

## EDITORIAL

# COVID-19 – THE LONG ROAD TO RECOVERY

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**Key words:** COVID-19, coronavirus, elderly.

*“Seems like it’s been a long journey in the past two months of recovery. I’m making progress and starting to walk independently with a cane. A little at a time but getting there.”*

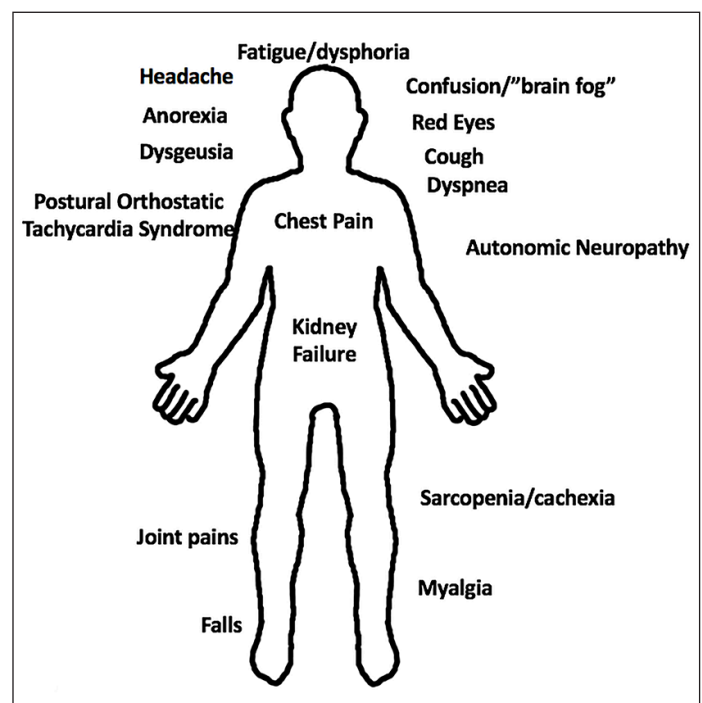
*--Carol Todecheene*

COVID-19 is a pandemic viral disease that has spread throughout the world in 2020 (1, 2). Nearly half of the persons with COVID-19 are asymptomatic. Older persons, persons with comorbidity and diabetes mellitus are particularly at risk of developing COVID-19. Severe cases of COVID-19 cause a viral pneumonia. In addition, COVID-19 can affect almost any organ in the body, as it enters cells through the angiotensin converting enzyme (ACE) 2 receptor (3). A subset of persons with COVID-19 appear to have a prolonged recovery period. This has been termed “long Covid” (4).

The concept of a viral disease leading to a post viral syndrome usually with chronic fatigue, is well recognized (5). In one study where patients were followed after having one of three viral diseases (Epstein Barr virus, Coxiella burnetti or Ross fever virus), 12% were found to have a specific syndrome for 6 or more months. Acute recurrences of the illness occurred in the first 3 months and chronic fluctuating symptoms included fatigue, cognitive disturbances, dysphoria, anxiety and pains in the muscles. This syndrome has also been termed myalgic encephalomyelitis (6).

After having had COVID-19, the Boston Red Sox pitcher, Eduardo Rodriguez was fatigued when throwing the ball and an MRI showed that he had myocarditis that will prevent him from pitching this year. There is now good evidence that the corona virus can invade myocardial cells and cause destruction of heart muscle (7). As is shown in Figure 1, myocarditis is not the only long-term side effect of COVID-19. These symptoms of “long Covid” include: fatigue, cough, dyspnea, loss of taste and smell, muscle weakness, muscle and joint pain, headache, confusion, conjunctivitis, chest pain, decreased mobility and falls (8, 9). It is important to recognize that persons who have severe pneumonia due to COVID-19 might take 6 months or longer to return their breathing to normal and that this is associated with decreased mobility. Elevated D-dimer levels are prognostic of poor lung function at 3 months (10).

**Figure 1**  
The Long Term Effects of COVID-19



Older persons who underwent lockdown with the COVID-19 pandemic are likely to have decreased their exercise and developed sarcopenia. During this period health professionals and public health professionals failed to increase public awareness to reduce the development of sarcopenia and frailty (11-13). The marked increase in inflammatory cytokines in COVID-19 leads to an acceleration of muscle destruction and cachexia (14). The loss of muscle can be further aggravated by immobilization during hospitalization, which is even greater if the persons received artificial ventilation. All persons with COVID-19 should have bioavailable 25(OH) vitamin D measured (15) as during lockdown lack of sunlight can markedly reduce vitamin D in COVID-19 patients (16).

