of long-term effects of COVID-19 in Children? 2) What are the long-term effects of COVID-19 in children?

39. Baye et al. The global prevalence of pulmonary fibrosis among post-COVID-19 follow-up patients.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021275832

Review question(s): Is pulmonary fibrosis prevalent among post-COVID-19 follow-up patients?

40. Bezerra da Silva Maciel et al. Prevalence of gastroenterological symptoms in survivors of coronavirus disease 2019 (COVID-19): a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021269492

Review question(s): To determine the prevalence of persistent gastrointestinal symptoms after hospital admission for COVID-19.

41. Bikkannavar et al. Prevalence and characteristics of headache associated with SARS-CoV-2 infection: a systematic review, meta-analysis and discussion.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235146

Review question(s): 1) What is the prevalence of headache attributed to SARS-CoV-2 infection, including in Long COVID? 2) What are the characteristics/categories of these headaches? 3) What is the prevalence of different categories of headaches attributed to SARS-CoV-2 infection, including in Long COVID?

42. Cavalini et al. A systematic review and meta-analyses exploring the main symptoms and mental health of long-term COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021265259

Review question(s): 1) What are the main skeletal muscle, neurological, and/or physical disorders of long-term COVID-19? 2) What are the common symptoms amongst acute COVID-19 and long-term

COVID-19? 3) What are the main mental health outcomes in long-term COVID-19? 4) What are the main pain symptoms in long-term COVID-19? 5) What is the current treatment that has been offered to these patients?

43. Chaurasia et al. Oral manifestations in COVID-19 infection: a systematic review and meta-analysis. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021273982

Review question(s): 1) What are the oral signs and symptoms reported in COVID-19 disease? 2) What are the most common oral signs and symptoms in COVID-19 disease? 3) Does age, sex and severity of COVID-19 disease affect the oral manifestations? 4) How frequently have oral signs and symptoms been reported in symptomatic COVID-19 patients having mild to severe forms of the disease? 5) Are oral signs and symptoms reported in post-COVID-19 patients?

44. Crivelli et al. Cognitive consequences of COVID-19: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243026

Review question(s): To evaluate cognitive impairment after SARS-CoV-2 infection in persons with or without pre-pandemic cognitive impairment.

NB: Population of interest is post COVID-19 infected adults.

45. Cruickshank et al. What is the impact of long term COVID-19 on workers in healthcare settings? A rapid review of current evidence.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021288181

Review question(s): The objective of this systematic rapid review is to assess the effects of long COVID among healthcare workers and its impact on their self-reported health status, professional working lives, personal circumstances and use of health services.

46. Cuba-Fuentes et al. A systematic review of the frequency of long-term patient-reported constitutional and respiratory symptoms related to COVID-19: a new long COVID syndrome?

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020208154

Review question(s): What is the frequency of long-term constitutional and respiratory symptoms related to COVID-19 infection?

47. Dassanayakege et al. Post COVID-19 outcomes of older people: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021287503

Review question(s): 1) What are the prevalence of acute post COVID-19 outcomes of older people? 2). What are the prevalence of chronic post COVID-19 outcomes of older people?

48. Delanerolle et al. A systematic review exploring the prevalence of autonomic dysfunction amongst COVID-19 patients

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235351

Research question: 1) What is the prevalence of autonomic dysfunction amongst COVID-19 patients? 2) What is the prevalence of autonomic dysfunction amongst SARS and MERS patients? 3) What are the common autonomic dysfunction denominators across MERS vs. SARS vs. COVID-19? 4) What is the prevalence of Neuropsychiatric outcomes amongst COVID-19 vs MERS vs SARS patients? 5) What are the autonomic parameters affected? 6) What are the current treatments offered to these patients?

49. Deng et al. The prevalence of long-term effects of COVID-19: a systematic review and prevalence meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021266569

Review question(s): For patients with long-term complications from COVID-19, what is the prevalence of each type of complication?

50. Di Matteo et al. COVID syndrome: symptoms and stratified follow up. A systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021283689

Review question(s): How many studies have considered post COVID 19 follow-up and what symptoms and timing have they investigated?

