

# Potential Benefits of Telemedicine for the Assessment of Neurological Change in the Age of COVID

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Coronavirus is a Zoonotic virus. A review reported that 49% of emerging Zoonotic viruses causes encephalitis or serious neurological clinical symptoms [1,2]. Coronavirus infections primarily target the human respiratory system but increasing evidence indicates a range of associated neurological symptoms including anosmia, febrile seizures, delirium, convulsions, and encephalitis. Mao et al 2020 reported that 36.4% of Covid-19 patients present with one or more CNS changes, while 45.5% of Covid-19 patients with severe infections presented neurological symptoms. Beijing Ditan Hospital recently reported the first case of viral encephalitis caused by Covid-19 [3].

That olfactory symptoms appear early is not surprising. Respiratory infections in general spread nasally and coronaviruses are no exception. Neurotropism in coronaviruses have previously been demonstrated in animal models[4] as well as in the clinical environment [5]. In such cases, infection enters the CNS through the olfactory bulb, causing inflammation and demyelination [6] neuroinvasion of immune-functioning microglia, or astrocytes [7].

Mao et al. reported that severe infections were associated with early development of neurologic symptoms. It therefore could be inferred that neurological symptoms early could enhance identification of Covid-19 prior to respiratory failure if cognitive symptoms were tracked early in the disease trajectory. This concurs with an urgent call to build a neuropsychological database of Covid-19 cases in hospitals and isolating at home, that is online neurocognitive assessments at a large scale, standardised with longitudinal follow-up to better understand the neurotoxic effects of the coronavirus [8].

In a parallel, telemedicine is proving to be an excellent resource for clarifying neuropsychiatric symptoms [9]. Tracking of subtle and/or progressive neurocognitive changes could be especially relevant in the context of Covid-19. Inflammation and demyelination are often associated with delirium and transient changes in cognition, whereas subclinical epileptiform changes may have long lasting and undetected effects on cognitive function. Any association between infectious diseases such as Covid-19 and neurocognitive change therefore opens up the potential for easily administered, brief and affordable digital neuropsychological tools that could be used in remote tracking of neurological symptoms.

In times of crisis it is vital that healthcare is made available to vulnerable groups who would otherwise be left without adequate resources[10]. In addition to supporting patients who are living in remote areas or those who are already immunocompromised, telehealth can help to maximise staff productivity by treating more people and, at the same time, reduce physical contact with vulnerable patients. If telemedicine can also maximise the early detection, management and outcome tracking in such patients, the potential for the widespread and effective use of such tools in this and future pandemics is expected to grow [10].

Work published so far indicates value of close cognitive monitoring as early as possible.

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## Conflicting Interests

The Authors declare that there is no conflict of interest.

## Author Contribution

Dr. Yan Hong Dong developed, reviewed and edited the manuscript and approved the final version of the manuscript.

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## References

1. Olival KJ, Daszak P (2005) The ecology of emerging neurotropic viruses. *J Neurovirol* 11: 441-446.
2. Wu Y, Xu X, Chen Z, Duan J, Hashimoto K, et al. Nervous system involvement after infection with COVID-19 and other coronaviruses. *Brain Behav Immun* 87: 18-22.
3. Li K, Wohlford-Lenane C, Perlman S, Zhao J, Jewell AK, et al. (2016) Middle east respiratory syndrome coronavirus causes multiple organ damage and lethal disease in mice transgenic for human dipeptidyl peptidase 4. *J Infect Dis* 212: 712-722.
4. Li YC, Bai WZ, Hashikawa T (2020) The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. *J Med Virol* 92: 552-555.
5. Desforges M, le Coupanec A, Dubeau P, Bourgouin A, Lajoie L, et al. (2019) Human coronaviruses and other respiratory viruses: Underestimated opportunistic pathogens of the central nervous system? *Viruses* 12: 14.
6. Soung A, Klein RS (2018) Viral Encephalitis and Neurologic Diseases: Focus on Astrocytes. *Trends Mol Med* 24: 950-962.
7. Harell KM, Wilkins SS, Connor MK, Chodosh J (2014) Telemedicine and the evaluation of cognitive impairment: The additive value of neuropsychological assessment. *J Am Med Dir Assoc* 15: 600-606.

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8. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, et al. (2020) Multidisciplinary research priorities for the COVID- 19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 7: 547-560.
9. Koo BM, Vizer LM (2019) Mobile Technology for Cognitive Assessment of Older Adults: A Scoping Review. *Innov Aging* 3: 38.
10. Scharre DW, Chang S ing, Nagaraja HN, Vrettos NE, Bornstein RA, et al. (2017) Digitally translated Self-Administered Gerocognitive Examination (eSAGE): relationship with its validated paper version, neuropsychological evaluations, and clinical assessments. *Alzheimers Res Ther* 9: 44.