Saskatchewan Health Authority

University of Saskatchewan

COVID-19 Evidence Support Team
EVIDENCE SEARCH REPORT

Review Question:	What are long COVID's demands on the healthcare system, and its severity of the illness?
Context:	Modelling group of Saskatchewan will be using this information to make more informed predictions about long-covid This is an update
Review Code:	EMP210602v003 ESR **Complete Date:** June 3, 2022
Cite As:	Howell-Spooner, B. What are long COVID's demands on the healthcare system, and its severity of the illness? 2022 Jun 03, Document no.: EMP210602v003 ESR. In: COVID-19 Rapid Evidence Reviews [Internet]. SK: SK COVID Evidence Support Team, c2022. 22 p. (CEST rapid review report).

Librarian Notes & Comments

Hello All,
Here are the results of our search on the severity of long-covid and its impact on the healthcare system, with a focus on modelling the effects of this. There were not that many modelling studies in the databases which tackled long-COVID's severity and impact. There are fewer studies since the gap between this version and version 2 versus version 1 and version 2 is less than 3 months instead of a year like last time.

Sincerely,

Brianna

Search Results: Guidelines, Summaries & Other Grey Literature

Agency for Clinical Innovation and the New South Wales Government

- Post acute sequelae of COVID-19 (long COVID). [1 April, 2022]. https://aci.health.nsw.gov.au/__data/assets/pdf_file/0004/695983/Evidence-Check-Post-acute-sequelae-of-COVID-19.pdf

COVID-19 Immunity Task Force

Disclaimer

- A long road to recovery for some: A closer look at long COVID. [27 April, 2022]. https://www.covid19immunitytaskforce.ca/a-long-road-to-recovery-for-some-a-closer-look-at-long-covid/

Health Library Ireland

- What is the latest national and international evidence about the existence of long COVID or post-COVID and its persistence for COVID-19 survivors? [28 April, 2022]. https://hselibrary.ie/what-is-the-latest-national-and-international-evidence-about-the-existence-of-long-covid-or-post-covid-and-its-persistence-for-covid-19-survivors/#gsc.tab=0

Public Health Ontario

- Post-Acute COVID-19 Syndrome (PACS) in Adults. [April, 2022]. https://www.publichealthontario.ca/-/media/Documents/nCoV/ipac/2022/04/post-acute-covid-syndrome-pacs.pdf?sc_lang=en

Search Results: News, Blogs, & Social Media

CBC

- Mix of health-care providers help long COVID patients as researchers work to understand condition. [2 June, 2022]. https://www.cbc.ca/news/canada/manitoba/long-covid-research-health-care-1.6474362

CIDRAP

- European studies shed light on long COVID risk and recovery. [27 April, 2022]. https://www.cidrap.umn.edu/news-perspective/2022/04/european-studies-shed-light-long-covid-risk-and-recovery

New Scientist

- Is covid-19 causing a global surge of diabetes cases?. [19 April, 2022]. https://www.newscientist.com/article/2316365-is-covid-19-causing-a-global-surge-of-diabetes-cases/

Search Results: Journal Articles (includes preprints)

Sorted by newest-oldest.

1. Clift AK, Ranger TA, Patone M, et al. Neuropsychiatric Ramifications of Severe COVID-19 and Other Severe Acute Respiratory Infections. JAMA Psychiatry. 2022.

ABSTRACT: Importance: Individuals surviving severe COVID-19 may be at increased risk of neuropsychiatric sequelae. Robust assessment of these risks may help improve clinical understanding of the post-COVID syndrome, aid clinical care during the ongoing pandemic, and inform postpandemic planning. Objective(s): To quantify the risks of new-onset neuropsychiatric conditions and new neuropsychiatric medication prescriptions after discharge from a COVID-19-related hospitalization, and to compare these with risks after discharge from hospitalization for other severe acute respiratory infections (SARI) during the COVID-19 pandemic. Design, Setting, and Participant(s): In this cohort study, adults (>=18 years of age) were identified from QResearch primary care and linked electronic health record databases, including national SARS-CoV-2 testing, hospital episode statistics, intensive care

admissions data, and mortality registers in England, from January 24, 2020, to July 7, 2021. Exposures: COVID-19-related or SARI-related hospital admission (including intensive care admission). Main Outcomes and Measures: New-onset diagnoses of neuropsychiatric conditions (anxiety, dementia, psychosis, depression, bipolar disorder) or first prescription for relevant medications (antidepressants, hypnotics/anxiolytics, antipsychotics) during 12 months of follow-up from hospital discharge. Maximally adjusted hazard ratios (HR) with 95% CIs were estimated using flexible parametric survival models. Result(s): In this cohort study of data from 8.38 million adults (4.18 million women, 4.20 million men; mean [SD] age 49.18 [18.45] years); 16679 (0.02%) survived a hospital admission for SARI, and 32525 (0.03%) survived a hospital admission for COVID-19. Compared with the remaining population, survivors of SARI and COVID-19 hospitalization had higher risks of subsequent neuropsychiatric diagnoses. For example, the HR for anxiety in survivors of SARI was 1.86 (95% CI, 1.56-2.21) and for survivors of COVID-19 infection was 2.36 (95% CI, 2.03-2.74); the HR for dementia for survivors of SARI was 2.55 (95% CI, 2.17-3.00) and for survivors of COVID-19 infection was 2.63 (95% CI, 2.21-3.14). Similar findings were observed for all medications analyzed; for example, the HR for first prescriptions of antidepressants in survivors of SARI was 2.55 (95% CI, 2.24-2.90) and for survivors of COVID-19 infection was 3.24 (95% CI, 2.91-3.61). There were no significant differences observed when directly comparing the COVID-19 group with the SARI group apart from a lower risk of antipsychotic prescriptions in the former (HR, 0.80; 95% CI, 0.69-0.92). Conclusions and Relevance: In this cohort study, the neuropsychiatric sequelae of severe COVID-19 infection were found to be similar to those for other SARI. This finding may inform postdischarge support for people surviving SARI.
URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9096686/

2. Del Corral T, Menor-Rodriguez N, Fernandez-Vega S, et al. Longitudinal study of changes observed in quality of life, psychological state cognition and pulmonary and functional capacity after COVID-19 infection: A six- to seven-month prospective cohort. J Clin Nurs. 2022;09:09.
ABSTRACT: AIMS: To investigate the health-related quality of life (HRQoL), symptoms, psychological and cognitive state and pulmonary and physical function of nonhospitalised COVID-19 patients at long-term, and to identify factors to predict a poor HRQoL in this follow-up.
BACKGROUND: Studies have focused on persistent symptoms of hospitalised COVID-19 patients in the medium term. Thus, long-term studies of nonhospitalised patients are urgently required.
DESIGN: A longitudinal cohort study.
METHODS: In 102 nonhospitalised COVID-19 patients, we collected symptoms at 3 months (baseline) and at 6-7 months (follow-up) from diagnosis (dyspnoea, fatigue/muscle weakness and chest/joint pain), HRQoL, psychological state, cognitive function, pulmonary and physical function. This study adhered to the STROBE statement.
RESULTS: HRQoL was impaired in almost 60% of the sample and remained impaired 6-7 months. At 3 months, more than 60% had impaired physical function (fatigue/muscle weakness and reduced leg and inspiratory muscle strength). About 40%-56% of the sample showed an altered psychological state (post-traumatic stress disorder (PTSD), anxiety/depression), cognitive function impairment and dyspnoea. At 6-7-months, only a slight improvement in dyspnoea and physical and cognitive function was observed, with a very high proportion of the sample (29%-55%) remained impaired. Impaired HRQoL at 6-7 months was predicted with 82.4% accuracy (86.7% sensitivity and 83.3% specificity) by the presence at 3 months of muscle fatigue/muscle weakness (OR = 5.7 (1.8-18.1)), PTSD (OR = 6.0 (1.7-20.7)) and impaired HRQoL (OR = 11.7 (3.7-36.8)).
CONCLUSION: A high proportion of nonhospitalised patients with COVID-19 experience an impaired HRQoL, cognitive and psychological function at long-term. HRQoL, PTSD and dyspnoea at 3 months can identify the majority of patients with COVID-19 who will have impaired quality of life at long-term.