51. Divakaruni et al. Prevalence of gastrointestinal manifestations in COVID-19 cases - a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021278999

Review question(s): 1) What is the prevalence of gastrointestinal manifestations in COVID19 cases? 2) Is there any difference of prevalence of GI manifestations of COVID19 according to age, health status, vaccination status, country? 3) Is there any relation between severity of GI symptoms and carrier status, prolonged COVID19 symptoms, multi system inflammatory disorder, ICU admissions, severity of COVID19, the spread of COVID19?

52. Firdaus et al. Respiratory and neuropsychiatry sequelae in post COVID-19 condition: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021274568

Review question(s): 1) What are the clinical manifestation and profile (laboratory, radiological and functional) of Post COVID-19 condition associated with sequelae in the respiratory and neuropsychiatry system among adults? 2) What are the predisposing condition or risk factors of Post COVID-19 condition associated with sequelae in the respiratory and neuropsychiatry system among adults?

53. Gesser et al. Functioning, fatigue and quality of life in survivors of critical COVID-19 cases after hospital discharge: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021258356

Review question(s): What are the short and long-term impairments to functioning, fatigue and quality of life in survivors of critical COVID-19 cases after hospital discharge?

54. Htet et al. Long term clinical outcomes among survivors of ICU admitted COVID-19 patients 3 months and beyond: A systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021277961

Review question(s): 1) What are the clinical outcomes among survivors of critically ill COVID-19 patients, 3 months and beyond? 2) What are the factors associated with the outcomes among survivors of critically ill COVID-19 patients, 3 months and beyond? 3) Is there a correlation between the severity of illness with clinical outcome 3 months and beyond among survivors of critically ill COVID-19 patients?

55. Jamal et al. Prolonged post COVID-19 symptoms: A systematic review and dental considerations in COVID-19 recovered patients with prolonged symptoms.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235714

Review question(s) What are the prolonged symptoms of COVID-19

NB: Protocol indicates that both primary research studies and systematic reviews will be included.

56. Karki et al. Long term complication associated with SARS-CoV-2 infections: A systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021262334

Review question(s): What are the long-term health complications associated with SARS-CoV-2 infection?

57. Kuodi et al. Characterisation of the long-term physical, mental and social health impacts of SARS-COV-2 infection: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021265890

Review question(s): What are the long-term physical and psychosocial health impacts of SARS-COV-2 infection?

58. Livingstone et al. Long-COVID: pulmonary sequelae.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021272625

Review question(s): Broadly we are investigating long-COVID and the pulmonary effects that come with this. In particular, the area of pulmonary effects will be broken down into 3 sub-categories of 1 - symptoms (dyspnoea, shortness of breath etc), 2 - pulmonary imaging and their findings and 3 - measurements of respiratory function (i.e. spirometry, 6 minute walk test). We hope to explore these categories to provide a better understanding of pulmonary sequelae in long-COVID patients

59. Lui et al. The impact of post-COVID-19 syndrome on function and quality of life: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021274305

Review question(s): Which cluster symptom of post-COVID-19 syndrome has the greatest effect on function, and quality of life?

60. Mendes da Silva et al. Prevalence of symptoms in post-COVID-19 syndrome in adults after six months of infection: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021262759

Review question(s): What is the prevalence of persistent symptoms in individuals with post-COVID-19 syndrome after six months of infection?

61. Middleton et al. Patient-reported respiratory outcome measures in the recovery of adults hospitalised with COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021242134

Review question(s): What is the respiratory symptomatic and functional recovery of patients with COVID-19 more than 8 weeks after hospitalisation?

62. Nersesjan et al. Delayed post-hypoxic leukoencephalopathy in COVID-19: a systematic review. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232753

Review question(s): In COVID-19 patients with an evident hypoxic event, followed by an intermittent recovery period and subsequent neurological and/or psychiatric deterioration with brain-MRI showing symmetric subcortical T2-hyperintensive lesions (P) is the overall disease course (I) compatible with previous described cases of delayed post-hypoxic leukoencephalopathy (DPHL) (C) or does the disease course in COVID-19 patients differ significantly?

NB: Protocol indicates that both primary research studies and reviews/meta-analyses will be included.

63. Noormahomed et al. Post-COVID-19 complications and sequelae in HIV infected and uninfected patients: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021260056

Review question(s): Are the complications and sequelae after COVID-19 infection more prevalent and severe in HIV infected patients than in HIV uninfected patients?

