Recovering Covid-19 patients share many of the physical, psychological, and cognitive challenges typical of recovering critical care patients, such as generalized deconditioning, pulmonary dysfunction, loss of mobility, and difficulty with activities of daily living. Covid-19 patients also have the added complexity that accompanies a novel disease with an unknown pattern of disease progression. NewYork-Presbyterian/Weill Cornell Medical Center created a 30-bed Covid-19 Recovery Unit to provide a multi-disciplinary, comprehensive treatment model for those recovering from Covid-19 critical illness, with a critical eye toward medicine, rehabilitation, and neuro-psychological needs.

The Covid-19 pandemic has created an unprecedented need for critical care and an equally unprecedented need for post-ICU care and recovery capacity. Recovering Covid-19 patients share many of the physical, psychological, and cognitive challenges typical of recovering critical care patients, such as generalized deconditioning, pulmonary dysfunction, loss of mobility, and difficulty with activities of daily living. Covid-19 patients also have the added complexity that accompanies a novel disease with an unknown pattern of disease progression. Preliminary research has suggested that Covid-19+ critical care patients may have higher risk for thrombotic complications, acute kidney injury (AKI), elevated liver enzymes, and cardiac injury. Further complicating the road to recovery for these patients is a range of psycho-social complexities caused by prolonged social isolation (due to strict visitation policies), extended stays in an ICU, and the fear and guilt associated with recovery from a novel pandemic-causing disease.

The sheer volume of critically ill patients, combined with their unique needs and presentations, led NewYork-Presbyterian/Weill Cornell Medical Center to create a Covid-19 Recovery Unit: a 30-bed...
unit with a dedicated team of providers. The unit is specifically designed to deliver a best-in-class, multi-disciplinary, comprehensive treatment model for those recovering from Covid-19 critical illness, with a critical eye toward medicine, rehabilitation, and neuro-psychological needs.

As the complex recovery needs of these patients became evident, an interdisciplinary team brainstormed how to effectively address the patients’ multisystem issues. A team of physicians from multiple departments and divisions – Hospital Medicine, Neurology, Nephrology, Pulmonology, Physical Medicine & Rehabilitation (PM&R), Psychiatry, Psychology, and Integrative Health – along with partners from Nursing, Nutrition, Social Work, and Care Coordination, conceptualized a new acute care unit, designed to integrate needed medical care with early rehabilitative therapy and extra support for psychosocial complications.

A 30-bed unit was quickly established, co-managed by Hospital Medicine and PM&R to prepare patients for the journey from the ICU to the next level of care. A Core Consulting Team from neurology, psychology, and neuro-psychology was established to help assess and address the immense physical and psychosocial toll this illness is taking on our patients. In addition to the Core Consulting Team, the unit has access to a full complement of consultants, including but not limited to Cardiology, Nephrology, Infectious Disease, GI, Endocrinology, Geriatrics, and Palliative Care. Figure 1 is a pictorial representation of our staffing model (note that this is not a reporting structure).

FIGURE 1

Staffing Model for 30-Bed Unit

Source: The authors
NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society
Patients Admitted to the Covid-19 Recovery Unit

The recovery unit was established to provide inpatient care to medically complex post-ICU and post-intubation patient populations. Many patients require dialysis and support with mobility and functional performance. At the NewYork-Presbyterian/Columbia University Medical Center campus a similar unit has been established to care for stable tracheostomy care patients. Although the Covid-19 unit includes rehabilitation and therapy components, the patient eligibility criteria are fundamentally different from an inpatient rehab unit, which requires patients to tolerate at least three hours of therapy per day. The eligibility criteria for the Recovery Unit are summarized in Table 1.

Because these patients are at risk for additional psychosocial consequences from prolonged social isolation and physical confinement to their hospital rooms, admission to the Covid-19 Recovery Unit includes an assessment by the primary attending for symptoms of depression, anxiety, and trauma. The Core Consulting Team helps to assess and treat these symptoms, and develops a plan for continuation of care upon discharge.

A Day in the Life of Covid-19 Recovery Unit Patient

While care in the Covid-19 Recovery Unit focuses on each patient’s unique needs, each day includes a set of uniform, structured activities for all residents. Each morning, patients receive a schedule for the day’s activities and a typical day includes each of the following key elements:

**Structured group and individual therapy opportunities** are provided throughout the week, including

- Five-times-weekly screening and sessions of physical therapy and occupational therapy, and speech-language pathology as appropriate
- Group therapy sessions three times weekly, in a central gym
- Mindfulness and meditation classes three times weekly, in a central classroom
- Chair yoga classes five times weekly, in a central classroom