RELEVANCE TO CLINICAL PRACTICE: Treatments aimed at improving psychological state and reducing the fatigue/muscle weakness of post-COVID-19 patients could be necessary to prevent the patients' HRQoL from being impaired at 6-7 months after their reported recovery. Copyright © 2022 John Wiley & Sons Ltd.
URL: https://pubmed.ncbi.nlm.nih.gov/35534994/

3. Fernandez-de-Las-Penas C, Martin-Guerrero JD, Florencio LL, et al. Clustering analysis reveals different profiles associating long-term post-COVID symptoms, COVID-19 symptoms at hospital admission and previous medical co-morbidities in previously hospitalized COVID-19 survivors. Infection. 2022;22:22.
ABSTRACT: PURPOSE: To identify subgroups of COVID-19 survivors exhibiting long-term post-COVID symptoms according to clinical/hospitalization data by using cluster analysis in order to foresee the illness progress and facilitate subsequent prognosis.
METHODS: Age, gender, height, weight, pre-existing medical comorbidities, Internal Care Unit (ICU) admission, days at hospital, and presence of COVID-19 symptoms at hospital admission were collected from hospital records in a sample of patients recovered from COVID-19 at five hospitals in Madrid (Spain). A predefined list of post-COVID symptoms was systematically assessed a mean of 8.4 months (SD 15.5) after hospital discharge. Anxiety/depressive levels and sleep quality were assessed with the Hospital Anxiety and Depression Scale and Pittsburgh Sleep Quality Index, respectively. Cluster analysis was used to identify groupings of COVID-19 patients without introducing any previous assumptions, yielding three different clusters associating post-COVID symptoms with acute COVID-19 symptoms at hospital admission.
RESULTS: Cluster 2 grouped subjects with lower prevalence of medical co-morbidities, lower number of COVID-19 symptoms at hospital admission, lower number of post-COVID symptoms, and almost no limitations with daily living activities when compared to the others. In contrast, individuals in cluster 0 and 1 exhibited higher number of pre-existing medical co-morbidities, higher number of COVID-19 symptoms at hospital admission, higher number of long-term post-COVID symptoms (particularly fatigue, dyspnea and pain), more limitations on daily living activities, higher anxiety and depressive levels, and worse sleep quality than those in cluster 2.
CONCLUSIONS: The identified subgrouping may reflect different mechanisms which should be considered in therapeutic interventions. Copyright © 2022. The Author(s).
URL: https://pubmed.ncbi.nlm.nih.gov/35451721/

4. Fugazzaro S, Contri A, Esseroukh O, et al. Rehabilitation Interventions for Post-Acute COVID-19 Syndrome: A Systematic Review. International Journal of Environmental Research & Public Health [Electronic Resource]. 2022;19(9):24.
ABSTRACT: Increasing numbers of individuals suffer from post-acute COVID-19 syndrome (PACS), which manifests with persistent symptoms, the most prevalent being dyspnea, fatigue, and musculoskeletal, cognitive, and/or mental health impairments. This systematic review investigated the effectiveness of rehabilitation interventions for individuals with PACS. We searched the MEDLINE, Embase, Cochrane Register of Controlled Trials, CINHAL, Scopus, Prospero, and PEDro databases and the International Clinical Trials Registry Platform for randomized controlled trials (RCTs) up to November 2021. We screened 516 citations for eligibility, i.e., trials that included individuals with PACS exposed to exercise-based rehabilitation interventions. Five RCTs were included, accounting for 512 participants (aged 49.2-69.4 years, 65% males). Based on the revised Cochrane risk-of-bias tool (RoB 2.0), two RCTs had "low risk of bias", and three were in the "some concerns" category. Three RCTs compared experimental rehabilitation interventions with no or minimal rehabilitation, while two compared two active rehabilitation interventions. Rehabilitation seemed to improve dyspnea, anxiety, and kinesiophobia.

Results on pulmonary function were inconsistent, while improvements were detected in muscle strength, walking capacity, sit-to-stand performance, and quality of life. Pending further studies based on qualitatively sound designs, these first findings seem to advocate for rehabilitation interventions to lessen disability due to PACS.
URL: https://pubmed.ncbi.nlm.nih.gov/35564579/

5. Gosser R, Anderson S, Blaszczyk A, et al. In It for the Long Haul: Post-Acute Sequelae of Severe Acute Respiratory Syndrome Coronavirus 2. J Pharm Pract. 2022:8971900221088799.
ABSTRACT: The COVID-19 pandemic has caused immeasurable clinical, economic, and societal challenges for the world since early 2020. Intense focus has been placed on determining evidence-based acute management of patients infected with the SARS-CoV-2 virus, as well as accelerating vaccination efforts for those eligible to receive it. As patients recover from infection, many are left with long-term symptoms, known as "Long COVID" or "Post-Acute Sequelae of COVID19," that challenges the ability to fully recover, return to baseline health status, and regain quality of life. As the most accessible healthcare professional, pharmacists can assist with the management of long COVID as a member of the multidisciplinary team. Pharmacists' medication acumen is beneficial to the management of long COVID symptomatology as more research comes to the forefront of this deadly disease.
URL: https://pubmed.ncbi.nlm.nih.gov/35356830/

6. Hadad R, Khoury J, Stanger C, et al. Cognitive dysfunction following COVID-19 infection. J Neurovirol. 2022;26:26.
ABSTRACT: The coronavirus (COVID-19) pandemic is still evolving, causing hundreds of millions of infections around the world. The long-term sequelae of COVID-19 and neurologic syndromes post COVID remain poorly understood. The present study aims to characterize cognitive performance in patients experiencing cognitive symptoms post-COVID infection. Patients evaluated at a post COVID clinic in Northern Israel who endorsed cognitive symptoms were referred for neurologic consultation. The neurologic work-up included detailed medical history, symptom inventory, neurological examination, the Montreal Cognitive Assessment (MoCA), laboratory tests and brain CT or MRI. Between December 2020 and June 2021, 46 patients were referred for neurological consultation (65% female), mean age 49.5 (19-72 years). On the MoCA test, executive functions, particularly phonemic fluency, and attention, were impaired. In contrast, the total MoCA score, and memory and orientation subscores did not differ from expected ranges. Disease severity, premorbid condition, pulmonary function tests and hypoxia did not contribute to cognitive performance. Cognitive decline may affect otherwise healthy patients post-COVID, independent of disease severity. Our examination identified abnormalities in executive function, attention, and phonemic fluency. These findings occurred despite normal laboratory tests and imaging findings.
URL: https://pubmed.ncbi.nlm.nih.gov/35618983/

7. Han JH, Womack KN, Tenforde MW, et al. Associations between persistent symptoms after mild COVID-19 and long-term health status, quality of life, and psychological distress. Influenza Other Respi Viruses. 2022;28:28.
ABSTRACT: BACKGROUND: We sought to assess whether persistent COVID-19 symptoms beyond 6 months (Long-COVID) among patients with mild COVID-19 is associated with poorer health status, quality of life, and psychological distress.
METHODS: This was a multicenter prospective cohort study that included adult outpatients with acute COVID-19 from eight sites during 2-week sampling periods from April 1 and July 28, 2020. Participants were contacted 6-11 months after their first positive SARS-CoV-2 to complete a survey, which collected information on the severity of eight COVID-19 symptoms using a 4-point scale ranging from 0 (not

present) to 3 (severe) at 1 month before COVID-19 (pre-illness) and at follow-up; the difference for each was calculated as an attributable persistent symptom severity score. A total attributable persistent COVID-19 symptom burden score was calculated by summing the attributable persistent severity scores for all eight symptoms. Outcomes measured at long-term follow-up comprised overall health status (EuroQol visual analogue scale), quality of life (EQ-5D-5L), and psychological distress (Patient Health Questionnaire-4). The association between the total attributable persistent COVID-19 burden score and each outcome was analyzed using multivariable proportional odds regression.
RESULTS: Of the 2092 outpatients with COVID-19, 436 (21%) responded to the survey. The median (IQR) attributable persistent COVID-19 symptom burden score was 2 (0, 4); higher scores were associated with lower overall health status (aOR 0.63; 95% CI: 0.57-0.69), lower quality of life (aOR: 0.65; 95%CI: 0.59-0.72), and higher psychological distress (aOR: 1.40; 95%CI, 1.28-1.54) after adjusting for age, race, ethnicity, education, and income.
CONCLUSIONS: In participants with mild acute COVID-19, the burden of persistent symptoms was significantly associated with poorer long-term health status, poorer quality of life, and psychological distress. Copyright © 2022 The Authors. Influenza and Other Respiratory Viruses published by John Wiley & Sons Ltd. This article has been contributed to by U.S. Government employees and their work is in the public domain in the USA.
URL: https://onlinelibrary.wiley.com/doi/10.1111/irv.12980