64. Nursanti et al. Global prevalence of persistence prolonged complication among COVID-19 survivors: a meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021251900

Review question(s): What is the pooled estimated prevalence of prolonged complication among COVID-19 survivors, including dizziness, chest pain, sleep difficulty, palpitation, weight loss, and hair loss, fatigue, hallucination?

65. Organ et al. The prevalence of Long COVID-19 symptoms among people with neurodevelopmental disorders (NDD) and/or mental illnesses.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021231279

Review question(s): The aims of this search are to summarise: 1) The prevalence of Long COVID-19 symptoms among people with Neurodevelopmental disorders (NDD) such as Intellectual disability, autism etc and/or mental illnesses following infection with COVID-19. 2) Sub analysis of the

prevalence of neuropsychiatric symptoms experienced by people with NDD and/or mental illnesses and disorders following COVID-19 infection.

NB: Protocol indicates that both primary research studies and meta-analyses will be included.

66. Pan et al. The relationship between ethnicity and Long-COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020220981

Review question(s): To investigate the relationship between ethnicity and long-COVID-19.

67. Plentz et al. Pulmonary function, quality of life and functional capacity post COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021278807

Review question(s): 1) What is the impact on pulmonary function in post-COVID-19 patients? 2) What is the level of functional capacity of post-COVID-19 patients? 3) What is the status of the quality of life of post-COVID-19 patients?

68. Posso et al. The upcoming wave: clinical outcomes and sequelae in COVID-19 survivors: a systematic review and meta-analyses.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021262688

Review question(s): What are the long-term clinical outcomes or sequelae in adults (>18 years) following COVID-19 recovery?

69. Ramos et al. Long-term outcomes and resource utilization after intensive care unit discharge for survivors of epidemic viral pneumonias: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021190296

Review question(s): What are the long-term outcomes and resource utilization of survivors from critical illness due to epidemic viral pneumonias (SARS, MERS, H1N1 and COVID-19)?

70. Rodrigues et al. Adult prevalence and characteristics of muscle pain and joint pain associated with SARS-CoV-2: a systematic review, meta-analysis, and critical appraisal.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021244419

Review question(s): 1) What is the prevalence of muscle pain and joint pain on COVID-19 cases globally? 2) Is there a difference in frequency and severity of muscle pain and joint pain between genders affected by COVID-19? 3) Is there a difference in the age of COVID-19 patients who report muscle and joint pain? 4) Did the patients use any medication to treat muscle and joint pain? 5) Whether muscle pain and joint pain are symptoms that remain after COVID-19 infection?

71. Sliwka et al. Post-COVID-19 symptoms in adults with asthma.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021242960

Review question(s): 1) What are the long term (lasting ≥ 12 weeks) symptoms caused by SARS-CoV-2 infection amongst patients with asthma? 2) Are the long term (lasting ≥ 12 weeks) symptoms caused by SARS-CoV-2 in patients diagnosed with asthma different than in patients without asthma? 3)

What does the evidence tell us about long-term consequences for the pulmonary function, asthma symptoms, intensity of pharmacological treatment, physical fitness and depressive symptoms of adults with asthma after SARS-CoV-2 infection? 4) Does the asthma control before SARS-CoV-2 infection influence the disease severity, pulmonary function and severity of long-term symptoms after infection? 5) Does the severity of acute SARS-CoV-2 infection influence the pulmonary function and long term symptoms?

72. Tabar et al. Long-term moderate to severe complications of COVID-19 infection since 2019 to date; a protocol for systematic review and/or meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021240027

Review question(s): To study the long-term moderate to severe complications of COVID-19 infection Since 2019 to date in patients of all ages who developed COVID-19.

73. Tan et al. Prognosis of smell and taste recovery in COVID-19 patients: a systematic review and one-stage meta-analysis of individual patient time-to-event data.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021283922

Review question(s): 1) What is the percentage of COVID-19 patients with olfactory/gustatory dysfunction who recover their sense of smell/taste? 2) What percentage of patients develop persistent olfactory/gustatory dysfunction? 3) What is the time-to-recovery of smell/taste? 4) What are the prognostic factors in association with time-to-recovery or extent of recovery of smell/taste?

