



Addressing the Urgent Need for Inter-disciplinary Intervention: Chronic Cognitive Symptoms Following Acute Phase of COVID-19 Infection

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To date the global COVID-19 pandemic has resulted in 243 million confirmed cases and taken 4.95 million lives globally¹. Unfortunately, many of those that survive and even those who experienced mild cases experience continued symptoms for months or years following their initial infection. Post-Acute COVID-19 Syndrome (PACS) or “Long-COVID” is a serious health concern around the world. Current estimates suggest that over 10-25% of individuals that get infected by COVID-19 will have some persistent symptoms for at least 6 months². PACS has been shown to impact all parts of the body and has been linked to over 50 different symptoms³. Most commonly, patients report breathlessness, headache, chest pain, abdominal symptoms, myalgia, fatigue, cognitive difficulties, as well as anxiety and depression⁴.

¹ <https://covid19.who.int/>

² Guo, P., Ballesteros, A. B., Yeung, S. P., Liu, R., Saha, A., Curtis, L., ... & Cheke, L. G. (2021). COVCOG 2: Cognitive and Memory Deficits in Long COVID: A Second Publication from the COVID and Cognition Study. *medRxiv*.

³ Lopez-Leon, S., Wegman-Ostrosky, T., Perelman, C., Sepulveda, R., Rebolledo, P. A., Cuapio, A., & Villapol, S. (2021). More than 50 Long-term effects of COVID-19: a systematic review and meta-analysis. *Available at SSRN 3769978*.

⁴ Del Rio C, Collins LF, Malani P. Long-term Health Consequences of COVID-19. *JAMA*. 2020. pmid:33031513; Butler M, Pollak TA, Rooney AG, Michael BD, Nicholson TR. Neuropsychiatric complications of covid-19. *BMJ*. 2020;371:m3871. pmid:33051183; Greenhalgh T, Knight M, A’Court C, Buxton M, Husain L. Management of post-acute covid-19 in primary care. *BMJ*. 2020;m3026. pmid:32784198; Gorna R, MacDermott N, Rayner C, O’Hara M, Evans S, Agyen L, et al. Long COVID guidelines need to reflect lived experience. *Lancet*. 2021;397:455–7. pmid:33357467; Davis HE, Assaf GS, McCorkell L, Wei H, Low RJ, Re’em Y, et al. Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact. *EClinicalMedicine*. 2021. Online first, July 15, 2021.

The Challenge: Treating Persisting Symptoms Following COVID-19

To date medical professionals are challenged with directing their patients to the appropriate line of care to support the reduction of their symptoms to improve quality of life (QOL) and overall functional capacities. Many individuals with PACS have been receiving support from medical doctors and allied health professionals to try to find a therapy that may be able to help this extremely vulnerable population.

For individuals that continue to struggle with respiratory issues following infection, specific protocols are being developed and offered to these patients. There is some reason for hope in treating these populations because, in the past, some respiratory therapies have yielded positive effect with other respiratory conditions such as RSV and Asthma.

One of the most distressing symptoms of PACS is “brain fog.” Over 63% of individuals with PACS report experiencing at least some form of mild cognitive dysfunction. Most commonly the cognitive functions impacted include executive functioning, processing speed, category fluency, memory encoding, and recall⁵. This can have a tremendous impact on an individual’s quality of life and will impact every aspect of their life. With such high number of individuals suffering from cognitive dysfunction, there is high urgency to find treatments to help these individuals recover and regain the capacity that was lost.

It is critical that work be done to find efficient treatment options for this growing group of patients. Focus needs to be placed on finding methods to help these individuals fully recover and reach the level of cognitive function they had prior to their infection. Clinicians should look to the research on other post-viral illnesses that follow other infections. The symptoms of PACS are very similar to those seen following other viral infections such as myalgic encephalomyelitis, chronic fatigue syndrome, and Lyme disease. Further more, clinicians should look to the work in concussion, stroke, and other brain injury rehabilitation for novel treatments that may be applied to this new population. Interventions that focus on neuroplasticity and capacity building should be prioritized prior to looking at compensation strategies.

