

TABLE 1: PASC cognitive symptom assessment recommendations

#	Statement
1	Patients should be screened for signs of cognitive symptoms using validated tools and instruments. (See Table 2 for commonly used tools/instruments).
2	Patients should be evaluated for conditions that may exacerbate cognitive symptoms and warrant further testing and potential subspecialty referral (see Table 3). Particular areas include: • Sleep impairment • Mood, including anxiety, depression, and posttraumatic stress disorder • Fatigue • Endocrine abnormalities • Autoimmune disorders Note: Patients often report dissatisfaction with their care because of their persistent symptoms being attributed to psychological factors. It is important to note that mood disorders may be secondary to persistent medical conditions or one of many factors leading to cognitive symptoms..
3	Patients should have a thorough neurological examination to identify focal neurological deficits.
3a	For those patients identified with new or worsening focal neurological deficits (including new or worsening cognitive symptoms) an emergent evaluation is warranted; neuroimaging should be considered.
4	The following basic lab workup should be considered to screen for reversible factors contributing to cognitive symptoms. The initial lab workup in new patients or those without lab workup in the 3 months prior to visit including complete blood count, vitamin B12, thiamine, folate, homocysteine, 1,25-dihydroxy vitamin D, magnesium, liver function tests, comprehensive metabolic panel thyroid function tests (thyroid stimulating hormone, free T3, free T4). In high-risk patients, one may consider syphilis rapid plasma regain and human immunodeficiency virus testing. Other laboratory tests may be considered based on the results of these tests or if there is specific concern for comorbid conditions as outlined in Table 3.
5	Clinicians should conduct a full patient history with review of preexisting conditions and comprehensive medication and supplement review for those that may contribute to cognitive symptoms. Of note, patients with PASC often present on antihistamine, anticholinergic, and antidepressant/anxiolytic medications that can contribute to cognitive symptoms.
5a	Clinicians should validate patient history through the collection of collateral history, including preexisting function and conditions, from care team/primary care, patient family or care partner, or close contact as available.
6	Clinicians should assess impact of cognitive symptoms using standardized patient-reported assessments, to include activities of daily living, instrumental activities of daily living, school, work and avocational (ie, hobbies), and quality of life.

Abbreviation: PASC, postacute sequelae of SARS-CoV-2 infection.

TABLE 2: Cognitive symptom screening tools

Assessment tool	Areas of assessment	Administration time	Pros	Limitations
▶ Montreal Cognitive Assessment (MoCA)^a	Visuospatial/Executive, Naming, Memory, Attention, Verbal Fluency, Abstraction, Delayed Recall and Orientation	10 minutes in healthy adults	- Available in 55 languages - Versions for illiterate/low education and blind individuals (can be used in virtual setting) - Designed for brief assessment of cognitive impairment across medical/neurological populations - Better than MMSE in detecting mild cognitive impairment (MCI)^b and dementia	- Requires training and certification to use - Fees required for training, certification and access to assessment tool
▶ Mini-Mental State Examination (MMSE)^b	Orientation, Recognition, Attention, Calculation, Recall and Language	5 to 10 minutes	- One of the most highly used measures in the United States - Requires no additional equipment - Can provide a method of monitoring deterioration over time	- Biased against people with poor education because of elements of language and mathematical testing - Bias against visually impaired - Limited examination of visuospatial cognitive ability - Poor sensitivity at detecting mild/early dementia - Not available via public domain (cost to use) - Low ceiling - Lack of sensitivity to MCI in young high functioning individuals
▶ Saint Louis University Mental Status Examination (SLUMS)^c	Orientation, Attention, Calculation, Verbal Fluency, Memory, Clock Drawing and Recognition	7 to 10 minutes	- Education-based norms - Superior to the MMSE - Can detect MCI	No executive components
▶ Mini-Cog^d	Memory, Planning	4 minutes	- Developed and validated for primary care setting - Informant/caregiver component - Quick measure that does not interfere with work flow	Assesses only very shortterm memory and planning
▶ Short Test of Mental Status (STMS)^e	Orientation, Recall, Calculation, Abstraction, Information, Construction and Copying, Digit Span	5 minutes	Intended to be more sensitive to problems of learning and mental agility that may be seen in MCI. Incorporates brevity and reasonable sensitivity and specificity for primary care in clinical practice.	Fewer items for assessing aspects of executive function as compared to the MoCA

^aMoCA: <https://www.mocatest.org/>.