74. Uribe et al. Psychiatric and neuropsychiatric signs and symptoms in patients with SARS-CoV-2 (COVID-19) infection, in the resolution phase: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021247057

Review question(s): What symptoms and signs of psychiatric and neuropsychiatric disorders may appear after the resolution of infection by SARS-CoV-2/COVID-19?

75. Velichkovsky et al. Cognitive deficits and impairments after COVID-19: systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021288003

Review question(s): What are cognitive impairments in people reconvalescent from COVID-19 in comparison to healthy controls?

76. Woodrow et al. The prevalence of long COVID: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020218351

Review question(s): What is the prevalence of prolonged symptoms and/or functional disability and/or new pathology following SARS-CoV2 infection among all people infected?

77. Xu et al. Post-COVID-19 pain burden and quality of life in COVID-19 patients: a meta-analysis and systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021272800

Review question(s) This pooled analysis aims to investigate the prevalence of pain related symptoms in patients after acute phase of COVID-19. Impact of COVID-19 on the quality of life and pain symptom among these populations in post-acute phase will also be evaluated.

Other reviews that may report relevant findings on Long COVID

The following protocols are for reviews that do not appear to have a predominant focus on long/post COVID. However, details in some sections of the protocols suggest that the reviews, when published, might provide some relevant findings.

Review of Reviews

1. Weir et al. An umbrella review and meta-analysis of the use of renin-angiotensin system drugs and COVID-19 outcomes: what do we know so far?

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021233398

Review question(s): What effect do angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) have on COVID-19 related outcomes?

Outcomes of interest: Includes hospital readmission.

Standard systematic reviews

Treatment & rehabilitation

2. Barbosa et al. Influence of pulmonary rehabilitation in post-Covid patients. Systematic review with meta-analysis

https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=289747

Review question(s): Does pulmonary rehabilitation contributes to patients' recovery

The 'Condition being studied' field of the protocol mentions Long COVID and people "who had severe pulmonary sequelae".

3. Piechotta et al. Antiplatelet agents for the treatment of COVID-19

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021256351

Review question(s): The objective of this systematic review is to assess the efficacy and safety of antiplatelet agents compared to no treatment, standard care or placebo for COVID-19.

Subset analysis: Protocol indicates that authors will carry out separate analyses for subsets of patients with acute, prolonged or long COVID-19.

4. Yeung et al. Special assessment of outpatient treatments for COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021282070

Review question(s): 1) What is the net health benefit of each of the five interventions (casirivimab/imdevimab sotrovimab, molnupiravir, PF-07321332, and fluvoxamine) versus usual symptomatic care. 2) Given the limitations in the available data, what can be understood about the relative effectiveness of these treatment options in the population described below?

Outcomes of interest: Include Long COVID.

Symptoms, effects & prevalence

5. Balanzá-Martínez et al. Objectively measured cognitive dysfunction in COVID-19 patients: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021251823

Review question(s): Assess the impact of COVID-19 on neurocognitive functioning.

6. Benzouak et al. COVID-19 related concerns or infection in patients living with Obsessive Compulsive Disorders; a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021252446

Review question(s): 1) Do COVID-19 concerns predict worsening or onset of new symptoms of Obsessive-Compulsive Disorders in patients diagnosed with OCD? 2) Are SARS-CoV-2 infection or concerns linked with new onset of Obsessive-Compulsive Disorders? 3) Is OCD relapse more likely following SARS-CoV-2 infection in OCD patients who are in remission?

7. Delanerolle et al. A systematic review exploring the physical and mental health impact amongst women diagnosed with COVID-19 who have gynaecological and/or obstetric conditions as well as healthcare professionals

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235356

Review question(s): 1) What is the physical and mental health (symptomatology and/or disorders) prevalence of COVID-19 amongst pregnant women? 2) What has been the mental health (symptomatology and/or disorders) prevalence of SARS vs MERS vs COVID-19 amongst pregnant women? 3) What are the common mental health and/or physical health denominators across MERS vs. SARS vs. COVID-19? 4) What is the prevalence of menstrual disturbances and pain due to COVID-19 vs MERS vs SARS patients?

Population of interest: Includes patients “that have had COVID-19”.