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**Table 1. Patient Eligibility Criteria**

| Current Inclusion Criteria | Exclusion Criteria |
|---------------------------|-------------------|
| Medically stable, with ongoing medical + rehabilitative needs | Active suicidal ideation, severe dementia & active delirium, or need for a 1:1 sitter |
| Able to tolerate >30+ min PT/OT each daily | Bedbound patients with little expectation of improvement in mobility or physical functioning or previously poor baseline |
| Anticipation of final discharge to acute or sub-acute rehabilitation | Chronically ventilated patients, requirement of 6 liters nasal cannula or more, or increasing O2 requirement |
| Anticipation of at least one additional week of inpatient-level of care | Need for peritoneal dialysis is not an exclusion |
| Able to interact well with staff & other patients | *Plan to expand patient criteria to include stable trach-care patients in the near future* Source: NewYork-Presbyterian/Weill Cornell Medical Center |
| Need for peritoneal dialysis is not an exclusion | |

*Plan to expand patient criteria to include stable trach-care patients in the near future* Source: NewYork-Presbyterian/Weill Cornell Medical Center
• Goal-setting with a therapist weekly, including documenting therapy goals (e.g. independence in ambulating to the bathroom) on the room’s white board, which helps build awareness with both the patient and other members of the care team

**Rest and mealtimes** are structured to ensure minimal disruption to therapy activities and to provide patients with a predictable schedule.

**Unstructured socialization opportunities** are provided daily, including patient gatherings in a converted conference room.

**Activities to support community re-integration** are provided as frequently as possible. Telephone and video calls are set up with family members, during which patients are encouraged to practice communication. For patients who do not have their own video device, the hospital provides tablets. For those interested, our staff receives photographs from patients’ families and places them in patients’ rooms for easy viewing. Patient families are also invited to join therapy sessions remotely.

**Bed-to-chair focus** including additional support throughout the day from nursing aides to help patients stand and transition.

For clinicians, each day includes two sets of rounds:

• **Morning rehab-focused huddles** aim to prioritize patients assessed and treated by therapists. A 15-minute discussion is led by the charge nurse to quickly communicate any changes in clinical status from the previous night and identify barriers to working with physical therapists, occupational therapists, and speech-language pathologists.

• **Early afternoon interdisciplinary rounds** provide patient-level status updates with a focus on new transfers and anticipated discharges. Rounds typically last one hour and have multidisciplinary participation: hospitalist, physiatrist, resident, nurses, physical therapists, occupational therapists, a speech pathologist, a social worker, and a case manager.

**Creating Physical Space**

During the Covid-19 surge, NewYork-Presbyterian/Weill Cornell rapidly cohorted and centralized several units, creating capacity and space within the hospital. Using a unit previously occupied by the inpatient behavioral health service, the facilities and engineering team rapidly created a highly functional inpatient medicine unit with medical gases and central monitoring capability. Two temporary gyms were created in the unit, including a set of practice stairs, exercise mat, stationary bike, cognitive equipment, upper limb exercise equipment, weights, and balance equipment. A physician conference room was converted to a patient gathering place to encourage socialization and communication.
The Covid-19 Recovery Unit focuses on early and consistent socialization and communication, as well as psychological and neurological evaluations and treatment.

**Lessons Learned**

- **Patient anxiety is substantially increased during a pandemic.** An ICU stay is traumatic and fraught with deliriogenic risk factors. Covid-19 exacerbates these risks, not only through the natural neurobiology of the disease but also through the uncertainty, fear, and anxiety caused by a pandemic. Patients can develop PTSD and survivor’s guilt. The Covid-19 Recovery Unit focuses on early and consistent socialization and communication, as well as psychological and neurological evaluations and treatment.

- **In times of uncertainty, structure provides relief.** The Covid-19 Recovery Unit established a structured schedule unlike other med/surg units in our hospital: meals hewed closely to their assigned times to maximize efficiency of therapy; nap and rest times were scheduled and predictable; and group therapy sessions occurred consistently each day. Our hope is that this structure provides some comfort to patients, especially in the midst of so much uncertainty. Early anecdotal evidence suggests that patients appreciate it.

- **Establishing the Covid-19 Recovery Unit was an important first step for NewYork-Presbyterian/Weill Cornell, but there is substantial work left to do.** We are developing a process to follow discharged patients longitudinally and ensure they receive the post-discharge support needed, including survivorship support groups and periodic virtual visits. We are also monitoring several key outcomes during the patient’s stay in the Recovery Unit, including functional improvement (successful weaning from dialysis and/or feeding tube, as well as improvement in mobility and ADLs), mental status, and patient’s self-assessment of functional status.

- **Medicine and Rehabilitation co-management was a key to success.** Traditional ICU patient journeys often include a post-ICU stay in a med-surg unit followed by admission to an inpatient rehabilitation unit. The Covid-19 Recovery Unit allowed patients to begin their therapy journey earlier in the process. The strong partnership between medicine and rehabilitation, combined with neurology and psychiatry support on a single unit, is novel for our hospital, and may be a model for future post-ICU care.

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