8. Hersche R, Weise A. Occupational Therapy-Based Energy Management Education in People with Post-COVID-19 Condition-Related Fatigue: Results from a Focus Group Discussion. Occup Ther Int. 2022;2022:4590154.
ABSTRACT: Persons with post-COVID-19 conditions have prolonged symptoms and longer-term consequences which can prevent them from returning to previous everyday functioning. Fatigue is the most frequent symptom reported in literature. Occupational therapists (OTs) are specialized in client-centered problem analysis, counseling, and education to recover occupational engagement and performance in everyday life. Since the beginning of the COVID-19 pandemic, OTs have been challenged to respond with services adequate to the needs of this patient group. Energy management education (EME) was initially developed for persons with multiple sclerosis-related fatigue and then made independent of diagnosis suitable to persons living with chronic disease-related fatigue. EME, a structured self-management education, is becoming a part of the new services. This study was aimed at exploring the initial experiences of OTs using the EME protocol and materials with persons with postacute COVID-19 and/or post-COVID-19 condition-related fatigue and gathering their recommendations for improvements and adaptions. One online focus group discussion took place in May 2021 with OTs experienced in using the EME protocol. The topics addressed were the institutional context of the OTs and their experiences during the treatment. A thematic analysis was performed. According to nine OTs working in different settings in Switzerland, the EME protocol is exploitable in both in- and outpatient settings and was judged appropriate by them, even if the EME materials can be improved. The main challenges for the OTs were the short period their patients had lived with fatigue; the discrepancy between self-concept, self-perception, and performance; and the insecurity, fear, and anxiety related to recovery. Further research is needed to include the perspective of EME participants and to measure quantitative outcomes such as fatigue impact, self-efficacy, occupational performance, and quality of life. Until the existing EME protocol is improved, it is applicable to persons with post-COVID-19 condition-related fatigue. Copyright © 2022 Ruth Hersche and Andrea Weise.
URL: https://europepmc.org/article/med/35521629

9. Keyes B, McCombe G, Broughan J, et al. Enhancing GP care of mental health disorders post-COVID-19: a scoping review of interventions and outcomes. Ir J Psychol Med. 2022:1-17.

ABSTRACT: OBJECTIVES: Considerable literature has examined the COVID-19 pandemic's negative mental health sequelae. It is recognised that most people experiencing mental health problems present to primary care and the development of interventions to support GPs in the care of patients with mental health problems is a priority. This review examines interventions to enhance GP care of mental health disorders, with a view to reviewing how mental health needs might be addressed in the post-COVID-19 era.
METHODS: Five electronic databases (PubMed, PsycINFO, Cochrane Library, Google Scholar and WHO 'Global Research on COVID-19') were searched from May - July 2021 for papers published in English following Arksey and O'Malley's six-stage scoping review process.
RESULTS: The initial search identified 148 articles and a total of 29 were included in the review. These studies adopted a range of methodologies, most commonly randomised control trials, qualitative interviews and surveys. Results from included studies were divided into themes: Interventions to improve identification of mental health disorders, Interventions to support GPs, Therapeutic interventions, Telemedicine Interventions and Barriers and Facilitators to Intervention Implementation. Outcome measures reported included the Seven-item Generalised Anxiety Disorder Scale (GAD-7), the Nine-item Patient Health Questionnaire (PHQ-9) and the 'The Patient Global Impression of Change Scale'.
CONCLUSION: With increasing recognition of the mental health sequelae of COVID-19, there is a lack of large scale trials researching the acceptability or effectiveness of general practice interventions. Furthermore there is a lack of research regarding possible biological interventions (psychiatric medications) for mental health problems arising from the pandemic.
URL: https://pubmed.ncbi.nlm.nih.gov/35545971/

10. Kute VB, Ray DS, Aziz F, et al. Management strategies and outcomes in renal transplant recipients recovering from COVID-19: A retrospective, multicentre, cohort study. EClinicalMedicine. 2022;46:101359.
ABSTRACT: Background: There is an enormous knowledge gap on management strategies, clinical outcomes, and follow-up after kidney transplantation (KT) in recipients that have recovered from coronavirus disease (COVID-19).
Methods: We conducted a multi-center, retrospective analysis in 23 Indian transplant centres between June 26, 2020 to December 1, 2021 on KT recipients who recovered after COVID-19 infections. We analyzed clinical and biopsy-confirmed acute rejection (AR) incidence and used cox-proportional modeling to estimate multivariate-adjusted hazard ratios (HR) for predictors of AR. We also performed competing risk analysis. Additional outcome measures included graft loss, all-cause mortality, waiting time from a positive real-time polymerase test (RT-PCR) to KT, laboratory parameters, and quality of life in follow-up.
Findings: Among 372 KT which included 38(10.21%) ABO-incompatible, 12(3.22%) sensitized, 64(17.20%) coexisting donors with COVID-19 history and 20 (5.37%) recipients with residual radiographic abnormalities, the incidence of AR was 34 (9.1%) with 1(0.26%) death censored graft loss, and 4(1.07%) all-cause mortality over a median (interquartile range) follow-up of 241 (106-350) days. In our cox hazard proportional analysis, absence of oxygen requirement during COVID-19 compared to oxygen need [HR = 0.14(0.03-0.59); p-value = 0.0071], and use of thymoglobulin use compared to other induction strategies [HR = 0.17(0.03-0.95); p-value = 0.044] had a lower risk for AR. Degree of Human leukocyte antigen (HLA) DR mismatch had the highest risk of AR [HR = 10.2(1.74-65.83); p-value = 0.011]. With competing risk analysis, with death as a competing event, HLA DR mismatch, and oxygen requirement continued to be associated with AR. Age, gender, obesity, inflammatory markers, dialysis vintage, steroid use, sensitization and ABO-incompatibility have not been associated with a higher risk of AR. The median duration between COVID-19 real time polymerase test negativity to transplant was

88(40-145) days (overall), and ranged from 88(40-137), 65(42-120), 110(49-190), and 127(64-161) days in World Health Organization ordinal scale <= 3, 4, 5, and 6-7, respectively. There was no difference in quality of life, tacrolimus levels, blood counts, and mean serum creatinine assessed in patients with a past COVID-19 infection independent of severity.
Interpretation: Our findings support that the outcomes of KT after COVID-19 recovery are excellent with absence of COVID-19 sequelae during follow-up. Additionally, there does not seem to be a need for changes in the induction/immunosuppression regimen based on the severity of COVID-19.
Funding: Sanofi. Copyright © 2022 The Authors.
URL: https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(22)00089-X/fulltext

11. Light SN. The Combined Use of Neuropsychiatric and Neuropsychological Assessment Tools to Make a Differential Dementia Diagnosis in the Presence of "long-Haul" COVID-19. Case Rep Neurol. 2022:130-48.
ABSTRACT: The longer term neurocognitive/neuropsychiatric consequences of moderate/severe COVID-19 infection have not been explored. The case herein illustrates a complex web of differential diagnosis. The onset, clinical trajectory, treatment course/response, serial neuroimaging findings, and neuropsychological test data were taken into account when assessing a patient presenting 8 months post-COVID-19 (with premorbid attention-deficit hyperactivity disorder, diabetes mellitus, mood difficulties, and a positive family history of vascular dementia). Her acute COVID-19 infection was complicated by altered mental status associated with encephalopathy and bacterial pneumonia. After recovery from COVID-19, the patient continues to experience persisting cognitive and emotive difficulties despite an ongoing psychopharmacotherapy regimen (16 + years), psychotherapy (15 + sessions), and speech-language pathology SLP; 2 x week/for 12 weeks). The purpose of her most recent and comprehensive neuropsychological evaluation was to determine the presence/absence of neurocognitive disorder. The patient is a 62-year-old Caucasian woman. Cognitive screening was completed 3 months post-acute COVID-19 as part of an SLP evaluation, and a full neuropsychological evaluation was conducted 8 months post-COVID-19 recovery on an outpatient basis (in person). The patient had serial neuroimaging. Initial neurological evaluation during acute COVID-19 included unremarkable brain computed tomography (CT)/magnetic resonance imaging. However, follow-up CT (without contrast) revealed, in part, "asymmetric perisylvian atrophy on the left."Full neuropsychological evaluation at 8 months post-COVID-19 recovery revealed a dysexecutive syndrome characterized by language dysfunction and affective theory-of-mind deficit, consistent with dementia. There is need for careful use of differential diagnosis in COVID-19 patients with multiple risk factors that make them more susceptible to long-term neurological complications post-COVID-19. Differential diagnosis should involve multidisciplinary assessment (e.g., neuropsychology, SLP, neurology, and psychiatry). Copyright © 2022
URL: https://www.karger.com/Article/FullText/522020