^bMMSE: <https://www.parinc.com/Products/Products/Pkey/238>.

^cSLUMS: https://www.slu.edu/medicine/internal-medicine/geriatric-medicine/aging-successfully/pdfs/slums_form.pdf.

^dMini-Cog: <https://mini-cog.com/>.

^eSTMS: <https://d3hjf51r9j54j7.cloudfront.net/wp-content/uploads/sites/5/2011/08/Short-Test-of-Mental-Status.pdf>.

TABLE 3: Common manifestations, symptoms, additional testing/studies, and referral options for cognitive symptoms

	Common Symptoms and Signs	Further studies to consider in addition to basic laboratory evaluation	Referral
► Neurologic	Symptoms: headache, weakness, numbness, cognitive or communication dysfunction, difficult walking, bowel or bladder dysfunction Signs: focal weakness, abnormal, cognitive screening, ataxia, hyperreflexia, aphasia, apraxia	For selected cases, neuroimaging including head computerized tomography (CT); MRI, electroencephalography (EEG)	Neurology, brain injury medicine psychiatry
► Endocrine	Symptoms: palpitations, fatigue, dizziness, weight gain/loss, sense of chills/fever, irregular menstrual cycle, poor diabetic control, excessive thirst/urination Signs: tachycardia, poor activity tolerance, weight gain/loss, low/elevated temperature, elevated finger-stick/urine glucose, ketotic (fruity) breath, bone pain, risk factors for malnutrition (eg, “tea and toast” diet or alcohol abuse)	Thyroid stimulating hormone (TSH)/free T4 (thyroxine), cortisol levels, growth hormone, luteinizing hormone (LH), follicle stimulating hormone (FSH), testosterone (men), estradiol (women) As in acquired brain injury, new neuroendocrine dysfunction may be present, assess serum cortisol, growth hormone (IGF-I), testosterone, estradiol, prolactin.	Endocrinology
► Autoimmune or infectious	Symptoms: rash, joint/muscle pain and stiffness, fever, mouth sores/ ulcers, cold/ pale/blue/red fingers, sharp chest pain, numbness/tingling/ burning in fingers/toes, blurry/decreased vision Signs: rash, arthropathy/swelling/warmth, decreased range of motion, myopathy/tenderness/weakness, fever, Raynaud’s phenomena, pleuritic pain on deep breathing, altered sensation, decreased visual acuity	Cytokine storming may induce or unmask autoimmune disease so consider ANA, RF, cyclic citrullinated peptide antibody, HLA B-27 antigen, antithyroid peroxidase antibodies, antiphospholipid antibodies Depending on the patient history, one may add HIV and syphilis (RPR) screening. HSV, EBV, Lyme disease, and Whipple’s disease are other less common causes. ⁵⁴ Consider mast cell activation syndrome assessment.	Rheumatology, infectious disease
► Mood disorders	Symptoms: anxiety, irritability, chest tightness, low frustration tolerance, depression, fatigue, mood swings, palpitations, change in memory/recall Signs: flat affect/low mood, emotional lability that is, crying/laughing inappropriately, limited impulse control, psychosis	Screening assessments for behavioral health conditions assist to disentangle psychiatric conditions from cognition impairments and may include assessments of anxiety, depression and posttraumatic stress disorder (PTSD): Hospital Anxiety and Depression Scale (HADS), Beck Depression Inventory (BDI) fast screen; Geriatric Depression Scale (GDS); Patient Health Questionnaire for depression (PHQ-2/9), (or PHQ-8 removing the suicidal thoughts question when immediate review and attention is not available); Generalized Anxiety	Disorder 7 (GAD-7); PTSD Checklist-5 Psychiatry, psychology neuropsychology
► Sleep disorders	Symptoms: Poor sleep - hard to get to sleep/wakes frequently/wakes early, nonrestorative/refreshing sleep - “tired” on waking, snoring, frequent urination at night, bad dreams/nightmares, falls asleep during the day Signs: snoring, restless legs, observed apneic episodes, hypertension, arrhythmias, narcolepsy, congestive heart failure, impaired cognition, poorly controlled mood disorder, metabolic dysfunction: glucose intolerance	Restorative sleep can be assessed using the Epworth Sleepiness Scale (ESS), Stanford Sleepiness Scale, PROMIS Sleep, or Sleep Scale Survey, Insomnia Severity Index screen Sleep apnea evaluation: STOP-BANG questionnaire; overnight sleep study with oximetry to assess for obstructive or central sleep apnea, benefit of CPAP/BIPAP, and oral appliances	Pulmonology - sleep medicine

