

## **The War on COVID-19 Pandemic:**

### **Role of Rehabilitation Professionals and Hospitals**

Henry L. Lew, MD, PhD

Professor and Chair, University of Hawaii at Mānoa, John A. Burns School of Medicine,

Department of Communication Sciences and Disorders

677 Ala Moana Blvd, Suite 625, Speech and Hearing Clinic

Honolulu, HI 96813

Tel: 808-692-1580, email: henrylew@hawaii.edu

Adjunct Professor, Department of Physical Medicine and Rehabilitation

Virginia Commonwealth University School of Medicine

Mooyeon Oh-Park, MD

Chief Medical Officer, Senior Vice President, Burke Rehabilitation Hospital

785 Mamaroneck Av, White Plains, NY 10605

Tel (914) 597-2562, Fax (914)597-2798

Email: mohpark@burke.org

Professor, Vice Chair of Administrative and Academic Affairs

The Arthur S. Abramson Department of Rehabilitation Medicine

Albert Einstein College of Medicine

Montefiore Health System

David X. Cifu, MD

Associate Dean of Innovation and System Integration

*Herman J. Flax, MD* Professor and Chair, Department of Physical Medicine and Rehabilitation

Virginia Commonwealth University School of Medicine

Senior TBI Specialist, U.S. Department of Veterans Affairs

Principal Investigator, Long-term Impact of Military-relevant Brain Injury Consortium - Chronic

Effects of Neurotrauma Consortium (LIMBIC-CENC)

Academic Office: 804-828-4231

Fax: 804-828-6755

Email: [dcifu@vcu.edu](mailto:dcifu@vcu.edu)

This article is made available via the PMC Open Access Subset for unrestricted re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for the duration of the COVID-19 pandemic or until permissions are revoked in writing. Upon expiration of these permissions, PMC is granted a perpetual license to make this article available via PMC and Europe PMC, consistent with existing copyright protections.

## **Abstract**

The global outbreak of coronavirus disease (COVID-19) has created an unprecedented challenge to the society. Currently, the United States stands as the most affected country, and the entire healthcare system is affected, from emergency department, intensive care unit, post-acute care, outpatient, to home care. Considering the debility, neurological, pulmonary, neuromuscular and cognitive complications, rehabilitation professionals can play an important role in the recovery process for individuals with COVID-19. Clinicians across the nation's rehabilitation system have already begun working to initiate intensive care unit-based rehabilitation care and develop programs, settings and specialized care to meet the short- and long-term needs of these individuals. We describe the anticipated rehabilitation demands, and the strategies to meet the needs of this population. The complications from COVID-19 can be reduced by (1) delivering interdisciplinary rehabilitation that is initiated early and continued throughout the acute hospital stay, (2) providing patient/family education for self-care after discharge from inpatient rehabilitation at either acute or subacute settings, and (3) continuing rehabilitation care in the outpatient setting, and at home through ongoing therapy either in-person or via telehealth.

In December 2019, a series of patients with severe pneumonia of unknown etiology was reported in the city of Wuhan, Hubei province, China. It came to be known as coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>1</sup>

On March 11<sup>th</sup>, 2020, the World Health Organization (WHO) declared the SARS-CoV-2 outbreak a worldwide pandemic. As of April 21, 2020, there were 2,561,044 confirmed cases of COVID-19 and 176,984 deaths caused by the disease. Currently, the United States stands as the most affected country, with 824,069 confirmed cases and 45,142 deaths. While much of the pandemic is still evolving, a general understanding of the post-COVID-19 rehabilitation needs has emerged. In this article, we describe the extent of COVID-19 related rehabilitation service needs across settings, including academic medical centers, rehabilitation hospitals, skilled nursing facilities and clinical facilities across the Veterans Affairs Health Care System.