12. Mannucci PM, Nobili A, Tettamanti M, et al. Impact of the post-COVID-19 condition on health care after the first disease wave in Lombardy. J Intern Med. 2022;04:04.
ABSTRACT: BACKGROUND: Lombardy was affected in the early months of 2020 by the SARS-CoV-2 pandemic with very high morbidity and mortality. The post-COVID-19 condition and related public health burden are scarcely known.
SETTING AND DESIGN: Using the regional population administrative database including all the 48,932 individuals who survived COVID-19 and became polymerase-chain-reaction negative for SARS-CoV-2 by 31 May 2020, incident mortality, rehospitalizations, attendances to hospital emergency room, and outpatient medical visits were evaluated over a mid-term period of 6 months in 20,521 individuals managed at home, 26,016 hospitalized in medical wards, and 1611 in intensive care units (ICUs). These

data were also evaluated in the corresponding period of 2019, when the region was not yet affected by the pandemic. Other indicators and proxies of the health-care burden related to the post-COVID condition were also evaluated.
MAIN RESULTS: In individuals previously admitted to the ICU and medical wards, rehospitalizations, attendances to hospital emergency rooms, and out-patient medical visits were much more frequent in the 6-month period after SARS-CoV-2 negativization than in the same prepandemic period. Performances of spirometry increased more than 50-fold, chest CT scans 32-fold in ICU-admitted cases and 5.5-fold in non-ICU cases, and electrocardiography 5.6-fold in ICU cases and twofold in non-ICU cases. Use of drugs and biochemical tests increased in all cases.
CONCLUSIONS: These results provide a real-life picture of the post-COVID condition and of its effects on the increased consumption of health-care resources, considered proxies of comorbidities. Copyright © 2022 The Authors. Journal of Internal Medicine published by John Wiley & Sons Ltd on behalf of Association for Publication of The Journal of Internal Medicine.
URL: https://pubmed.ncbi.nlm.nih.gov/35373863/

13. Matsumoto K, Hamatani S, Shimizu E, et al. Impact of post-COVID conditions on mental health: a cross-sectional study in Japan and Sweden. BMC Psychiatry. 2022;22(1):237.
ABSTRACT: BACKGROUND: Due to the coronavirus disease 2019 (COVID-19) pandemic, people have undermined their mental health. It has been reported that post-COVID conditions at a certain rate. However, information on the mental health of people with post-COVID conditions is limited. Thus, this study investigated the relationship between post-COVID conditions and mental health.
METHODS: Design of the present study was an International and collaborative cross-sectional study in Japan and Sweden from March 18 to June 15, 2021. The analyzed data included 763 adults who participated in online surveys in Japan and Sweden and submitted complete data. In addition to demographic data including terms related to COVID-19, psychiatric symptoms such as depression, anxiety, and post-traumatic stress were measured by using the fear of COVID-19 scale (FCV-19S), Patient Health Questionnaire-9 (PHQ-9), General Anxiety Disorder-7 item (GAD-7), and Impact of Event Scale-Revised (IES-R).
RESULTS: Of the 135 COVID-19 survivors among the 763 total participants, 37.0% (n = 50/135) had COVID-19-related sequelae. First, the results of the Bonferroni-corrected Mann Whitney U test showed that the group infected SARS-CoV-2 with post-COVID conditions scored significantly higher than those without one and the non-infected group on all clinical symptom scales (P <= .05). Next, there was a significant difference that incidence rates of clinical-significant psychiatric symptoms among each group from the results of the Chi-squared test (P <= .001). Finally, the results of the multivariate logistic model revealed that the risk of having more severe clinical symptoms were 2.44-3.48 times higher among participants with post-COVID conditions.
CONCLUSION: The results showed that approximately half had some physical symptoms after COVID-19 and that post-COVID conditions may lead to the onset of mental disorders.
TRIAL REGISTRATION: The ethics committee of Chiba University approved this cross-sectional study (approval number: 4129). However, as no medical intervention was conducted, a clinical trial registration was not necessary. Copyright © 2022. The Author(s).
URL: https://pubmed.ncbi.nlm.nih.gov/35379224/

14. Meagher T. Long COVID - One Year On. J Insur Med. 2022;13:13.
ABSTRACT: Long COVID is now a recognized complication of acute COVID-19 infection. As the COVID-19 pandemic moves into its third year, the prevalence of Long COVID continues to increase. Many individuals report symptoms lasting longer than a year, and a subset of this group is unable to work. This article will provide an update on Long COVID, with a particular focus on distinguishing it from other

clinical entities. It will review several proposed disease mechanisms and will attempt to anticipate the impact on disability insurance. Copyright © 2022 Journal of Insurance Medicine.

15. Mitchell PD, Olaniyi J, Buckley C, et al. Long COVID syndrome and the lung-How long will it last? QJM. 2022;22:22.
ABSTRACT: The prevalence and duration of the long term respiratory complications of COVID-19 infection remains to be elucidated. This short commentary reports on recently published studies in patients post acute COVID-19 infection in terms of symptom prevalence, physiological and radiological sequela and where only symptoms are present despite investigation. Pulmonary function testing, six minute walk tests, CT Chest and more advanced imaging modalities have been incorporated to reveal the underlying pathophysiology that cause such disabling symptoms in patient with post acute COVID-9 syndrome (PACS). PACS has a serious impact on people's ability to return to work, affecting the physical, mental, social sphere and with significant healthcare and general economic consequences for them, their families and society. Copyright © The Author(s) 2022. Published by Oxford University Press on behalf of the Association of Physicians. All rights reserved. For Permissions, please email: journals.permissions@oup.com.
URL: https://pubmed.ncbi.nlm.nih.gov/35323978/

16. Molina-Molina M, Hernandez-Argudo M. Respiratory consequences after COVID-19: outcome and treatment. Rev Esp Quimioter. 2022;35 Suppl 1:67-72.
ABSTRACT: The SARS-CoV-2 (COVID-19) pandemic represents the infection with the highest lethality, but also the one that has caused the most sequelae and multi-organ consequences, especially respiratory, in the last century. Several actions have been required in the field of respiratory and intensive care medicine to reduce mortality and chronicity. The consequences of COVID-19 are multiple and encompass different physical, emotional, organizing, and economic aspects, which will require a multidisciplinary, transversal, and collaborative approach. This review includes the observations and results of published retrospective and prospective studies on post-COVID19 respiratory sequelae, especially after severe pneumonia with associated adult respiratory distress syndrome (ARDS).
URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9106190/

17. Murch BJ, Hollier SE, Kenward C, et al. Use of linked patient data to assess the effect of Long-COVID on system-wide healthcare utilisation. Health Inf Manag. 2022:18333583221089915.
ABSTRACT: Background: Within the relatively early stages of the COVID-19 pandemic, there had been an awareness of the potential longer-term effects of infection (so called Long-COVID) but little was known of the ongoing demands such patients may place on healthcare services. Objective: To investigate whether COVID-19 illness is associated with increased post-acute healthcare utilisation. Method: Using linked data from primary care, secondary care, mental health and community services, activity volumes were compared across the 3 months preceding and proceeding COVID-19 diagnoses for 7,791 individuals, with a distinction made between whether or not patients were hospitalised for treatment. Differences were assessed against those of a control group containing individuals who had not received a COVID-19 diagnosis. All data were sourced from the authors' healthcare system in South West England. Results: For hospitalised COVID-19 cases, a statistically significant increase in non-elective admissions was identified for males and females <65 years. For non-hospitalised cases, statistically significant increases were identified in GP Doctor and Nurse attendances and GP prescriptions (males and females, all ages); Emergency Department attendances (females <65 years); Mental Health contacts (males and females >=65 years); and Outpatient consultations (males >=65 years). Conclusion: There is evidence of an association between positive COVID-19 diagnosis and increased post-acute activity within particular healthcare settings. Linked patient-level data provides information that can be useful to

understand ongoing healthcare needs resulting from Long-COVID, and support the configuration of Long-COVID pathways of care.
URL: https://pubmed.ncbi.nlm.nih.gov/35615791/

