



Hospital for Special Care (HFSC) is a long-term acute care hospital providing post-acute care to patients with highly complex medical conditions or who have suffered catastrophic injuries. Among the hospital’s core areas of expertise: pulmonary care, ventilator weaning and intensive rehabilitation. On any given day the hospital cares for more than 80 patients from infants to seniors who are ventilator-dependent among its 228 patients.

At the height of the COVID-19 global pandemic in Connecticut, HFSC converted its close observation unit, comparable to an intensive care unit, to a 10-bed COVID-19 recovery unit. This created a critical resource within the statewide health care system, a system that was overwhelmed with hospital admissions¹ and facing a post-acute environment that largely had no capacity to care for new COVID patients safely.

Forty-one patients were admitted to HFSC’s 10-bed COVID-19 recovery unit between April and September 2020. Each patient met the referral criteria to qualify for intensive rehabilitation at the long-term acute level of care HFSC provides: all patients were admitted directly from an intensive care unit severely deconditioned, 83 percent had spent more than 96 hours on a ventilator and most had been hospitalized for at least a month prior to admission. In addition to caring for patients recovering from COVID-19, HFSC has operated at surge capacity (above its licensed bed-capacity) with approval from the Connecticut Department of Public Health throughout much of the pandemic expanding service to other pediatric and adult patients with complex medical conditions.

A multidisciplinary clinical team assigned to the HFSC COVID-19 recovery unit has conducted a detailed analysis of the patient cohort admitted, including racial and ethnic composition, age, gender and pre-COVID health status, as well as functional, cognitive and psychological measures of recovery. This analysis:

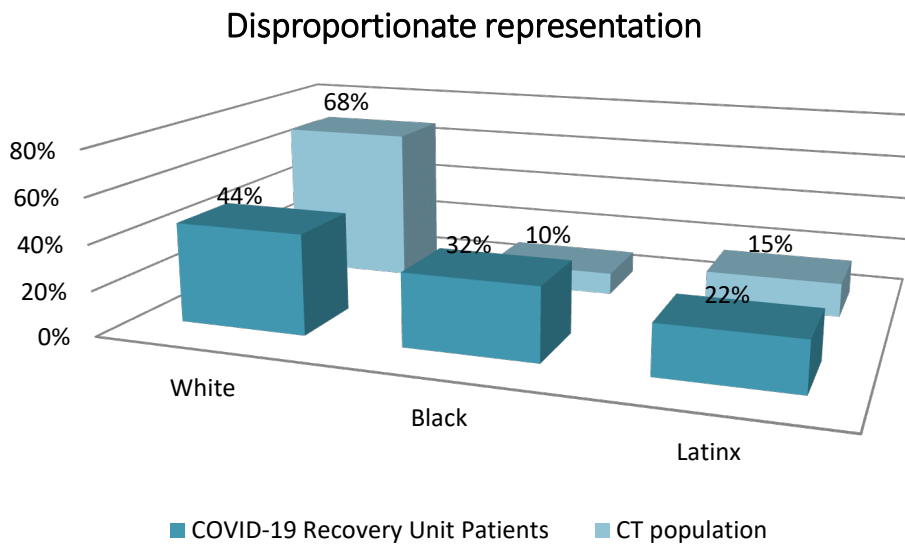
- **underscores observed disparities in COVID-19 severe infection rates in communities of color**
- **addresses the implications of health disparities on recovery for severely impacted patients in the near and far-term**

The analysis also demonstrates the impact of the long-term acute care hospital in ensuring equity in access to highly specialized, multidisciplinary care for severely impacted patients. This,

and other data, will also inform a larger study conducted by the National Association of Long Term Hospitals (NALTH) documenting care outcomes at this level of care nationally.

OBSERVED DISPARITIES:

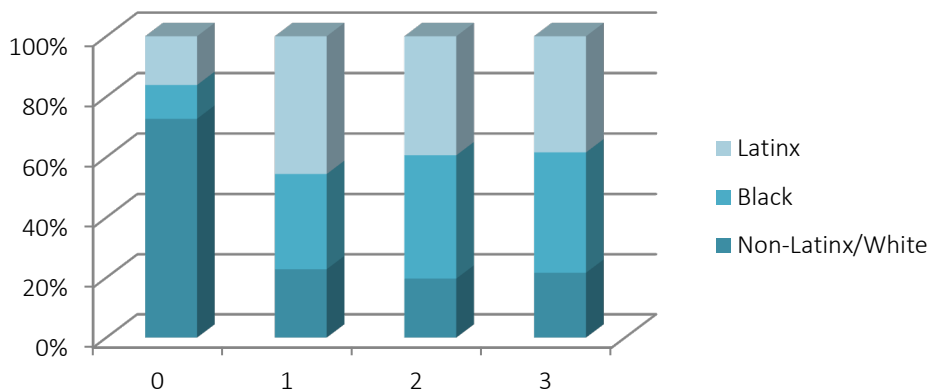
- **Individuals of Black or Latinx racial or ethnic background were disproportionately represented in the patient cohort** requiring intensive post-acute care at HFSC following COVID-19 infection and disproportionately represented among Medicaid recipients in the patient cohort.