8. Dhiman et al. A systematic review and meta-analysis establishing the relation between COVID-19 and neuropathic pain.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021257060

Review question(s): Is neuropathic pain one of the clinical sign/symptom of COVID 19 disease?

Population of interest: Patients with ongoing COVID-19 or post COVID-19 recovered patients.

9. Elias et al. Microvascular and macrovascular alterations in COVID-19: a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021252382

Review question(s): To investigate the quantitative differences in (micro- and macro-) vascular anatomical alterations, function, and flow-related hemodynamics between COVID-19 and non-COVID-19 controls.

Population of interest: Patients with pre-existing COVID-19 or subjects recovered from COVID-19

10. Hemsley et al. Systematic review of the literature on COVID-19 and disability: inclusion, experiences, needs, impacts, and strategies.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021284032

Review question(s): This review aims to answer the following research questions: 1) How have people with disability been included in COVID-19 research relating to disability to date, and what are the areas of research (e.g., screening/detection, vaccination, treatment/management, morbidity, mortality)? 2) What are the needs and experiences of people with disability and their family members or support workers, and disability service providers in relation to COVID-19 pandemic? (e.g., health or mental health needs, information needs, social needs, employment, education, financial, social, support needs; access to services relating to these needs; accessibility of the information and services) 3) What is the impact of the COVID-19 pandemic on people with disability, their supporters, and disability organisations provided services to people with disability? (e.g., incidence and prevalence, health outcomes, social and financial outcomes) 4) What public health measures have included people with disability and what is the impact of these measures? (e.g., prevention measures such as masks and handwashing and social distancing, screening, vaccination; guidance for healthcare providers on working with people with disability during the COVID-19 pandemic) 5) What strategic responses were instigated by governments, disability service providers, and others in relation to people with disability and COVID-19? (e.g., strategic initiatives, legislation, policies, procedures)

Search terms: Include long-COVID; Main outcomes: Include long COVID.

11. Leblebicioglu et al. A systematic review of autoimmune thyroiditis associated with COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021269312

Review question(s): 1) To investigate a possible association between autoimmune thyroiditis among patients diagnosed with COVID-19. 2) What is the rate of autoimmune thyroiditis in patients infected by COVID-19? 3) What are the risk factors for autoimmune thyroiditis associated with COVID-19? 4) What are the patterns of autoimmune thyroiditis presentation according to symptoms, signs laboratory finding? 5) What are the complications of autoimmune thyroiditis associated with COVID-19?

12. Lukács et al. Investigating the prevalence and characteristics of cardiovascular abnormalities in COVID-19 associated multisystem inflammatory syndrome in children (MIS-C): a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021282515

Review question(s): What is the incidence/prevalence of different cardiovascular endpoints in multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19 infection.

13. Menezes et al. Clinical manifestations and prognosis associated with multiple sclerosis patients diagnosed with COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021259299

Review question(s): What are the clinical manifestations and prognosis associated with multiple sclerosis patients diagnosed with COVID-19?

Secondary outcomes: Include persistent COVID-19 signs and symptoms (long COVID).

14. Pironatto et al. The incidence of mesenteric venous thrombosis in COVID-19 patients: a systematic review.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021286846

Review question(s) What is the incidence of Mesenteric Venous Thrombosis in COVID-19 patients?

Search terms: included long-COVID

15. Qamar et al. Risk factors, clinical characteristics and prognosis of Multisystem Inflammatory Syndrome in Adults (MIS-A): a systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021262177

Review question(s): 1) What are the clinical and laboratory features of multisystem inflammatory syndrome in adults (MIS-A)? 2) What are the treatment/management modalities required for multisystem inflammatory syndrome in adults (MIS-A)? 3) What is the prognosis (hospitalisation, intensive care unit (ICU) admission, deaths, recovery) of multisystem inflammatory syndrome in adults (MIS-A)? 4) What is the prevalence and risk factors associated with MIS-A in COVID-19?

16. Salvador et al. Cardiovascular outcomes in patients with COVID-19, systematic review and meta-analysis.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021238681

Review question(s): What are the main cardiovascular outcomes in patients with COVID-19?

Population of interest: Patients with active or previous COVID-19.