18. Nehme M, Braillard O, Chappuis F, et al. One-year persistent symptoms and functional impairment in SARS-CoV-2 positive and negative individuals. J Intern Med. 2022;15:15.
ABSTRACT: BACKGROUND: Persistent symptoms of SARS-CoV-2 are prevalent weeks to months following the infection. To date, it is difficult to disentangle the direct from the indirect effects of SARS-CoV-2, including lockdown, social, and economic factors.
OBJECTIVE: The study aims to characterize the prevalence of symptoms, functional capacity, and quality of life at 12 months in outpatient symptomatic individuals tested positive for SARS-CoV-2 compared to individuals tested negative.
METHODS: From 23 April to 27 July 2021, outpatient symptomatic individuals tested for SARS-CoV-2 at the Geneva University Hospitals were followed up 12 months after their test date.
RESULTS: At 12 months, out of the 1447 participants (mean age 45.2 years, 61.2% women), 33.4% reported residual mild to moderate symptoms following SARS-CoV-2 infection compared to 6.5% in the control group. Symptoms included fatigue (16% vs. 3.1%), dyspnea (8.9% vs. 1.1%), headache (9.8% vs. 1.7%), insomnia (8.9% vs. 2.7%), and difficulty concentrating (7.4% vs. 2.5%). When compared to the control group, 30.5% of SARS-CoV-2 positive individuals reported functional impairment at 12 months versus 6.6%. SARS-CoV-2 infection was associated with the persistence of symptoms (adjusted odds ratio [aOR] 4.1; 2.60-6.83) and functional impairment (aOR 3.54; 2.16-5.80) overall, and in subgroups of women, men, individuals younger than 40 years, those between 40-59 years, and in individuals with no past medical or psychiatric history.
CONCLUSION: SARS-CoV-2 infection leads to persistent symptoms over several months, including in young healthy individuals, in addition to the pandemic effects, and potentially more than other common respiratory infections. Symptoms impact functional capacity up to 12 months post infection. Copyright © 2022 The Authors. Journal of Internal Medicine published by John Wiley & Sons Ltd on behalf of Association for Publication of The Journal of Internal Medicine.
URL: https://onlinelibrary.wiley.com/doi/10.1111/joim.13482

19. Neville TH, Hays RD, Tseng CH, et al. Survival After Severe COVID-19: Long-Term Outcomes of Patients Admitted to an Intensive Care Unit. J Intensive Care Med. 2022:8850666221092687.
ABSTRACT: BACKGROUND: Understanding the long-term sequelae of severe COVID-19 remains limited, particularly in the United States.
OBJECTIVE: To examine long-term outcomes of patients who required intensive care unit (ICU) admission for severe COVID-19.
DESIGN, PATIENTS, AND MAIN MEASURES: This is a prospective cohort study of patients who had severe COVID-19 requiring an ICU admission in a two-hospital academic health system in Southern California. Patients discharged alive between 3/21/2020 and 12/31/2020 were surveyed approximately 6 months after discharge to assess health-related quality of life using Patient-Reported Outcomes Measurement Information System (PROMIS R)-29 v2.1, post-traumatic stress disorder (PTSD) and loneliness scales. A preference-based health utility score (PROPr) was estimated using 7 PROMIS domain scores. Patients were also asked their attitude about receiving aggressive ICU care.
KEY RESULTS: Of 275 patients admitted to the ICU for severe COVID-19, 205 (74.5%) were discharged alive and 132 (64%, median age 59, 46% female) completed surveys a median of 182 days post-discharge. Anxiety, depression, fatigue, sleep disturbance, ability to participate in social activities, pain interference, and cognitive function were not significantly different from the U.S. general population, but physical function (44.2, SD 11.0) was worse. PROPr mean score of 0.46 (SD 0.30, range -0.02 to 0.96

[<0 is worse than dead and 1 represents perfect health]) was slightly lower than the U.S. general population, with an even distribution across the continuum. Poor PROPr was associated with chronic medical conditions and receipt of life-sustaining treatments, but not demographics or social vulnerability. PTSD was suspected in 20% and loneliness in 29% of patients. Ninety-eight percent of patients were glad they received life-saving treatment.
CONCLUSION: Most patients who survive severe COVID-19 achieve positive outcomes, with health scores similar to the general population at 6 months post-discharge. However, there is marked heterogeneity in outcomes with a substantial minority reporting severely compromised health.
URL: https://pubmed.ncbi.nlm.nih.gov/35382627/

20. Nittas V, Gao M, West EA, et al. Long COVID Through a Public Health Lens: An Umbrella Review. Public Health Rev. 2022;43:1604501.
ABSTRACT: Objectives: To synthesize existing evidence on prevalence as well as clinical and socio-economic aspects of Long COVID. Methods: An umbrella review of reviews and a targeted evidence synthesis of their primary studies, including searches in four electronic databases, reference lists of included reviews, as well as related article lists of relevant publications. Results: Synthesis included 23 reviews and 102 primary studies. Prevalence estimates ranged from 7.5% to 41% in non-hospitalized adults, 2.3%-53% in mixed adult samples, 37.6% in hospitalized adults, and 2%-3.5% in primarily non-hospitalized children. Preliminary evidence suggests that female sex, age, comorbidities, the severity of acute disease, and obesity are associated with Long COVID. Almost 50% of primary studies reported some degree of Long COVID-related social and family-life impairment, long absence periods off work, adjusted workloads, and loss of employment. Conclusion: Long COVID will likely have a substantial public health impact. Current evidence is still heterogeneous and incomplete. To fully understand Long COVID, well-designed prospective studies with representative samples will be essential. Copyright © 2022 Nittas, Gao, West, Ballouz, Menges, Wulf Hanson and Puhan.
URL: https://pubmed.ncbi.nlm.nih.gov/35359614/

21. Nopp S, Moik F, Klok FA, et al. Outpatient Pulmonary Rehabilitation in Patients with Long COVID Improves Exercise Capacity, Functional Status, Dyspnea, Fatigue, and Quality of Life. Respiration. 2022.
ABSTRACT: Background: COVID-19 survivors face the risk of long-term sequelae including fatigue, breathlessness, and functional limitations. Pulmonary rehabilitation has been recommended, although formal studies quantifying the effect of rehabilitation in COVID-19 patients are lacking. Method(s): We conducted a prospective observational cohort study including consecutive patients admitted to an outpatient pulmonary rehabilitation center due to persistent symptoms after COVID-19. The primary endpoint was change in 6-min walk distance (6MWD) after undergoing a 6-week interdisciplinary individualized pulmonary rehabilitation program. Secondary endpoints included change in the post-COVID-19 functional status (PCFS) scale, Borg dyspnea scale, Fatigue Assessment Scale, and quality of life. Further, changes in pulmonary function tests were explored. Result(s): Of 64 patients undergoing rehabilitation, 58 patients (mean age 47 years, 43% women, 38% severe/critical COVID-19) were included in the per-protocol-analysis. At baseline (i.e., in mean 4.4 months after infection onset), mean 6MWD was 584.1 m (+/-95.0), and functional impairment was graded in median at 2 (IQR, 2-3) on the PCFS. On average, patients improved their 6MWD by 62.9 m (+/-48.2, $p < 0.001$) and reported an improvement of 1 grade on the PCFS scale. Accordingly, we observed significant improvements across secondary endpoints including presence of dyspnea ($p < 0.001$), fatigue ($p < 0.001$), and quality of life ($p < 0.001$). Also, pulmonary function parameters (forced expiratory volume in 1 s, lung diffusion capacity, inspiratory muscle pressure) significantly increased during rehabilitation. Conclusion(s): In patients with long COVID, exercise capacity, functional status, dyspnea, fatigue, and quality of life improved after 6

weeks of personalized interdisciplinary pulmonary rehabilitation. Future studies are needed to establish the optimal protocol, duration, and long-term benefits as well as cost-effectiveness of rehabilitation. Copyright © 2022
URL: https://www.karger.com/Article/FullText/522118