- **A disproportionate number of patients of Black or Latinx racial or ethnic background had multiple, pre-existing risk factors** for severe illness (including diabetes, obesity and hypertension) as compared to White patients in the cohort.

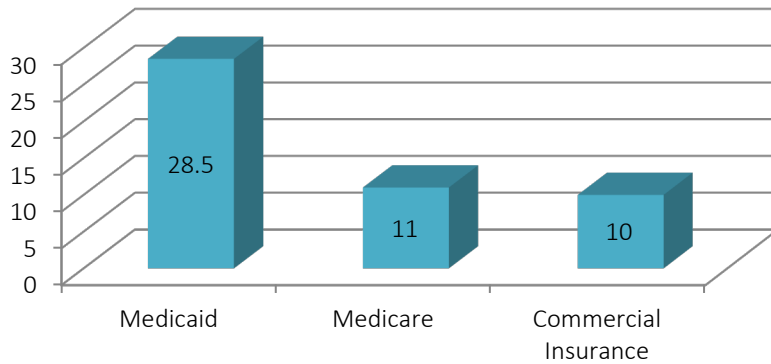
Race/Ethnicity: Metabolic Risk

Number of risk metabolic risk factors by race/ethnicity (Obesity, Diabetes Mellitus, Hypertention)



Patients covered by Medicaid spent more days on a ventilator in acute care prior to admission at HFSC (median 28.5 days) than did patients with Medicare (median 11 days) or commercial insurance (median 10 days). The number of days a patient required mechanical ventilation is an indicator of how severely COVID-19 impacted their lungs.

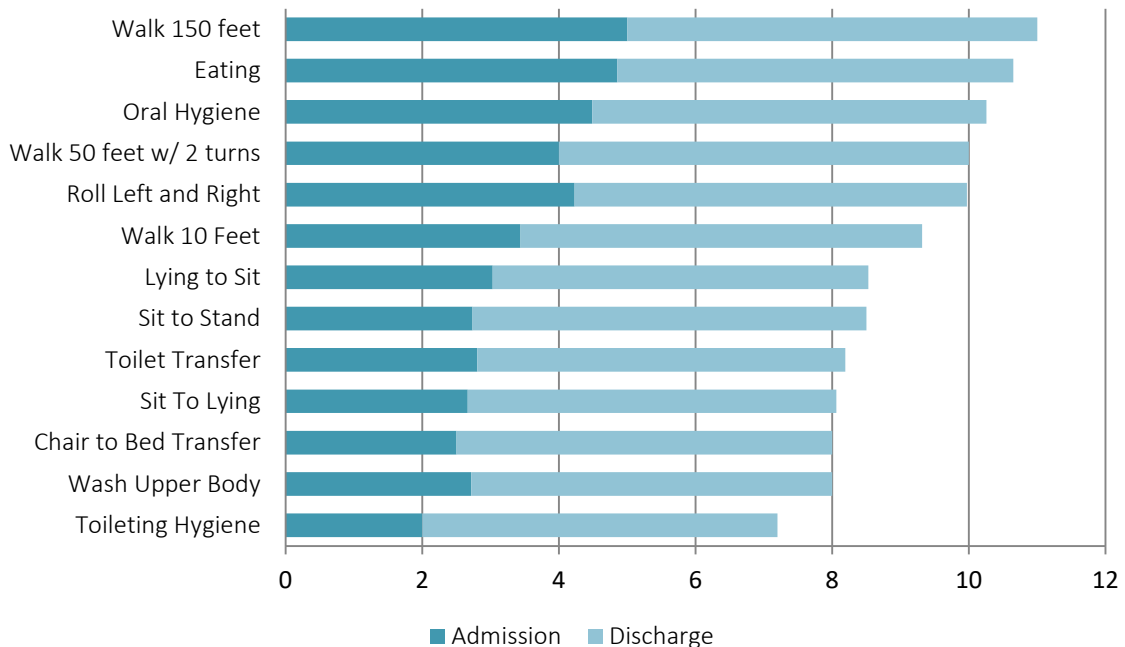
Median Days on Vent in Acute Care



RECOVERY OUTCOMES:

- Patients in the COVID-19 recovery cohort demonstrated substantial progress achieving a modified level of independent functioning for multiple daily activities.