Initially, a shortage of available beds in acute care hospitals necessitated the use of several inpatient rehabilitation units for acute pulmonary care, but as the pandemic continued, almost all healthcare sectors have become affected. In addition, Pandemic Emergency Status was declared by these institutions for graduate medical education and granted by the Accreditation Council for Graduate Medical Education's Extraordinary Circumstances policy.<sup>2</sup> Under this policy, house staff were deployed to different locations from emergency departments, medical units, and intensive care units. In some medical centers in regions of high incidence of COVID-19 cases, rehabilitation units were converted to acute medical units for treatment of patients with COVID-19 pneumonia. Physical Medicine and Rehabilitation (PM&R) physicians in some hospitals were assigned to

medical units caring for COVID-19 patients while maintaining their roles in consultation and telehealth outpatient practice. As social distancing, shelter-in-place, and personal protective equipment (PPE) measures have been implemented to reduce the spread of infection, telehealth (also referred to as telemedicine or tele-practice) has become essential for continuity of care, especially in patients with outpatient rehabilitation needs.

Critical illness and intensive care unit (ICU) care influence a wide range of long-term patient outcomes, with some impairments persisting beyond the ICU stay and likely for life. To date, 4-11% of all individuals (i.e., >30,000) infected by SARS-CoV-2 are estimated to develop profound COVID-19 requiring an intensive care unit stay that will include pulmonary support and artificial ventilation.<sup>3</sup> Another 15% (i.e., >95,000) will require acute hospitalization and pulmonary care. While there may be unique neurologic and neuromuscular conditions and sequelae from the SARS-CoV-2 itself (e.g., stroke, encephalopathy, other organ involvement)<sup>4</sup>, the overall debility, acute hospital/ICU stay and need for ventilator usage alone will result in significant physical, cognitive and functional deficits that will require both acute and long-term rehabilitation interventions and care.

Neuromuscular weakness and impairments occur in up to 50% of all individuals who have prolonged ICU stays due to critical illness polyneuropathy (CIP), which can result in ongoing dysfunction for greater than 5 years in 85% of individuals. Pulmonary dysfunction may be seen in up to 40% of individuals who have acute respiratory disorders resulting in the need for ventilators. In fact, for individuals who require artificial respiration on a ventilator for >48 hours, 65% will

continue to have functional deficits at 1 year, 75% will have cognitive impairment at time of hospital discharge and 45% at 1 year, and more than 25% will have significant psychiatric issues related to their illness, including major depression and posttraumatic stress disorder in the first year after discharge.<sup>5</sup> Thus, in addition to pulmonary rehabilitation, survivors of COVID-19 may require long term cognitive and physical rehabilitation, especially those who develop central nervous system dysfunction from ischemia.<sup>4</sup>

Physicians, psychologists and therapists across the nation's rehabilitation system have already begun working to initiate ICU-based rehabilitation care for individuals with COVID-19 and are developing programs, settings and specialized care to meet the short- and long-term needs of these individuals. We believe the complications from COVID-19 can be reduced by (1) delivering interdisciplinary rehabilitation that is initiated early and continued throughout the acute hospital stay, (2) providing patient/family education for self-care after discharge from inpatient rehabilitation at either acute or subacute settings, and (3) continuing rehabilitation care in the outpatient setting, and at home through ongoing therapy either in-person or via telehealth.

## References

1. Lauer SA, Grantz KH, Bi Q, et al. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application [published online ahead of print, 2020 Mar 10]. *Ann Intern Med.* 2020;M20-0504. doi:10.7326/M20-0504
2. ACGME, Stage 3: Pandemic Emergency Status Guidance. <https://acgme.org/COVID-19/Three-Stages-of-GME-During-the-COVID-19-Pandemic/Stage-3-Pandemic-Emergency-Status-Guidance>, accessed on 04/16/2020.
3. Severe Outcomes among patients with Coronavirus disease 2019- United States, Feb 12- March 16, 2020. [https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm?s\\_cid=mm6912e2\\_w](https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm?s_cid=mm6912e2_w) (accessed 04/16/2020)
4. Helms J, Kremer S, Merdji H, et al. Neurologic Features in Severe SARS-CoV-2 Infection [published online ahead of print, 2020 Apr 15]. *N Engl J Med.* 2020;10.1056/NEJMc2008597. doi:10.1056/NEJMc2008597
5. Desai SV, Law TJ, Needham DM: Long-term complications of critical care. *Crit Care Med* 2011; 39:371–379