22. O'Brien K, Townsend L, Dowds J, et al. 1-year quality of life and health-outcomes in patients hospitalised with COVID-19: a longitudinal cohort study. Respir Res. 2022;23(1):115.
ABSTRACT: BACKGROUND: Published studies suggest physical recovery from the COVID-19 is complex, with many individuals experiencing persistent symptoms. There is a paucity of data investigating the longer-term trajectory of physical recovery from COVID-19.
METHODS: A prospective longitudinal design was utilised to investigate the impact COVID-19 has on physical functioning at 10-weeks (T1), 6-months (T2) and 1-year (T3) post-hospital discharge. Objective measures of recovery included 6-Minute Walk Test Distance (6MWTD), frailty (Clinical Frailty Scale), quantification of falls following hospital-discharge, return to work status and exercise levels. Subjective markers included symptoms (COVID-19-Specific Patient Concerns Assessment), fatigue (Chalder Fatigue Score) and health-related quality of life (HrQOL) [Short-Form-36 Health Survey Questionnaire (SF-36-II)]. Univariate analysis was performed using t-test, Wilcoxon rank-sum, and Chi-squared test, paired analysis using one-way analysis of variance and Krustal Wallis testing and correlation analysis with Spearman correlation tests.
RESULTS: Sixty-one subjects participated. Assessments were conducted at a median of 55 days(T1), 242 days(T2), and 430 days(T3) following hospital-discharge. 6MWTD improved significantly overtime ($F = 10.3$, $p < 0.001$) from 365(209)m at T1 to 447(85)m at T3, however remained below population norms and with no associated improvement in perceived exertion. Approximately half (n = 27(51%)) had returned to pre-diagnosis exercise levels at T3. At least one concern/symptom was reported by 74%, 59% and 64% participants at T1, T2 and T3 respectively. Fatigue was the most frequently reported symptom at T1(40%) and T2(49%), while issues with memory/concentration was the most frequently reported at T3(49%). SF-36 scores did not change in any domain over the study period, and scores remained lower than population norms in the domains of physical functioning, energy/vitality, role limitations due to physical problems and general health. Return-to-work rates are low, with 55% of participants returning to work in some capacity, and 31% of participants don't feel back to full-health at 1-year following infection.
CONCLUSION: Hospitalised COVID-19 survivors report persistent symptoms, particularly fatigue and breathlessness, low HrQOL scores, sub-optimal exercise levels and continued work absenteeism 1-year following infection, despite some objective recovery of physical functioning. Further research is warranted to explore rehabilitation goals and strategies to optimise patient outcomes during recovery from COVID-19.
CLINICAL MESSAGE: Hospitalised COVID-19 survivors report significant ongoing rehabilitation concerns 1-year following infection, despite objective recovery of physical functioning. Our findings suggest those who returned to exercise within 1-year may have less fatigue and breathlessness. The impact of exercise, and other rehabilitative strategies on physical functioning outcomes following COVID-19 should be investigated in future research. Copyright © 2022. The Author(s).
URL: https://pubmed.ncbi.nlm.nih.gov/35509060/

23. Peter RS, Nieters A, Krausslich HG, et al. Prevalence, determinants, and impact on general health and working capacity of post-acute sequelae of COVID-19 six to 12 months after infection: a population-based retrospective cohort study from southern Germany. medRxiv. 2022;15.
ABSTRACT: Background Post-acute sequelae of SARS-CoV-2 infection have commonly been described after COVID-19, but few population-based studies have examined symptoms six to 12 months after

acute SARS-CoV-2 infection and their associations with general health recovery and working capacity. Methods This population-based retrospective cohort study in four geographically defined regions in southern Germany included persons aged 18-65 years with PCR confirmed SARSCoV-2 infection between October 2020 and March 2021. Symptom frequencies (six to 12 months after versus before acute infection, expressed as prevalence differences [PD] and prevalence ratios [PR]), symptom severity and clustering, risk factors and associations with general health recovery, and working capacity were analysed. Findings Among a total of 11 710 subjects (mean age 44.1 years, 59.8% females, 3.5% previously admitted with COVID-19, mean follow-up time 8.5 months) the most prevalent symptoms with PDs >20% and PRs >5% were rapid physical exhaustion, shortness of breath, concentration difficulties, chronic fatigue, memory disturbance, and altered sense of smell. Female sex and severity of the initial infection were the main risk factors. Prevalence rates, however, appeared substantial among both men and women who had a mild course of acute infection, and PCS considerably affected also younger subjects. Fatigue (PD 37.2%) and neurocognitive impairment (PD 31.3%) as symptom clusters contributed most to reduced health recovery and working capacity, but chest symptoms, anxiety/depression, headache/dizziness and pain syndromes were also prevalent and relevant for working capacity, with some differences according to sex and age. When considering new symptoms with at least moderate impairment of daily life and <=80% recovered general health or working capacity, the overall estimate for post-COVID syndrome was 28.5% (age- and sex-standardised rate 26.5%). Interpretation The burden of self-reported post-acute symptoms and possible sequelae, notably fatigue and neurocognitive impairment, remains considerable six to 12 months after acute infection even among young and middle-aged adults after mild acute SARS-CoV-2 infection, and impacts general health and working capacity.
URL: https://www.medrxiv.org/content/10.1101/2022.03.14.22272316v1

24. Rolin S, Chakales A, Verduzco-Gutierrez M. Rehabilitation Strategies for Cognitive and Neuropsychiatric Manifestations of COVID-19. Current Physical Medicine & Rehabilitation Reports. 2022:1-6.
ABSTRACT: Purpose of Review: Extrapulmonary manifestations of COVID-19 are abundant, including after recovery of acute SARS-CoV-2 infection. This review seeks to explore the cognitive and neuropsychiatric manifestations of COVID-19 and post-acute sequelae of SARS-CoV-2 (PASC), including Long COVID syndromes. Furthermore, the review will discuss rehabilitation strategies for the emerging neurological consequences of COVID-19 to help those experiencing long-term effects of COVID-19. Recent Findings: There is emerging evidence depicting the neural involvement of COVID-19. Health priorities have shifted from understanding pathogenesis and treatment of pulmonary symptoms to targeting the acute and chronic sequelae of COVID-19, including cognitive and neuropsychiatric symptoms. The sequelae of COVID-19 often co-occur with other medical problems and is best managed by assessment and care across multiple disciplines. Symptoms following infection are similar to those found by other syndromes and disorders that disrupt the central nervous system.
Summary: The acute and chronic sequelae of COVID-19 have become major targets of current health care providers given its significant public health impact, inclusive of cognitive and neuropsychiatric sequelae. Assessment and referral to rehabilitation based on each individual's needs and symptoms can decrease morbidity and improve quality of life. Copyright © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022.
URL: https://link.springer.com/article/10.1007/s40141-022-00352-9

25. Scibilia SJ, Gendreau SK, Towbin RT, et al. Impact of COVID-19 on Patient-Provider Communication in Critical Care: Case Reports. Crit Care Nurse. 2022:e1-e9.

ABSTRACT: INTRODUCTION: Communication impairment during mechanical ventilation and prolonged critical illness is extremely frustrating and frightening for patients and increases the risk for miscommunication, misinterpretation, and poor outcomes. The COVID-19 pandemic amplified patient communication impairment in intensive care units. This article presents 3 case examples from the experience of a team of hospital-based speech-language pathologists providing augmentative and alternative communication support resources and services to intensive care unit patients treated for COVID-19 during the first wave of the pandemic. Cases were selected to illustrate the protracted and complex in-hospital and rehabilitative recovery of critically ill patients with COVID-19, necessitating creative problem-solving and nursing collaborations with speech-language pathologists to support patient-provider communication.
CLINICAL FINDINGS: The cases demonstrate (1) increased need for bilingual communication resources, (2) impaired cognitive and motor function associated with a variety of post-COVID-19 sequelae including severe critical illness myopathy, and (3) delayed transition to a speaking valve due to the secretion burden.
DIAGNOSES: COVID-19 and acute respiratory distress syndrome (all), cerebral microhemorrhage, multi-system organ failure, hypoxic brain injury, altered mental status, seizure, stroke.
INTERVENTIONS: Multimodal and progressive augmentative and alternative communication interventions included low-technology strategies and simple communication boards, video language interpretation, tracheostomy speaking strategies, and a video intercom system.
OUTCOMES: All patients made progressive gains in communication ability.
CONCLUSION: Evaluation by augmentative and alternative communication specialists and progressive intervention from speech-language pathologists in collaboration with intensive care unit nurses can greatly improve patient-provider communication during treatment for and recovery from COVID-19 and other prolonged critical illnesses. Copyright ©2022 American Association of Critical-Care Nurses.
URL: https://pubmed.ncbi.nlm.nih.gov/35388397/

26. Sirayder U, Inal-Ince D, Kepenek-Varol B, et al. Long-Term Characteristics of Severe COVID-19: Respiratory Function, Functional Capacity, and Quality of Life. International Journal of Environmental Research & Public Health [Electronic Resource]. 2022;19(10):23.