Patients achieving modified level of independence
(Change from admission to discharge)



- Despite observed disparities within the composition of the patient cohort on admission, no subgroup differences in functional gains based on race/ethnicity, insurance coverage or metabolic risk factors were recorded at discharge as measured by FIM² scores.
- Among patients returning for outpatient care post-discharge, individuals of Black or Latinx racial or ethnic background reported less improvement in anger, fatigue, depression and anxiety than their White peers as measured via PROMIS® (Patient Reported Outcomes Measurement Information Systems). A recent study published in the Lancet Psychiatry Journal documented greater post-illness diagnoses of anxiety disorder, insomnia and even dementia among COVID-19 patients.³

DISCUSSION

The data observed within the HFSC COVID-19 patient cohort provides further evidence that historic disparities in access to health care and risk prevalence tied to race, ethnicity and socioeconomic status have shaped patient experience of COVID-19. Patients of Black and Latinx racial and ethnic background and patients eligible for Medicaid were disproportionately represented among the most severely impacted by COVID-19 infection – and left post-acute care with recovery outcomes consistent with other patients in the cohort. They also left, however, with many of the same metabolic risk factors that increased their susceptibility to the coronavirus.

Hospital for Special Care, a uniquely resourced long-term acute care hospital, successfully eliminated the impact of each of race, ethnicity and insurance coverage variables on functional recovery from COVID-19 severe infection, demonstrating outcomes undifferentiated by demographic or socioeconomic barriers. In the near-term, is the capacity to mitigate the impact of health disparities on recovery is a critically important outcome and one that raises questions that merit longer-term study in the local and national health conversation.

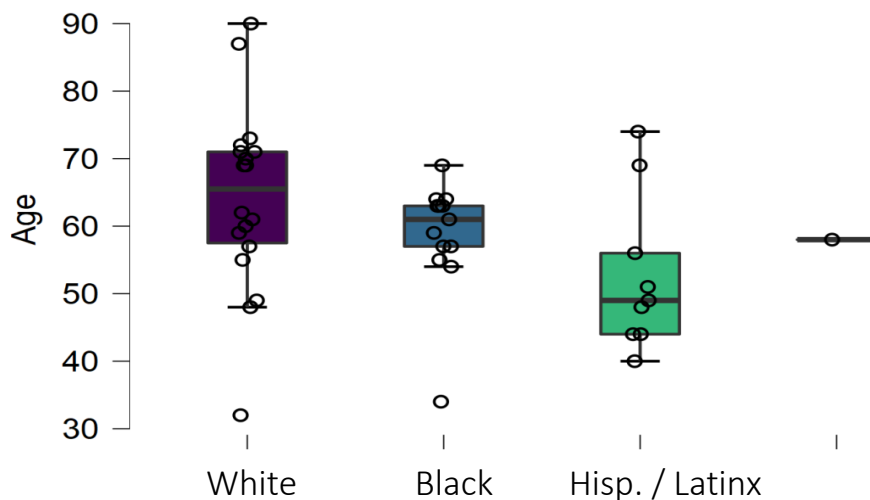
- Are these outcomes transferrable to patients requiring long-term acute care following ICU level care, across medical condition or diagnoses?
 - Further exploration of how these outcomes have been achieved and identification of key variables and differentiators from other types of care environments are indicated.
- How can the durability of recovery gains be sustained in a geographically dispersed population with limited access to COVID-19 informed follow-up care?
 - Initial differences in post-discharge improvement in emotional status by race and ethnicity raise questions about the long-term impact of severe COVID-19 infection on emotional health.

- While patients may have experienced short-term decreases in metabolic risk factors due to weight loss during the course of COVID-19 hospitalization, long-term changes in diabetes, hypertension and obesity rates are far from assured.
- What are the implications (recovery outcomes, number of days in care, long-term health care costs) for patients without access to intensive post-acute rehabilitation in regions without the LTCH level of care?

COVID-19 RECOVERY PATIENT COHORT:

Forty-one patients were admitted to HFSC’s 10-bed COVID-19 recovery unit between April and September 2020. Most were admitted to HFSC approximately one month (median = 33 days) after their admission to the acute care hospital. All patients required intensive care and 83 percent required mechanical ventilation in the acute care setting. In general, patients spent approximately two weeks on a vent while in the acute care setting (median = 14 days). The subgroup of patients who had required mechanical ventilation were significantly younger than the group who did not (mean age 57 versus 71).

