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NEUROCRITICAL CARE SOCIETY

INVITED COMMENTARY

# Early Rehabilitation for Patients with Disorders of Consciousness after Severe COVID-19

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Emerging evidence suggests that up to 80% of hospitalized patients with coronavirus disease 2019 (COVID-19) develop neurological symptoms [1]. The most severely affected patients experience a disorder of consciousness (DoC), which may persist after cessation of intravenous sedation and mechanical ventilation [2]. Preliminary data suggest that recovery of consciousness is possible in these patients, even after weeks of unresponsiveness [3–5]. Yet the data are limited and susceptible to reporting bias; thus, the natural history of recovery in patients with COVID-19 DoC remains unknown. In this setting of ongoing uncertainty, clinicians and families face decisions about continuation of life-sustaining therapy and the utility of rehabilitative care for patients with COVID-19 DoC [6].

In this issue of *Neurocritical Care*, Gurin and colleagues [7] shed new light on the natural history of recovery and optimal rehabilitative care for patients with COVID-19 DoC. The authors report results from 21 patients who participated in a comprehensive rehabilitation program developed for patients with COVID-19 DoC in the intensive care unit (ICU). This ICU rehabilitation program, implemented during the spring 2020 COVID-19 surge in New York City, included multidisciplinary consultative care specialists from neurology, physiatry, physical therapy, occupational therapy, and speech–language therapy. Patients were treated with multimodal sensory stimulation, early mobilization, and pharmacologic stimulants. Crucially, the rehabilitation program also included serial behavioral assessments with the Coma Recovery Scale-Revised (CRS-R) [8], which were performed by a team of 15 physical, occupational, and speech–language therapists; results informed communication between members of the interdisciplinary team about prognosis and discharge planning.

The key finding of the study is that early rehabilitation and assessment of consciousness by using a standardized behavioral scale was feasible to implement in the ICU for all 21 patients with COVID-19 DoC. The CRS-R detected behavioral signs of consciousness in 12 patients (57%) prior to hospital discharge, although the investigators relied on the CRS-R total score, which is less specific for detecting consciousness than the subscale scores [9]. Behavioral assessment for critically ill patients is typically performed with the Glasgow Coma Scale, but the CRS-R increases the sensitivity for detecting consciousness by up to 40% [10] because of assessment of additional behaviors, such as gaze-tracking, and an emphasis on maximizing arousal prior to evaluation. The CRS-R was endorsed by a 2018 multi-society guideline [11] and received the strongest recommendation from an American Congress of Rehabilitation Medicine task force on the basis of its psychometric properties for detecting consciousness in patients with subacute to chronic DoC [12]. Accordingly, the CRS-R is used in rehabilitation settings worldwide, but the time required to complete a CRS-R assessment (up to 45 min) has historically limited its use in the ICU, where comprehensive behavioral assessments may not be feasible. In this context, it is noteworthy that a median of six CRS-R assessments were performed in the 21 patients with COVID-19 DoC, exceeding the recommended

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number of assessments necessary to establish an accurate diagnosis of level of consciousness in patients with chronic DoC [13]. The optimal number and frequency of CRS-R assessments in patients with acute DoC is unknown, but the high level of variability in CRS-R scores observed by Gurin and colleagues [7] suggests that multiple CRS-R assessments may similarly be needed to optimize detection of consciousness in the ICU.

The study by Gurin and colleagues [7] raises profound ethical questions about resource allocation and the appropriateness of early rehabilitation for patients with acute DoC in the ICU. If signs of consciousness are often missed by the Glasgow Coma Scale and if early emergence of consciousness is associated with better long-term outcomes [14–16], should every ICU patient with a DoC be assessed with the CRS-R prior to decisions about continuation of life-sustaining therapy? If so, how many CRS-R assessments should be performed, and over what period of time? Given the multidisciplinary personnel, infrastructure, and resources required to implement an early rehabilitation program in this study and others [17–19], it is unclear if ICU rehabilitation programs are generalizable outside of well-resourced academic medical centers. Nevertheless, the findings reported here inform ongoing debates about best practices and optimal resource allocation for critically ill patients with acute DoC. Ethical analyses have recently focused on ensuring equitable access to task-based neuroimaging and electrophysiologic tests that detect "covert consciousness" in patients who appear unresponsive [20–22]. Yet the present study reinforces the foundational importance of the behavioral assessment as part of a multimodality approach to detecting consciousness in the ICU. Even if advanced neuroimaging and electrophysiologic techniques detect covert consciousness in 15–20% of patients [23], expert consensus and clinical guidelines indicate that the CRS-R remains a cornerstone of the consciousness evaluation for patients with acute, subacute, and chronic DoC [11, 12, 24, 25]. Moreover, comprehensive behavioral assessments are far more generalizable to community hospitals and low-resource settings than are task-based functional neuroimaging and electrophysiologic techniques.

The present study by Gurin and colleagues [7] thus makes an important contribution to the field of COVID-19 DoC (and DoC more broadly) by highlighting the importance of performing multiple comprehensive behavioral assessments to detect consciousness in the ICU. Although the study does not provide mechanistic evidence linking early rehabilitation to recovery of consciousness, it provides a blueprint for optimizing rehabilitative care in the ICU. The findings also add to a growing body of evidence that patients with COVID-19 DoC may recover consciousness, even after prolonged periods of unresponsiveness. Moreover, these results magnify the need to ensure that clinicians have training opportunities to learn standardized behavioral assessments. As decisions about continuation of life-sustaining therapy are considered for patients with severe COVID-19 and other etiologies of acute DoC, the critical care community needs access to every tool that could optimize detection of consciousness.

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