ABSTRACT: Recovery from pneumonia takes around 3-6 months in individuals with severe COVID-19. In order to detect the isolated damage caused by COVID-19, the 6-month period must pass after the recoveries. However, to our knowledge, no published study analyzes a comprehensive evaluation of individuals with severe COVID-19 after 6 months. We aimed to evaluate long-term consequences of severe COVID patients by comparing respiratory function, functional capacity, quality of life, fatigue, and balance 6 months after the intensive care unit (ICU) discharge with healthy individuals.
METHOD: 26 post-COVID adult patients and 26 healthy individuals (control group) were included in this study. Physical characteristics of both groups and patients' ICU data, including APACHE II scores, were recorded. Lung function, respiratory, and peripheral muscle strength were measured. The lower limit of normal (LLN) cutoff points for forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) were calculated. A 6-minute walk test (6MWT) was used to assess functional capacity. Time Up and Go test (TUG) with a stadiometer was performed for balance evaluation. Quality of life was evaluated using Nottingham Health Profile (NHP) and St George Respiratory Questionnaire (SGRQ).
RESULTS: Percent predicted FVC and FEV1, 6MWT distance, change in oxygen saturation (SpO2) during 6MWT, were lower and NHP, SGRQ, FSS scores and TUG findings were higher in the COVID group than the control group ($p < 0.05$). The FVC of nine individuals and the FEV1 value of seven individuals in the COVID-19 group were below the LLN values. A moderate correlation was found between ICU length of

stay and APACHE II scores with FVC, FEV1, 6MWT distance, and change in SpO2 values in the COVID-19 patients ($p < 0.05$).
CONCLUSION: Respiratory function, functional capacity, quality of life, and fatigue levels of the individuals with severe COVID-19 infection are impaired at 6 months after ICU discharge. Impaired lung function might be associated with severe inflammation, which starts during the acute infection process and the fibrous tissue during the healing process, impairing lung compliance and diffusion capacity. Infiltration of coronavirus and inflammatory cytokines into the cerebrum and muscle might have increased fatigue and decreased functional capacity. Overall, our study suggests that severe COVID patients need post-discharge care even after 6 months of recovery.
URL: https://pubmed.ncbi.nlm.nih.gov/35627841/

27. Tobler DL, Pruzansky AJ, Naderi S, et al. Long-Term Cardiovascular Effects of COVID-19: Emerging Data Relevant to the Cardiovascular Clinician. Current Atherosclerosis Reports. 2022;04:04.
ABSTRACT: PURPOSE OF REVIEW: COVID-19 is now a global pandemic and the illness affects multiple organ systems, including the cardiovascular system. Long-term cardiovascular consequences of COVID-19 are not yet fully characterized. This review seeks to consolidate available data on long-term cardiovascular complications of COVID-19 infection.
RECENT FINDINGS: Acute cardiovascular complications of COVID-19 infection include myocarditis, pericarditis, acute coronary syndrome, heart failure, pulmonary hypertension, right ventricular dysfunction, and arrhythmia. Long-term follow-up shows increased incidence of arrhythmia, heart failure, acute coronary syndrome, right ventricular dysfunction, myocardial fibrosis, hypertension, and diabetes mellitus. There is increased mortality in COVID-19 patients after hospital discharge, and initial myocardial injury is associated with increased mortality. Emerging data demonstrates increased incidence of cardiovascular illness and structural changes in recovered COVID-19 patients. Future research will be important in understanding the clinical significance of these structural abnormalities, and to determine the effect of vaccines on preventing long-term cardiovascular complications.
URL: https://pubmed.ncbi.nlm.nih.gov/35507278/

28. Xie Y, Al-Aly Z. Risks and burdens of incident diabetes in long COVID: a cohort study. Lancet Diabetes Endocrinol. 2022;10(5):311-21. DOI: 10.1016/S2213-8587(22)00044-4
ABSTRACT: BACKGROUND: There is growing evidence suggesting that beyond the acute phase of SARS-CoV-2 infection, people with COVID-19 could experience a wide range of post-acute sequelae, including diabetes. However, the risks and burdens of diabetes in the post-acute phase of the disease have not yet been comprehensively characterised. To address this knowledge gap, we aimed to examine the post-acute risk and burden of incident diabetes in people who survived the first 30 days of SARS-CoV-2 infection. METHODS: In this cohort study, we used the national databases of the US Department of Veterans Affairs to build a cohort of 181 280 participants who had a positive COVID-19 test between March 1, 2020, and Sept 30, 2021, and survived the first 30 days of COVID-19; a contemporary control (n=4 118 441) that enrolled participants between March 1, 2020, and Sept 30, 2021; and a historical control (n=4 286 911) that enrolled participants between March 1, 2018, and Sept 30, 2019. Both control groups had no evidence of SARS-CoV-2 infection. Participants in all three comparison groups were free of diabetes before cohort entry and were followed up for a median of 352 days (IQR 245-406). We used inverse probability weighted survival analyses, including predefined and algorithmically selected high dimensional variables, to estimate post-acute COVID-19 risks of incident diabetes, antihyperglycaemic use, and a composite of the two outcomes. We reported two measures of risk: hazard ratio (HR) and burden per 1000 people at 12 months. FINDINGS: In the post-acute phase of the disease, compared with

the contemporary control group, people with COVID-19 exhibited an increased risk (HR 1·40, 95% CI 1·36-1·44) and excess burden (13·46, 95% CI 12·11-14·84, per 1000 people at 12 months) of incident diabetes; and an increased risk (1·85, 1·78-1·92) and excess burden (12·35, 11·36-13·38) of incident antihyperglycaemic use. Additionally, analyses to estimate the risk of a composite endpoint of incident diabetes or antihyperglycaemic use yielded a HR of 1·46 (95% CI 1·43-1·50) and an excess burden of 18·03 (95% CI 16·59-19·51) per 1000 people at 12 months. Risks and burdens of post-acute outcomes increased in a graded fashion according to the severity of the acute phase of COVID-19 (whether patients were non-hospitalised, hospitalised, or admitted to intensive care). All the results were consistent in analyses using the historical control as the reference category. INTERPRETATION: In the post-acute phase, we report increased risks and 12-month burdens of incident diabetes and antihyperglycaemic use in people with COVID-19 compared with a contemporary control group of people who were enrolled during the same period and had not contracted SARS-CoV-2, and a historical control group from a pre-pandemic era. Post-acute COVID-19 care should involve identification and management of diabetes. FUNDING: US Department of Veterans Affairs and the American Society of Nephrology.
URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8937253/
DOI: 10.1016/S2213-8587(22)00044-4

29. Zhang J, Shu T, Zhu R, et al. The Long-Term Effect of COVID-19 Disease Severity on Risk of Diabetes Incidence and the Near 1-Year Follow-Up Outcomes among Postdischarge Patients in Wuhan. Journal of Clinical Medicine. 2022;11(11) (no pagination)(3094).
ABSTRACT: We assessed the nearly 1-year health consequences following discharge and related risk factors of COVID-19 infection and further explored the long-term effect of COVID-19 disease severity on the risk of diabetes incidence. This prospective study included 248 COVID-19 patients discharged from Wuhan Hospital of Traditional Chinese Medicine who were followed up between 1 March and 10 June 2021. Logistic regression models were used to evaluate risk fac-tors. The top ten symptoms were shortness of breath (30.3%), sore or dry throat (25.7%), cough (23.2%), expectoration (23.2%), body pain (22.3%), chest tightness (20.8%), palpitations (17.8%), sleep difficulties (17.0%), fatigue (16.6%), and anxiety (15.3%). Hypertension was associated with fatigue (OR = 2.51, 95% CI: 1.08, 5.80), shortness of breath (OR = 2.34, 95% CI: 1.16, 4.69), palpitations (OR = 2.82, 95% CI: 1.26, 6.31), expectoration (OR = 2.08, 95% CI: 1.01, 4.30), and sore or dry throat (OR = 2.71, 95% CI: 1.30, 5.65). Diabetes was associated with palpitations (OR = 3.22, 95% CI: 1.18, 8.81). Critical illness was associated with an increased risk of diabetes incidence after discharge (OR = 2.90, 95% CI: 1.07, 7.88), which seemed more evident in males. Long COVID-19 symptoms were common at 1-year postdischarge; hypertension and diabetes could be projected as potential risk factors. We are among the first researchers to find that critical illness is associated with incident diabetes after discharge.
URL: https://www.mdpi.com/2077-0383/11/11/3094/html

Appendix 1: Evidence Search Details

Filters, Limits & Exclusions:	English only March 11, 2022 – June 3, 2022

Sources Searched:	• Agency for Clinical Innovation and New South Wales Government • CanCOVID • CDC • CoronaCentral • COVID-END • COVID-19 Best Evidence Front Door, University if Michigan • COVID-19 Immunity Task Force • ECDC • Embase • Google • Knowledge for Healthcare Search Bank (NHS) • Medline	• National Health Library & Knowledge Service (Ireland) • National Collaborating Centre for Infectious Diseases • National Collaborating Centre for Methods and Tools (NCCMT) • Newfoundland and Labrador Centre for Applied Health Research • Ontario Science Table • Prevent Epidemics • Public Health Ontario • Strategy for Patient-Orient Research (SPOR) Evidence Alliance • USHER Netowkr for COVID-19 Evidence Reviews (UNCOVER), University of Edinburgh
Librarian(s):	Brianna Howell-Spooner, Clinical Librarian, Saskatchewan Health Authority	