17. Sugumaran et al. Oral and cutaneous manifestations of COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021277512

Review question(s): 1) What are the distinct oral manifestations noted in patients affected with COVID-19? 2) What are the distinct cutaneous manifestations noted in patients affected with COVID-19?

Subset analysis: Protocol indicates that authors will carry out separate analyses related to COVID-19 exposure (infection present at the time of diagnosis, under treatment and after recovery).

18. Vasquez et al. Laryngotracheal pathology in adults treated with endotracheal intubation due to COVID-19.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021245262

Review question(s): What is the incidence of laryngotracheal pathology in adults treated with endotracheal intubation due to COVID-19?

Population of interest: Include post-COVID-19 patients who required hospitalization.

19. Wagner et al. Neuroimaging in COVID-19-infected critical care patients.

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021251620

Review question(s): What are the reported neuroimaging findings in patients with COVID-19 infections who are critically ill?

Appendix 1

Table A: Summary of identified reviews with a primary focus on Long COVID

Review status Main outcomes of interest	Review of review	Living review	Systematic review
Published*			
Symptoms/effects and/or risk factors	1	3	43
Treatment/rehabilitation		1	2
Prevention		1	
Completed not yet published			
Symptoms/effects			7
Treatment/rehabilitation			1
Lived experience			1
Ongoing			
Symptoms/effects and/or risk factors	1	3	55
Treatment/rehabilitation		2	13
Health & economics			3

*Includes six pre-prints, one conference abstract and one report published as grey literature

NB:19 reviews that did not have a predominant focus on Long COVID have been omitted from the table.

Full reference of published reviews in Table 1

- Ahmad, M. S., Shaik, R. A. et al. (2021). "LONG COVID": An insight. *Eur Rev Med Pharmacol Sci*, 25(17), 5561-5577. https://doi.org/10.26355/eurrev_202109_26669
- Aiyegbusi, O. L., Hughes, S. E. et al. (2021). Symptoms, complications and management of long COVID: A review. *J R Soc Med*, 114(9), 428-442. <https://doi.org/10.1177/01410768211032850>
- Akbarialiabad, H., Taghrir, M. H. et al. (2021). Long COVID, a comprehensive systematic scoping review. *Infection*, 49, 1163–1186. <https://doi.org/10.1007/s15010-021-01666-x>
- Amdal, C. D., Pe, M. et al. (2021). Health-related quality of life issues, including symptoms, in patients with active COVID-19 or post COVID-19; a systematic literature review. *Qual Life Res*, 30(12), 3367-3381. <https://doi.org/10.1007/s11136-021-02908-z>
- Anaya, J. M., Rojas, M. et al. (2021). Post-COVID syndrome. A case series and comprehensive review. *Autoimmun Rev*, 20(11), 102947. <https://doi.org/10.1016/j.autrev.2021.102947>
- Badenoch, J.B., Rengasamy, E.R. et al. (2021). Persistent neuropsychiatric symptoms after COVID-19: a systematic review and meta-analysis (PRE-PRINT). medRxiv 2021.04.30.21256413; <https://doi.org/10.1101/2021.04.30.21256413>
- Behnood, S., & Shafran, R. (2021). Persistent symptoms following SARS-COV-2 infection among children and young people: A meta-analysis of controlled and uncontrolled studies. *Journal of Infection*. <https://doi.org/10.1016/j.jinf.2021.11.011>
- Cabrera Martimbianco, A. L., Pacheco, R. L. et al. (2021). Frequency, signs and symptoms, and criteria adopted for long COVID-19: A systematic review. *Int J Clin Pract*, 75(10), e14357. <https://doi.org/10.1111/ijcp.14357>
- Cares-Marambio, K., Montenegro-Jiménez, Y. et al. (2021). Prevalence of potential respiratory symptoms in survivors of hospital admission after coronavirus disease 2019 (COVID-19): A systematic review and meta-analysis. *Chron Respir Dis*, 18, 14799731211002240. <https://doi.org/10.1177/14799731211002240>
- Chakraborty, T., Jamal, R. F. et al. (2021). A review of prolonged post-COVID-19 symptoms and their implications on dental management. *Int J Environ Res Public Health*, 18(10). <https://doi.org/10.3390/ijerph18105131>
- Daroische, R., Hemminghyth, M. S. et al. (2021). Cognitive impairment after COVID-19-a review on objective test data. *Front Neurol*, 12, 699582. <https://doi.org/10.3389/fneur.2021.699582>
- de Araújo, B.C., da Silva, L.A.L.B. et al. (2021). Manifestações clínicas e laboratoriais pós-covid Quais são as manifestações clínicas persistentes, sequelas ou complicações da COVID-19? https://www.researchgate.net/publication/355752133_Manifestacoes_clinicas_e_laboratoriais_pos-covid_-_Revisao_rapida
- d'Ettorre, G., Gentilini Cacciola, E. et al. (2021). COVID-19 sequelae in working age patients: A systematic review. *J Med Virol*. <https://doi.org/10.1002/jmv.27399>
- De-la-Rosa-Martinez, Delaye-Martínez, M.A. et al. (2021). Long-term manifestations and modifiers of prevalence estimates of the post-COVID-19 syndrome: A systematic review and meta-analysis (PRE-PRINT). medRxiv 2021.10.17.21265123. <https://doi.org/10.1101/2021.10.17.21265123>
- Domingo, F.R., Waddell, L.A. et al. (2021). Prevalence of long-term effects in individuals diagnosed with COVID-19: an updated living systematic review (PRE-PRINT). medRxiv 2021.06.03.21258317. <https://doi.org/10.1101/2021.06.03.21258317>

