# Acute and Chronic Neurological Implications Associated with COVID-19

**Author: Alea Penner, DPT-S, Duke University Student and BI SIG Student Intern**

## Fact Sheet

**Produced by**

BRAIN INJURY SPECIAL INTEREST GROUP
Academy of Neurologic Physical Therapy

A Special Interest Group of

ACADEMY OF NEUROLOGIC PHYSICAL THERAPY

**Contact us:**
ANPT
Phone: 952.646.2038
info@neuropt.org
www.neuropt.org

a component of

APTA American Physical Therapy Association

**Background Information:**

Recent research on the systemic aberrations associated with COVID-19 has demonstrated both acute and chronic neurologic impairments concurrent with and following acute infection. Individuals infected with COVID-19 also have an appreciably increased risk of infectious toxic encephalopathy, viral encephalitis, and acute cerebrovascular events. The proposed leading sources of neurological impairments associated with COVID-19 are pathways involving abnormalities in the circulatory and neuronal systems, hypoxic injury, deviations in ACE2 receptors, and immune injury. In addition to the increased risk of severe acute neurologic injury, many individuals infected with COVID-19 experience long lasting cognitive deficits, psychological trauma, and decreased activity tolerance. Due to the exceptionally high number of individuals infected with COVID-19, awareness of potential neurologic complications associated with COVID-19 is crucial to appropriately assess and treat patients in both the inpatient and outpatient settings.

**Epidemiology/Statistics:**

- 40% of individuals infected with COVID-19 will experience neurologic signs and symptoms such as headache, change in consciousness, paresthesia, anosmia, and other brain dysfunction symptoms.
- Pooled prevalence of each neurological manifestations
  - smell disturbances (35.8%; 95% CI 21.4–50.2)
  - taste disturbances (38.5%; 95%CI 24.0–53.0
  - myalgia (19.3%; 95%CI 15.1–23.6)
  - headache (14.7%; 95%CI 10.4–18.9)
  - dizziness (6.1%; 95% CI 3.1–9.2)
- 60-80% of ICU patients on mechanical ventilation and 20-50% of non-mechanically ventilated patients experience delirium
- Depression and anxiety present in 30% of ARDS survivors at 6 and 12 months
- PTSD present in 25% of ARDS survivors at 6 and 12 months
- Prevalence of stroke in meta-analysis studies is highly variable from 2.3%-53.4% depending on the study with a higher prevalence of ischemic stroke.

**The Role of Physical Therapy:**

- Assess for neurological signs/symptoms to detect neurological manifestations early
  - Confusion Assessment Method (CAM)-ICU
  - Medication/Sedatives Awareness
  - Delirium Assessment: Richmond Agitation-Sedation Scale
  - Vitals and Lab Value abnormalities associated with increased risk of acute neurologic injury
  - Cognition Assessment:
    - "Close & open your eyes" "Look at me" "Stick out your tongue" "Nod your head" "Raise your eyebrows"
    - Saint Louis University Mental Status Examination (SLUMS)

# Acute and Chronic Neurological Implications Associated with COVID-19

- Reducing complications associated with a prolonged ICU stay
  - Peripheral nerve injury screening ("swimmers" pose per proning protocols)
  - ICU acquired weakness & delirium
  - Encephalopathic/CNS changes due to metabolic disarray
  - Cognitive deficits and emotional trauma
  - Prevention of skin breakdown (considering prone pressure points)
  - Assisting and advocating for proning to improve oxygenation
  - Early Mobility Programs
- Patient education
  - Conscious proning protocol
  - Breathing techniques
  - Activity pacing
  - Cognitive pacing

Additional Resources

1. APTA Academies and Sections Consensus Statement: COVID-19 Core Outcome Measures
2. Physical Therapy Considerations of Neurologic Presentations in COVID-19 Webinar Presentation
3. Overview of Prone Positioning: Why It Works and Lessons Learned

References


1. Brummel, N. E., & Girard, T. D. (2013). Preventing delirium in the intensive care unit. *Critical care clinics*, *29*(1), 51–65. https://doi.org/10.1016/j.ccc.2012.10.007
2. Chua, T. H., Xu, Z., & King, N. K. (2020). Neurological manifestations in COVID-19: A systematic review and meta-analysis. *Brain Injury*, *34*(12), 1549–1568. https://doi.org/10.1080/02699052.2020.1831606
3. D, V., Sharma, A., Kumar, A., & Flora, S. J. (2021). Neurological manifestations in COVID-19 patients: A meta-analysis. *ACS Chemical Neuroscience*, *12*(15), 2776–2797. https://doi.org/10.1021/acschemneuro.1c00353
4. Favas, T. T., Dev, P., Chaurasia, R. N., Chakravarty, K., Mishra, R., Joshi, D., Mishra, V. N., Kumar, A., Singh, V. K., Pandey, M., & Pathak, A. (2020). Neurological manifestations of COVID-19: a systematic review and meta-analysis of proportions. *Neurological sciences: official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology*, *41*(12), 3437–3470. https://doi.org/10.1007/s10072-020-04801-y
5. Spencer-Segal, J. L., Hyzy, R. C., Iwashyna, T. J., & Standiford, T. J. (2017). Psychiatric Symptoms in Survivors of Acute Respiratory Distress Syndrome. Effects of Age, Sex, and Immune Modulation. *Annals of the American Thoracic Society*, *14*(6), 960–967. https://doi.org/10.1513/AnnalsATS.201606-468OC
6. Sullivan, B. N., & Fischer, T. (2021). Age-Associated Neurological Complications of COVID-19: A Systematic Review and Meta-Analysis. *Frontiers in aging neuroscience*, *13*, 653694. https://doi.org/10.3389/fnagi.2021.653694
7. Wu, Y., Xu, X., Chen, Z., Duan, J., Hashimoto, K., Yang, L., Liu, C., & Yang, C. (2020). Nervous system involvement after infection with COVID-19 and other coronaviruses. *Brain, behavior, and immunity*, *87*, 18–22. https://doi.org/10.1016/j.bbi.2020.03.031



Produced by

BRAIN INJURY SPECIAL INTEREST GROUP
Academy of Neurologic Physical Therapy

a Special Interest Group of

ACADEMY OF NEUROLOGIC PHYSICAL THERAPY

a component of

APTA American Physical Therapy Association