Appendix 2: Search Strategies

Medline

#	Searches	Results
1	(coronavirus/ or betacoronavirus/ or coronavirus infections/ or covid-19/) and (disease outbreaks/ or epidemics/ or pandemics/)	83961
2	(nCoV* or 2019nCoV or 19nCoV or COVID19* or COVID or SARS-COV-2 or SARSCOV-2 or SARSCOV2 or Severe Acute Respiratory Syndrome Coronavirus 2 or Severe Acute Respiratory Syndrome Corona Virus 2).ti,ab,kf,nm,ox,rx,px.	251141
3	((new or novel or "19" or "2019" or Wuhan or Hubei or China or Chinese) adj3 (coronavirus* or corona virus* or betacoronavirus* or CoV or HCoV)).ti,ab,kf.	70483
4	((coronavirus* or corona virus* or betacoronavirus*) adj3 (pandemic* or epidemic* or outbreak* or crisis)).ti,ab,kf.	12534
5	((Wuhan or Hubei) adj5 pneumonia).ti,ab,kf.	396
6	or/1-5	259875
7	limit 6 to (english language and yr="2022 -Current")	58047
8	Long Term Adverse Effects/ or Recurrence/ or Symptom Flare Up/ or Symptom Assessment/	203596

9	((long-term or long term or long-tail or long tail or longitudinal* or chronic* or persist* or permanent or prolong* or ongoing or recurr* or lasting or long-lasting* or linger*) adj2 (symptom* or complicat* or consequence* or outcome* or effect* or aftereffect? or after-effect? or after effect? or manifest*)).ti,ab,kw,kf.	351477
10	(sequela* or long-COVID* or long COVID* or chronic-COVID or chronic COVID or long-hauler? or long hauler?).ti,ab,kw,kf.	78335
11	or/8-10	612664
12	(post-acute or postacute or post-hospital* or posthospital* or post-discharg* or postdischarg*).ti,ab,kw,kf.	20020
13	(postcovid* or post-covid* or postcoronavirus* or post-coronavirus*).ti,ab,kw,kf.	3996
14	("long-term COVID" or "long term COVID" or persistent COVID or long-haul* COVID or long haul* COVID).ti,ab.	202
15	or/12-14	23939
16	7 and 11 and 15	559
17	Longitudinal Studies/ or Follow-Up Studies/	826732
18	((study or studies) adj1 (follow-up or follow up or follow up or longitudinal)).ti,ab,kw,kf.	148842
19	17 or 18	888017
20	public health informatics/ or models, statistical/ or models, theoretical/ or logistic models/ or models, biological/ or computer simulation/ or nonlinear dynamics/	882642
21	(novel agent-based simulation framework* or novel agent based simulation framework* or agent based model* or public health informatics or public-health informatics or ((statistical or probabilistic or theoretic* or biologic* or experimental or mathematical or logistic or logit or computer* or non-linear or nonlinear) adj2 model*) or computer simulation* or nonlinear dynamic* or non-linear dynamic*).ti,ab.	348118
22	20 or 21	1122936
23	patient reported outcome measures/ or outcome assessment, health care/ or health impact assessment/ or morbidity/ or quality of life/ or sickness impact profile/ or economics, medical/ or "severity of illness index"/ or patient acuity/ or "health services needs and demand"/ or health care sector/ or health services research/	700355
24	(impact or outcome? or patient reported outcome? measure? or patient-reported outcome? measure? or PROMs or PROM or patient reported experience? measure? or patient-reported outcome? measure? or PREM or PREMs or morbidit* or mortalit* or "quality of life" or life quality or	3973410

	QoL or HRQoL or "health-related quality of life" or health impact assessment? or ((sickness or illness or disease) adj1 (impact or severity)) or medical economics or patient acuit* or ((healthcare or health) adj2 (need* or demand)) or health service? research or health service evaluation? or healthcare research or health care research or medical care research).ti,ab.	
25	23 or 24	4284758
26	16 and 19	33
27	16 and 22	10
28	16 and 25	260
29	26 or 27 or 28	273
30	limit 29 to dt=20220311-20220602	123

Embase

#	Searches	Results
1	sars-related coronavirus/	509
2	(coronavirinae/ or betacoronavirus/ or coronavirus infection/) and (epidemic/ or pandemic/)	10874
3	(nCoV* or 2019nCoV or 19nCoV or COVID19* or COVID or SARS-COV-2 or SARSCOV-2 or SARS-COV2 or SARSCOV2 or SARS coronavirus 2 or Severe Acute Respiratory Syndrome Coronavirus 2 or Severe Acute Respiratory Syndrome Corona Virus 2).ti,ab,kw,hw,ot.	270460
4	((new or novel or "19" or "2019" or Wuhan or Hubei or China or Chinese) adj3 (coronavirus* or corona virus* or betacoronavirus* or CoV or HCoV)).ti,ab,kw,hw,ot.	234978
5	((coronavirus* or corona virus* or betacoronavirus*) adj3 (pandemic* or epidemic* or outbreak* or crisis)).ti,ab,kw,ot.	14575
6	((Wuhan or Hubei) adj5 pneumonia).ti,ab,kw,ot.	456
7	or/1-6	292320
8	limit 7 to yr="2022 -Current"	59882
9	recurrent disease/ or symptom assessment/	209543
10	((long-term or long term or long-tail or long tail or longitudinal* or chronic* or persist* or permanent or prolong* or ongoing or recurr* or lasting or long-lasting* or linger*) adj2 (symptom* or complicat* or consequence* or outcome* or effect* or aftereffect? or after-effect? or after effect? or manifest*)).ti,ab,kw.	502960

11	(sequela* or long-COVID* or long COVID* or chronic-COVID or chronic COVID or long-hauler? or long hauler?).ti,ab,kw.	98073
12	9 or 10 or 11	785169
13	(post-acute or postacute or post-hospital* or posthospital* or post-discharg* or postdischarg*).ti,ab,kw.	32192
14	(postcovid* or post-covid* or postcoronavirus* or post-coronavirus*).ti,ab,kw.	4798
15	("long-term COVID" or "long term COVID" or persistent COVID or long-haul* COVID or long haul* COVID).ti,ab.	244
16	13 or 14 or 15	36913
17	8 and 12 and 16	665
18	Longitudinal Studies/ or Follow Up/	1963307
19	((study or studies) adj1 (follow-up or follow up or follow up or longitudinal)).ti,ab,kw.	186866
20	18 or 19	2024870
21	medical informatics/ or statistical model/ or theoretical model/ or statistical model/ or biological model/ or computer simulation/ or nonlinear system/	561462
22	(novel agent-based simulation framework* or novel agent based simulation framework* or agent based model* or public health informatics or public-health informatics or ((statistical or probabilistic or theoretic* or biologic* or experimental or mathematical or logistic or logit or computer* or non-linear or nonlinear) adj2 model*) or computer simulation* or nonlinear dynamic* or non-linear dynamic*).tw,kw.	435593
23	21 or 22	914344
24	patient-reported outcome/ or outcome assessment/ or health impact assessment/ or morbidity/ or "quality of life"/ or Sickness Impact Profile/ or health economics/ or "severity of illness index"/ or disease severity/ or patient acuity/ or "health care cost"/ or health services research/	2347768
25	(impact or outcome? or patient reported outcome? measure? or patient-reported outcome? measure? or PROMs or PROM or patient reported experience? measure? or patient-reported outcome? measure? or PREM or PREMs or morbidit* or mortalit* or "quality of life" or life quality or QoL or HRQoL or "health-related quality of life" or health impact assessment? or ((sickness or illness or disease) adj1 (impact or severity)) or medical economics or patient acuit* or ((healthcare or health) adj2 (need* or demand)) or health service? research or health service evaluation? or healthcare research or health care research or medical care research).tw,kw.	5713673
26	23 or 24	3212089

27	17 and 20	178
28	17 and 23	7
29	17 and 26	211
30	27 or 28 or 29	313
31	limit 30 to english language	307
32	limit 31 to dd=20220311-20220602	98
33	limit 32 to medline	14
34	32 not 33	84

Other Sources
Long haul or long COVID