- Fahriani, M. Ilmawan, M. et al. (2021). Persistence of long COVID symptoms in COVID-19 survivors worldwide and its potential pathogenesis - A systematic review and meta-analysis. *Narra J*, 1 (2): e36, <http://doi.org/10.52225/narraj.v1i2.36>
- Fernández-de-Las-Peñas, C., Palacios-Ceña, D. et al. (2021a). Prevalence of post-COVID-19 symptoms in hospitalized and non-hospitalized COVID-19 survivors: A systematic review and meta-analysis. *Eur J Intern Med*, 92, 55-70. <https://doi.org/10.1016/j.ejim.2021.06.009>
- Fernández-de-Las-Peñas, C., Navarro-Santana, M. et al. (2021b). Headache as an acute and post-COVID-19 symptom in COVID-19 survivors: A meta-analysis of the current literature. *Eur J Neurol*, 28(11), 3820-3825. <https://doi.org/10.1111/ene.15040>
- Fernández-de-Las-Peñas, C., Navarro-Santana, M. et al. (2021c). Time course prevalence of post-COVID pain symptoms of musculoskeletal origin in patients who had survived to severe acute respiratory syndrome coronavirus 2 infection: A systematic review and meta-analysis. *Pain*. <https://doi.org/10.1097/j.pain.0000000000002496>
- Groff, D., Sun, A., et al. (2021). Short-term and long-term rates of postacute sequelae of SARS-CoV-2 infection: A systematic review. *JAMA Netw Open*, 4(10), e2128568. <https://doi.org/10.1001/jamanetworkopen.2021.28568>
- Hayes, L. D., Ingram, J., & Sculthorpe, N. F. (2021). More than 100 persistent symptoms of SARS-CoV-2 (long COVID): A scoping review. *Front Med*, 8, 750378. <https://doi.org/10.3389/fmed.2021.750378>
- Hoshijima, H., Mihara, T. et al. (2021). Incidence of Long-term Post-acute Sequelae of SARS-CoV-2 Infection Related to Pain and Other Symptoms: A Living Systematic Review and Meta-analysis (PRE-PRINT). medRxiv 2021.04.08.21255109. <https://doi.org/10.1101/2021.04.08.21255109>
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- Jennings, G., Monaghan, A. et al. (2021). A systematic review of persistent symptoms and residual abnormal functioning following acute COVID-19: Ongoing symptomatic phase vs. post-COVID-19 syndrome (PRE-PRINT). medRxiv 2021.06.25.21259372. <https://doi.org/10.1101/2021.06.25.21259372>
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- Ramadan, M. S., Bertolino, L. et al. (2021). Cardiac sequelae after coronavirus disease 2019 recovery: A systematic review. *Clin Microbiol Infect*, 27(9), 1250-1261.
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<https://doi.org/10.3390/biomedicines9080900>
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