Abbreviations: ANA, antinuclear antibody; CPAP/BIPAP, continuous positive airway pressure/bilevel positive airway pressure; CT, computed tomography; EBV, Epstein-Barr virus; EEG, electroencephalogram; HLA, human leukocyte antigen; HSV, herpes simplex virus; IGF-I, insulin-like growth factor I; MRI, magnetic resonance imaging; PROMIS, Patient-Reported Outcomes Measurement Information System; RF, rheumatoid factor; RPR, rapid plasma reagin.

TABLE 4: Neurocognitive assessment tools and therapeutic intervention strategies by cognitive domain

Cognitive domain*	Patient concerns	Assessment tools	Therapeutic interventions
► Attention	- Brain fog - Difficulty with concentration on tasks - Losing train of thought - Misplacing objects - Miscalculation - Easily distracted	- Digit Span - Digit Vigilance Test - Cancellation	Attention process training for verbal and nonverbal tasks, metacognitive strategies, timed structured activities, minimize distractions.
► Processing speed	- Slowed thought processes - Difficulty following conversations	- Brain fog - Difficulty with concentration on tasks - Losing train of thought - Misplacing objects - Miscalculation - Easily distracted	Recording talks, lectures, etc. to review at own pace; practicing skills repeatedly towards automaticity; breaking projects to components to complete over time.
► Motor function/ speed Language	- Slowed motor function - Word finding difficulty during conversation - Grasping for words - Verbal fluency - Difficulty with comprehension of multiple step instructions due to changes in recall and comprehension	- Grooved Pegboard - Letter Fluency - Category Fluency - Boston Naming Test - Neuropsychological Assessment Battery (NAB) Naming - Multilingual Aphasia Examination (MAE) Token Test - Portions of the Western Aphasia Battery-R - Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN)	Use of dictation devices (speech to text). Semantic feature analysis, word finding strategies, use word associations, convergent/divergent naming tasks, anagrams. Structured tasks with speech-language pathology (SLP) to address various domains, such as comprehension, recall, word finding, thought organization, identification of strategies for all domains that are impaired based on assessments.
► Memory	- Poor learning and recall of novel information - Forgetting daily activities and to do tasks	- California Verbal Learning Test-III - Hopkins Verbal Learning Test - Rey Auditory Verbal Learning Test - Brief Visual Memory Test - Rey-Osterrieth Complex Figure Test - Wechsler Memory Scale-IV	Use of memory strategies during structured tasks, identify strengths (visual vs auditory, note taking, repetition, rehearsal, etc.), use of phone or smartphone applications, calendar, day planner, to do lists.

TABLE 4: Neurocognitive assessment tools and therapeutic intervention strategies by cognitive domain (continued)

Cognitive domain*	Patient concerns	Assessment tools	Therapeutic interventions
► Mental fatigue	Mental exhaustion/brain fog due to sensory stimulation or after completing cognitive tests for extended periods without breaks	- Mental Fatigue Scale⁵⁵ - State Trait Inventory of Cognitive Fatigue (STI-CF)	Energy Envelope Theory: maintaining expended energy levels consistent with available energy levels may reduce the frequency and severity of symptoms.⁵⁶ Mindfulness-Based Stress Reduction (MBSR): method of using meditation and yoga to cultivate awareness and reduce stress.⁵⁷
► Executive function	- Error monitoring, for example, increased frequency of errors made in work/school performance - Trouble planning, organizing and sequencing (e.g., cooking, finances) - Difficulty multitasking	- Trails B - Stroop Color Word - Delis-Kaplan Executive Function Scales - Tower of London - Wisconsin Card Sorting Test - Functional Assessment of Verbal Reasoning and Executive Strategies (FAVRES)	Training in metacognitive strategies to promote self-awareness and self-monitoring. Examples of metacognitive strategies: Goal-Plan-Do-Review, self-talk, Goal Management Training (Stop-Think - Plan), Predict-Perform Technique. Use of organizational aids (calendar, filing system, daily checklist for chores/tasks, etc.), alarms/reminders on a phone or smartwatch, creating routines, placing items at the same place.
► Visuospatial or visuoconstruction skills	Blurred vision, depth perception, neglect	- Line Orientation - Figure Copy - Clock Drawing Test - Rey-Osterrieth Complex Figure Test - The Bells Test	Use of language-mediated strategies such as self-talk or verbalization to solve problems or remember information. Application of compensatory strategies/aids for writing and organization, including use of graph or lined paper, limiting problems or text on a page, and highlighting key words or text to remember. Use of visual cancellation tasks, strategies for visual organization such as scanning from left to right, top to bottom for symbols, shapes, numbers, etc. Verbalize maps (eg, use of global positioning system [GPS]).