With millions of individuals at risk of developing PACS, health care systems around the world are ill-equipped to deal with the magnitude of this emerging population. Work needs to be done not only to better identify and diagnose the condition but on the development of targeted interventions to help patients regain their quality of life and participation in daily activities. Due to the immense number of individuals in need of care, traditional 1-to-1 clinician to patient ratio

⁵ Becker JH, Lin JJ, Doernberg M, et al. Assessment of Cognitive Function in Patients After COVID-19 Infection. *JAMA Netw Open*. 2021;4(10):e2130645. doi:10.1001/jamanetworkopen.2021.30645

will lead to extensive wait times and prolonged suffering of this population. Well-scaled and accessible solutions are needed to help address this health care emergency.

The Opportunity: The Case for Cognitive Rehabilitation Learning from Lessons in Brain Injury Recovery

Due to the immediate need to help individuals with Long-COVID, the World Health Organization is advising healthcare organizations to utilize programs that have shown efficacy in other areas of rehabilitation for this population⁶. Having access to something that could have a positive effect without doing harm is better than doing nothing at all.

*“The impediment to action advances action. What stands in the way becomes the way”.*⁷

Research resourcing is being invested into vaccinations and education. This investment is essential to improving outcomes. However, more must be done to address the COVID-19 PACS population now. If action is not taken then more individuals will continue to suffer. The current watch-and-wait approach poses a significant risk to this population.⁸ The person may get better (or not get worse) without treatment. And if the condition gets worse, the person and his or her doctor will decide what to do next⁸.

*“Persistent symptoms associated with PACS appear to impact physical and cognitive function, health-related quality of life and participation in society”.*⁹

Scientific lessons learned throughout history inform us that utilizing treatments that have demonstrated effect with a similar yet different condition may yield positive outcomes. Given that the population of PACS and the range of symptoms are both heterogenous, it is a challenge to generalize treatment protocols.

⁶ WHO (2021). Long-COVID Webinar.

⁷ Aurelius, M. (2002). The Meditations. Random House

⁸ Alberta Health. (2021). Watchful waiting.
<https://myhealth.alberta.ca/Health/Pages/conditions.aspx?hwid=d22520553>

⁹Tabacof, L., Tosto-Mancuso, J., Wood, J., Cortes, M., Kontorovich, A., McCarthy, D., ... & Putrino, D. (2021). Post-acute COVID-19 syndrome negatively impacts physical function, cognitive function, health-related quality of life and participation. *American Journal of Physical Medicine & Rehabilitation*.

The Importance of Behavioral Programs to Enhance Outcomes

Given that individuals with PACS often present with a variety of symptoms, aligning assessment and treatment through inter-disciplinary care is critical to ensuring that these individuals receive the care that they need. Recent research has shown that inter-disciplinary care models provide a fantastic opportunity to improve outcomes and further advance clinical practice and outcomes – including physical, psychological, social, emotional, and spiritual healing – and is a leading approach for brain injury rehabilitation. and is a determinant of “good quality care”¹⁰. The inter-disciplinary care model looks at the patient’s unique experience and the dynamic relationship with their environment. In addition, by integrating complimentary treatments, one can maximize a client’s recovery potential and minimize time spent in rehabilitation.

Scientific Progress in Brain Change: Learning from Other Acquired Brain Injury Programs

Asking the right questions is key to better understanding how to address a problem. In the case of trying to understand how to better assess and treat chronic cognitive symptoms following mild traumatic brain injury, a study was conducted examining the impact of behavioural neuroplastic cognitive program to understand if some this program could have effect on this group of participants. The study concluded: “Our results provide preliminary evidence that participating in an intensive cognitive intervention program was associated with neuroplastic changes in adults with chronic TBI that occurred in parallel with improvements in cognition.”¹¹ These findings, albeit from a small sample, indicate that the brain has a remarkable capacity for change when it is put into a position to foster cognitive and behavioural change.