Patients ranged in age from 30 to 90 or older with a median age of 60. Seventy percent of patients in the cohort were under the age of 65. The median age of patients of Latinx ethnicity was lower than other subgroups in the cohort, a difference also reflected in the Connecticut population. Males were overrepresented in the cohort population (56 percent) as compared to the state population (48.8 percent).



Among the 41 individuals in this cohort, there are disproportionately more individuals who are younger and of non-White Hispanic / Latinx background.

Among risk factors for severity of COVID-19 infection, 46 percent of patients had a history of diabetes, 44 percent had a history of obesity (BMI: Body Mass Index >29), 49 percent had a history of hypertension, and 29 percent were age 65 or older. Among the patients with diabetes, there were disproportionately more individuals of Latinx or Black racial or ethnic background than non-Latinx White. Thirty-two percent of the cohort had one COVID-19 severity risk factor, 39 percent had two risk factors, and 10 percent had three risk factors. A disproportionate number of individuals of non-White racial or ethnic background had multiple risk factors for severity of illness.

REHABILITATION AND RECOVERY:

A comprehensive, multidisciplinary care team provided coordinated treatment for all patients within the COVID-19 patient cohort. The team differs from the clinical teams in acute care and other post-acute environments such as nursing homes, in both composition, and depth of experience providing intensive rehabilitation to severely deconditioned, pulmonary-compromised patients, under isolation precautions.

The HFSC COVID-19 recovery unit team included:

- Infectious disease preventionists and specialists
- Neuropsychologists
- Nurses and certified nursing assistants
- Occupational therapists
- Pastoral care
- Physiatrists
- Physical therapists
- Pulmonologists
- Registered dietitians
- Rehabilitation psychologists
- Respiratory therapists
- Speech language pathologists
- Therapeutic recreation specialists

Members of the clinical team, and all ancillary staff supports, received extensive training or re-training in donning and doffing of personal protective equipment, were fitted for N-95 masks, and followed extensive safety protocols to reduce infection transmission. Where possible, staff were either dedicated to the unit, or treated patients on the unit via telehealth or at end of shift.

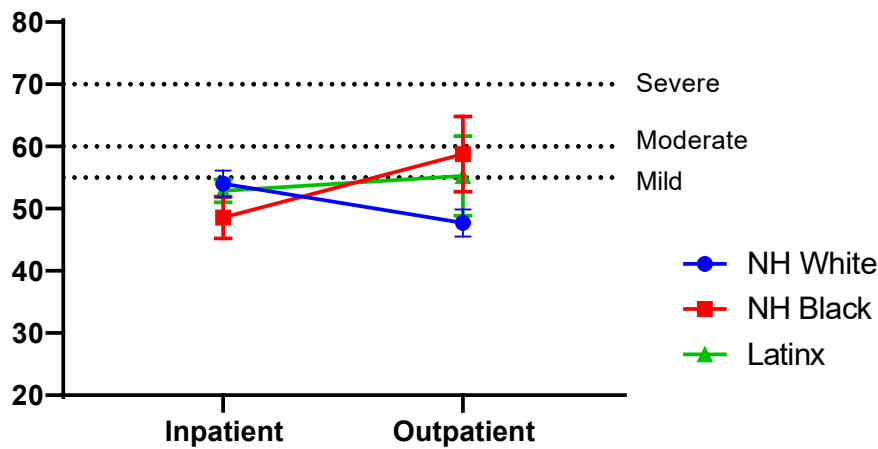
No incidence of patient to staff or patient to patient transmission of the coronavirus occurred during the unit's operation.

The average length of stay for patients in the COVID-19 cohort was 29 days. Patients demonstrated some cognitive difficulty during their rehabilitation period (more than 1.5 standard deviations from mean). Among patients able to complete a cognitive screening, test scores showed 14 percent with lower than average attention and 68 percent with lower than average memory functioning. These observations are consistent with studies that have identified