*Influence of effort on subjective cognitive concerns and performance-based neuropsychological test results should be considered, consistent with literature on standardized cognitive assessments following mild traumatic brain injury.⁵⁸ All above measures in addition to performance-based validity measured should be administered and interpreted by doctoral-level trained professional with dedicated training in neurocognitive testing.

TABLE 5: PASC cognitive symptom treatment recommendation



#	Statement
1	For patients who screen positive for cognitive symptoms, refer to a specialist (ie, speech-language pathologist, occupational therapist, neuropsychologist) with expertise in formal cognitive assessment and remediation. (See Table 3 for specialist referral options; and Table 4 for examples of Assessment Tools and Intervention Options by Cognitive Domain.)
2	Treat, in collaboration with appropriate specialists, underlying medical conditions, such as pain, insomnia/sleep disorders (including poor sleep hygiene), and mood disorders that may be contributing to cognitive symptoms.
3	Complete, in collaboration with patient primary care provider, medication polypharmacy reduction, weaning or deprescribing medications if medically feasible with emphasis on medications that may impact cognition
4	Reinforce sleep hygiene techniques including nonpharmacologic approaches as first line of sleep remediation.
5	Similar to patients experiencing “physical” fatigue, patients should be advised to begin an individualized and structured, titrated return to activity program.
5a	For patients who achieve a return to their normal, daily activities, regular exercise (at least 2–3 times/week of aerobic exercise) may be effective in improving cognition and also contribute to improved sleep patterns.
5b	Frequent assessment of the impact of return to normal, daily activities (including school, work, driving, operating heavy machinery, etc.) is recommended to ensure that symptoms do not flare and exercise is tolerated.

Abbreviation: PASC, postacute sequelae of SARS-CoV-2 infection.

TABLE A1: Health equity considerations and examples in postacute sequelae of SARS-CoV-2 infection (PASC): Cognitive symptom

Category	Comment	What is known	Clinical considerations
► Racial / ethnic minority groups <i>Example: People who identify as Black (including African-American), American-Indian/Alaska Native, Pacific Islander, Asian-American, and Mixed Race, and/or Latino/Hispanic (ethnicity)</i>	Racial/ethnic minority groups may have multiple factors that affect their overall cognitive scores.	Cognitive testing may be biased or inaccurate in people who identify with racial/ethnic minority groups or other marginalized groups owing to a variety of issues such as not having English as a primary language, not properly accounting for variations in dialect or education level, and stereotype threat. ^{HE-CI-1} Stereotype threat refers to an important psychological phenomenon in which concern of following negative stereotypes about one's group impairs task performance. ^{HE-CI-2}	Stereotype threat is common, particularly among non-White students, and interferes with learning. ^{HE-CI-2} Clinicians administering cognitive testing that may elicit stereotype threat should be aware of factors that may affect test scores and clinical recommendations.
► Biologic sex <i>Example: Female Adults</i>	Physiologic and biologic sex differences should be considered for both the diagnosis and treatment of PASC-related cognitive dysfunction.	Pregnant women frequently have pregnancy-related fatigue, and they may be at higher risk for more severe COVID-19 infections and symptoms, particularly women who have certain comorbidities and other characteristics (eg, older age, diabetes, kidney disease, obesity). ^{HE-CI-13}	Pregnant or postpartum women may experience fatigue, insomnia, and cognitive dysfunction that can be challenging to distinguish from PASC-related cognitive symptoms. Pregnant women may need alternatives to diagnostic testing (eg, computed tomography due to radiation exposure) to avoid potential harm to the fetus. The risks and benefits of medications and other treatment interventions should be assessed for both mother and fetus. Exercise prescriptions may be impacted by symptoms such as excessive vomiting and weight loss in the first trimester and large girth, back pain, or pre-eclampsia in the third trimester.
► Gender <i>Example: Women</i>	There may be differences in the reporting of PASC-related symptoms by gender.	Women may report PASC-related symptoms more than men, with a common symptom being cognitive impairment. ^{HE-CI-3,HE-CI-4,HE-CI-5}	More studies are needed to better determine the incidence and prevalence of post-COVID cognitive symptoms across the gender spectrum (eg, men, women, nonbinary and gender nonconforming identities). Additional PASC-related findings of fatigue, insomnia, and mood disorders may also contribute to cognitive symptoms.