According to Aristotle, “We are what we repeatedly do. Excellence, therefore, is not an act, but a habit”.¹² Let us consider what is being done day-to-day behaviourally in the PACS population: multiple appointments, blood draws, siloed care models and a significant lack of a

¹⁰ Wright, C. J., Zeeman, H., & Biezaitis, V. (2016). Holistic Practice in Traumatic Brain Injury Rehabilitation: Perspectives of Health Practitioners. *National Center for Biotechnology Information, 11*(6). doi: 10.1371/journal.pone.0156826

¹¹ Porter, S., Torres, I.J., Panenka, W., Rajwani, Z., Fawcett, D. et al. (2017). Changes in brain-behavior relationships following a 3-month pilot cognitive intervention program for adults with traumatic brain injury. *Heliyon, Vol 3 Issue 8*. doi:10.1016/j.heliyon.2017.e00373

¹² Aristotle. (1925). *Nicomachean ethics: Book II*. (W.D. Ross, Trans.). Retrieved from The Internet Classics Archive: <http://classics.mit.edu> (Original work published 350 B.C.E)

system and plan. If we believe in Aristotle's wisdom currently the PACS population is confusing, scary and disjointed.

Addressing Fatigue, Brain Fog, Attention and Memory symptoms safely: Brain Enhance and Recovery System Methodology

“What gets measured get managed.”¹³

Based on learnings regarding neuroplasticity and the value of intervention for patients at the end of their “standard recovery period” – new models of care focusing on the needs of these patients are under development. The ABI Wellness model presents one such approach.

According to the research facilitated by University of British Columbia's Djavad Mowafaghian Centre for Brain Health, the brain has capacity to change and regain cognitive functions well after the acute recovery period.¹⁴ These preliminary results were concluded from the impact of ABI Wellness' four-pillar program and the patients who received treatment for acquired brain injuries with this approach.

This evidence-based, four-pillar approach includes:

1. Higher-order cognitive function rehabilitation using the tested BrainEx cognitive rehabilitation tools and methodology.
2. Aerobic exercise catered for brain injury patients and integrated with the other key pillars to optimize overall treatment plan.
3. Mindfulness through tailored sessions integrated in program.
4. Holistic health including validated and reliable quality of life tracking to allow for quick intervention and engagement with patients.

Many similarities exist between the symptoms reported by individuals with chronic brain injury and PACS brain fog. Executive function, attention, processing speed, memory, reasoning, and communication are affected and cause significant disruption in all aspects of life. ABI Wellness has seen success in addressing these areas of cognition in a well-targeted approach that has allowed many individuals return to work and see significant improvements in quality of life. Based on this success, we believe that the program could offer an opportunity for individuals

¹³ Drucker (1954).

¹⁴ Porter, S., Torres, I.J., Panenka, W., Rajwani, Z., Fawcett, D. et al. (2017). Changes in brain-behavior relationships following a 3-month pilot cognitive intervention program for adults with traumatic brain injury. *Heliyon, Vol 3 Issue 8*. doi:10.1016/j.heliyon.2017.e00373

with PACS to engage in rehabilitation that can restore cognitive capacity and help them return to the life they had before COVID-19.

Get Involved

Kuhn¹⁵ suggests that new scientific discoveries will face resistance from various disciplines. This is expected and it a part of the process. However, one must remain aware one's own biases while critiquing the innovation.

While considering context for the PACS population, ABI Wellness is willing to collaborate with organizations and utilize its platform to optimize the allocation of resources in service of the treatment of the PACS population.

ABI Wellness is committed to supporting clinical providers in need of programs right now that can further address the needs of the PACS population and patients suffering from cognitive dysfunction following post-viral infections. Our clinical network of certified providers is available [here](#). There is an immediate need for clinical programs that can reliably provide treatment to clients that require cognitive care for prolonged symptoms following infection with COVID-19. The ABI Wellness Brain Enhance and Recovery Systems is one such platform that can assess and provide programming for this group of individuals. Contact our team at: 1-833-414-8958 or email us at: info@abiwellness.com to learn more.

¹⁵ Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.