In addition to the muscle loss in “long Covid”, the extended time at bedrest can lead to postural hypotension (17). Also, vasculitis during COVID-19 can lead to baroreceptor damage

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resulting in autonomic dysregulation (18). Further, the increase in cytokines can damage the autonomic nervous system (19). Postural orthostatic tachycardia has also been observed in “long Covid.” These factors can lead to an increase in falls, possibly associated with syncope. Persons who fall frequently or who are unsteady are likely to develop “fear of falling” (20).

Because of the increase in coagulopathy, persons with COVID-19 are at risk for having a stroke. These patients require neurorehabilitation to a similar degree of other persons with a cerebral vascular accident (21).

Delirium is not uncommon in acute COVID-19. Any precipitating causes should be avoided. Persons with delirium should not be physically restrained nor receive antipsychotics nor long acting benzodiazepines (22, 23). Delirium is associated with an increased mortality rate over the year following hospital admission (24). Persons with delirium show frontal hypometabolism and cerebellar hypermetabolism (25). Delirium should be screened for daily using either the confusion assessment method (CAM) or the 4-AT Rapid Clinical Test for Delirium (26-29).

Cognitive impairment is not unusual following COVID-19. Besides the possibility of increased microthrombi in the brain, cerebral micro-structural changes have been identified in the hippocampus and multiple other brain areas (30). These changes were correlated with deterioration in cognition. Persons with cognitive impairment tend to describe a “brain fog” associated with fluctuations in behavior (31). Fatigue, while common, tends to fluctuate.

Acute COVID-19 is associated with renal tubular injury and focal sequential glomerulonephritis (32, 33). Kidney function needs to be carefully followed in persons who have had COVID-19 and care needs to be taken not to prescribe potentially nephrotoxic drugs.

### Rehabilitation

In view of the multiple complications associated with “long Covid” it is essential that during recovery older persons are carefully followed by physicians and other health professionals. It is important to recognize that symptoms fluctuate and may go away for a few days and then return. There is a need for an integrated interprofessional care model to obtain the optimum recovery after COVID-19 (34).

The key to a good recovery is an exercise program adjusted to the ability of the patient to perform it. As has been shown by Izquierdo and his colleagues, these programs should be started in hospital and continued following hospital (35-37). The ViviFrail exercise program is ideally adapted to doing this. Also, it is essential that while in the Intensive Care Unit, patients receive as much exercise as possible (38). These include respiratory exercises, passive joint motion, stretching, electrical stimulation of muscles, standing at bedside and walking where possible (39). On discharge the exercise program should include respiratory, resistance, aerobic

and balance exercises as well as a focus on making sure the Activities of Daily Living can be adequately carried out. In view of the fatigue, exercises may need to be spread out during the day.

Speech therapy may need to help persons who have been ventilated to regain adequate speech patterns. In addition, they can work with occupational therapy to provide a variety of forms of cognitive stimulation therapy in those who have had a decline in their cognition (40, 41). Dietetics needs to work on creating taste enhancement of food in those who have lost their sense of taste and smell. Persons with sarcopenia or cachexia need supplementation with 10-15g/kg/day of leucine enriched essential amino acids (42, 43).

In view of the social isolation that occurs during the Covid epidemic it is important that programs are developed to provide socialization (44, 45). This can include telehealth programs such as the “Circle of Friends” as enhanced use of social media (46). Care should be taken to screen for dysphoria/depression and provide psychological therapy when it occurs (47).

It is suggested that at discharge from hospital and at 3 months discharge from hospital all COVID-19 patients are screened for frailty with the FRAIL test (48-51), sarcopenia with the SARC-F (52-55), anorexia with the SNAQ (56, 57) and cognitive failure with the Rapid Cognitive Screen (RCS) (58). These tests are simply combined into the RAPID Geriatric Assessment (59, 60) and are available in an App form (61). Persons who screen positive and need to receive appropriate therapy which needs to be provided free to the individual.

“Long Covid” is an important condition which can respond to an interprofessional team approach. Its fluctuations can be frustrating both for the patient and the health care provider. An additional factor that needs to be taken into account is whether, in the long term, chronic subclinical chronic inflammation may lead to accelerated aging both in the periphery and as a neurodegenerative process (62, 63)?

*Disclosures:* The author declares there are no conflicts.

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