TABLE A1: Health equity considerations and examples in postacute sequelae of SARS-CoV-2 infection (PASC): Cognitive symptom (continued)

Category	Comment	What is known	Clinical considerations
► Age <i>Example: Older individuals</i>	Healthy older individuals as well as those with mild cognitive symptoms and dementia have among the highest rates of COVID-19 infection. Older people may actually have or be perceived as having cognitive symptoms.	Cognitive symptoms in healthy older individuals as well as those with mild cognitive impairment or dementia may be due to direct or indirect effects of the virus.^{HE-CI-6} In addition to PASC-related cognitive symptoms, older individuals are at higher risk for preexisting cognitive conditions such as Alzheimer's disease, stroke, and Parkinson's disease. Delirium is also more common in older people. Polypharmacy and inappropriate dosing may also affect cognition. Age-related disability such as impaired vision or hearing may affect cognitive testing.	Cognitive testing should be conducted by clinicians experienced in working with older individuals. A review of all medications (including over the counter drugs and supplements) is critical in this population. Vision and hearing should be checked and for correctable impairments and interventions should be prescribed. Screening for depression and sleep disorders is appropriate. Alcohol and other substance use should not be overlooked in this population as it may contribute to cognitive symptoms.
► Environmental exposure <i>Example: People who live in low socioeconomic environments that expose them to various types of environment-related stressors</i>	Social determinants of health (SDOH) include the conditions in which people are born, work, live, and age and the wider set of forces and systems that shape the conditions of daily life. SDOH often focus on environmental exposures that may negatively impact cognitive function which may be exacerbated by PASC-related cognitive symptoms.	Both children and older individuals exposed to air pollution exhibit signs of cognitive dysfunction.^{HE-CI-7} Several modifiable risk factors have been found to have a higher risk of cognitive function in the form of Alzheimer's disease and related dementias (ADRDs): neighborhoods that are economically underinvested with insufficient physical resources, lower food security in early and late life, lower socioeconomic status, less education, manual labor for employment, racial discrimination, higher levels of stress, and early-life adversity.^{HE-CI-8}	The incorporation of healthy lifestyle practices is a strong recommendation for physical and cognitive health. Recovery from PASC-related cognitive dysfunction may be impacted by exposure to the natural and psychosocial environment in which people live. Clinicians should be aware of environmental-related stressors, and provide interventions that aim to decrease them whenever possible. Referrals to a local food bank and other community resources can be very helpful to individuals. People knowledgeable about these types of resources include, but are not limited to, medical social workers and community leaders. Appropriate referrals can facilitate physical and cognitive health recovery.

TABLE A1: Health equity considerations and examples in postacute sequelae of SARS-CoV-2 infection (PASC): Cognitive symptom (continued)

Category	Comment	What is known	Clinical considerations
► Disability <i>Example: People who have impairments in physical and/or mobility, psychological or mental health, vision, hearing, emotional or social relationships, cognitive or learning, speech and communication, and other disabilities</i>	When possible, cognitive rehabilitation testing and treatment strategies should be adapted to accommodate one's primary disability. Among persons with disability, many have underlying cognitive impairments. Some of these are static (eg, cerebral palsy, traumatic brain injury, stroke) and some are progressive (eg, dementia, multiple sclerosis). These pre-morbid health conditions may contribute to more profound PASC-related cognitive dysfunction and complicate the diagnosis and treatment of PASC-related cognitive impairments.	During the SARS-CoV-2 pandemic, people with intellectual disability and/or cognitive impairments may require assistance from their caregivers to understand changing recommendations regarding health advisories, social practices and their personal safety.^{HE-CI-9} People with intellectual disability and PASC-related cognitive dysfunction are susceptible to fraudulent exploitation by others.^{HE-CI-9}	The compounding of a chronic disability with PASC-related cognitive symptoms may have an additional impact on function and community participation. Before PASC, individuals with chronic visual deficits, hearing deficits, or communication deficits may rely on intact cognition for memory, attention, multitasking, problem solving, and communication strategies. Individuals with PASC-related cognitive symptoms may report more difficulty with their primary disability. Recommendations should be customized to the specific impairments and individual.
► Religion <i>Example: People who identify with a shared belief in what is sacred, holy, divine, spiritual, or reverent</i>	Participation in religious/spiritual based practices may contribute to better cognitive and mental health during the COVID-19 pandemic; however, due to social restrictions many people were not able to attend their usual religious gatherings.	Positive associations have been reported between religion and spiritual based practices and may be protective in middle aged and elderly adults.^{HE-CI-10} As a result of the COVID-19 pandemic, spiritual/religious leaders and support groups are attempting to assist with an increased need to attend to widespread suffering in the form of loneliness and isolation.^{HE-CI-11} At the same time, these leaders have a responsibility to keep people as safe as possible and avoid spread of the virus.	If in alignment with personal beliefs and in an appropriately safe manner, PASC survivors should be encouraged to return to and/or pursue involvement in religious/spiritual practices as another form of social connection and community support. Caution should be recommended for cognitively impaired individuals as they may be more susceptible to not adhering to safety precautions as well as predatory practices. Clinicians should also recognize that many individuals may receive similar health benefits from nonreligious/nonspiritual types of social interaction such as joining a nature group.

TABLE A1: Health equity considerations and examples in postacute sequelae of SARS-CoV-2 infection (PASC): Cognitive symptom (continued)

Category	Comment	What is known	Clinical considerations
► Immigration <i>Example: People who have come from another country in order to live in the United States</i>	Clinicians should be aware that people who immigrated may encounter health equity issues related to communication and/or education that may impact both cognitive evaluation and treatment.	Laws at the local, state, and federal level influence immigrants' access to health insurance and medical care, cash assistance, food assistance, education, and other vital services. ^{HE-CI-12}	Treatment for PASC-related cognitive symptoms may require customized language and cultural considerations to achieve health equity.

Note: Note: This table is included in the Appendix to provide additional information for clinicians who are treating patients for PASC-related cognitive symptoms. This is not intended to be a comprehensive list, but rather to provide clinical examples as they relate to health equity, health disparities, and social determinants of health. The literature demonstrates that all marginalized groups face socioeconomic barriers and access to care barriers, though these may or may not be barriers for a specific individual patient. People with intersectional identities (eg, those who identify with more than one underrepresented or marginalized group), often face enhanced levels of bias and discrimination.

Abbreviation: PASC, postacute sequelae of SARS-CoV-2 infection.

References:

- 1HE-CI-1. VanLandingham H, Ellison RL, Laique A, Cladek A, Khan H, Gonzalez C, Dunn MR. A scoping review of stereotype threat for BIPOC: cognitive effects and intervention strategies for the field of neuropsychology. Clin Neuropsychol. 2021 Jul 7:1–20. doi: 10.1080/13854046.2021.1947388. Epub ahead of print. PMID: 34233577.
- 2HE-CI-2. Bullock JL, Lockspeiser T, Del Pino-Jones A, Richards R, Teherani A, Hauer KE. They Do not See a Lot of People My Color: A Mixed Methods Study of Racial/Ethnic Stereotype Threat Among Medical Students on Core Clerkships. Acad Med. 2020 Nov;95(11S Association of American Medical Colleges Learn Serve Lead: Proceedings of the 59th Annual Research in Medical Education Presentations):S58-S66. doi: 10.1097/ACM.0000000000003628. PMID: 32769459.
- 3HE-CI-3. Graham EL, Clark JR, Orban ZS, Lim PH, Szymanski AL, Taylor C, DiBiase RM, Jia DT, Balabanov R, Ho SU, Batra A, Liotta EM, Koralnik IJ. Persistent neurologic symptoms and cognitive dysfunction in non-hospitalized Covid-19 “long haulers”. Ann Clin Transl Neurol. 2021 May;8(5):1073–1085. doi: 10.1002/acn3.51350. Epub 2021 Mar 30. PMID: 33755344; PMCID: PMC8108421.
- 4HE-CI-4. Vanichkachorn G, Newcomb R, Cowl CT, Murad MH, Breeher L, Miller S, Trenary M, Neveau D, Higgins S. Post-COVID-19 Syndrome (Long Haul Syndrome): Description of a Multidisciplinary Clinic at Mayo Clinic and Characteristics of the Initial Patient Cohort. Mayo Clin Proc. 2021 Jul;96(7):1782–1791. doi: 10.1016/j.mayocp.2021.04.024. Epub May 11, 2021. PMID: 34218857; PMCID: PMC8112396.
- 5HE-CI-5. Davis, Hannah E. and Assaf, Gina S. and McCorkell, Lisa and Wei, Hannah and Low, Ryan J. and Re'em, Yochai and Redfield, Signe and Austin, Jared P. and Akrami, Athena, Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact. Available at SSRN: <https://ssrn.com/abstract=3820561> or <https://doi.org/10.2139/ssrn.3820561>.
- 6HE-CI-6. Iodice F, Cassano V, Rossini PM. Direct and indirect neurological, cognitive, and behavioral effects of COVID-19 on the healthy elderly, mild-cognitive-impairment, and Alzheimer's disease populations. Neurol Sci 2021;42(2):455–465. doi:10.1007/s10072-020-04902-8.
- 7HE-CI-7. Babadjouni RM, Hodis DM, Radwanski R, Durazo R, Patel A, Liu Q, Mack WJ. Clinical effects of air pollution on the central nervous system; a review. J Clin Neurosci. 2017 Sep;43:16–24. doi: 10.1016/j.jocn.2017.04.028. Epub May 18, 2017. PMID: 28528896; PMCID: PMC5544553.
- 8HE-CI-8. Majoka MA, Schimming C. Effect of Social Determinants of Health on Cognition and Risk of Alzheimer Disease and Related Dementias. Clin Ther. 2021 Jun 5:S0149-2918(21)00220–4. doi: 10.1016/j.clinthera.2021.05.005. Epub ahead of print. PMID: 34103175.
- 9HE-CI-9. Courtenay K, Perera B. COVID-19 and people with intellectual disability: impacts of a pandemic. Ir J Psychol Med. 2020 Sep;37(3):231–236. doi: 10.1017/ipm.2020.45. Epub May 14, 2020. PMID: 32404232; PMCID: PMC7287305.
- 10HE-CI-10. Hosseini S, Chaurasia A, Oremus M. The Effect of Religion and Spirituality on Cognitive Function: A Systematic Review. Gerontologist 2019;59(2): e76-e85. doi:10.1093/geront/gnx024.
- 11HE-CI-11. Ferrell BR, Handzo G, Picchi T, Puchalski C, Rosa WE. The Urgency of Spiritual Care: COVID-19 and the Critical Need for Whole-Person Palliation. J Pain Symptom Manage. 2020 Sep;60(3):e7-e11. doi: 10.1016/j.jpainsymman.2020.06.034. Epub 2020 Jul 3. PMID: 32629084; PMCID: PMC7332903.
- 12HE-CI-12. Perreira KM, Pedroza JM. Policies of Exclusion: Implications for the Health of Immigrants and Their Children. Annu Rev Public Health. 2019 Apr 1;40:147–166. doi: 10.1146/annurev-publhealth-040218-044115. Epub 2019 Jan 2. PMID: 30601722; PMCID: PMC6494096.
- 13HE-CI-13. Lassi ZS, Ana A, Das JK, Salam RA, Padhani ZA, Irfan O, Bhutta ZA. A systematic review and meta-analysis of data on pregnant women with confirmed COVID-19: Clinical presentation, and pregnancy and perinatal outcomes based on COVID-19 severity. J Glob Health. 2021 Jun 30;11:05018. doi: 10.7189/jogh.11.05018. PMID: 34221361; PMCID: PMC8248750