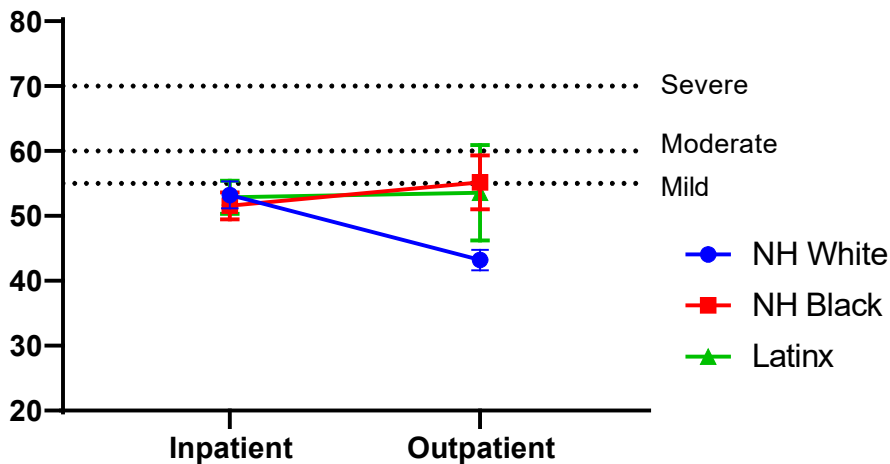
cognitive problems during inpatient rehabilitation after severe illness requiring an ICU level of care.). A recent study published in the Lancet Psychiatry Journal documented greater post-illness diagnoses of anxiety disorder, insomnia and even dementia among COVID-19 patients.⁴

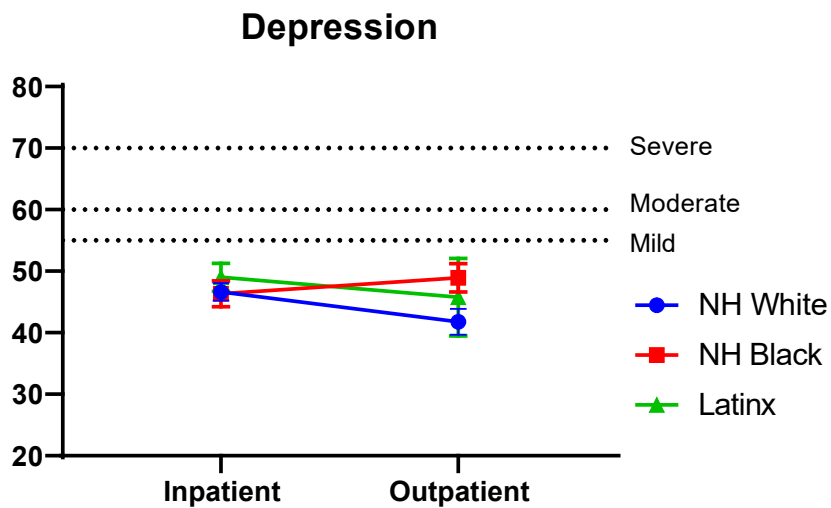
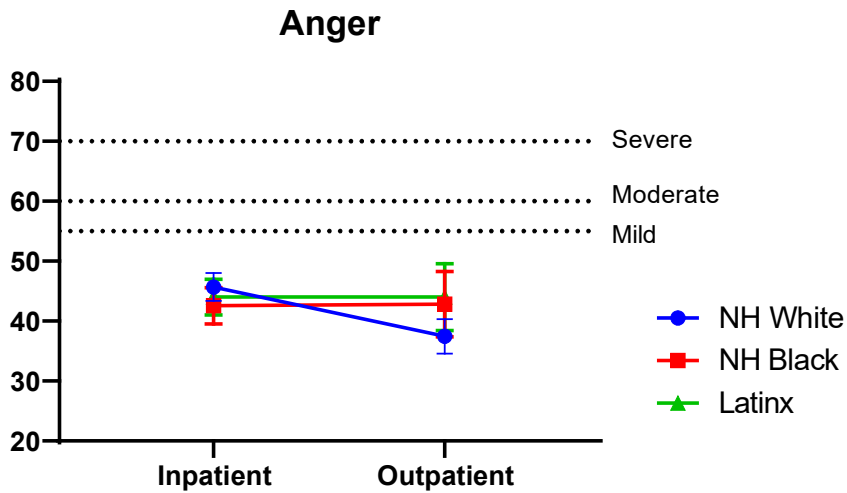
A relatively low percentage of patients, as compared to the patients receiving intensive post-acute care not related to COVID-19, reported atypical levels of persisting pain (two percent), sleep disturbance (27 percent), fatigue (12 percent) or emotional distress (anger – seven percent; anxiety – 22 percent; depression two percent). Of note, among patients returning for outpatient care post-discharge, individuals of Black or Latinx racial or ethnic background reported less improvement in anger, fatigue, depression and anxiety than their White peers as measured via PROMIS® (Patient Reported Outcomes Measurement Information Systems).

Fatigue



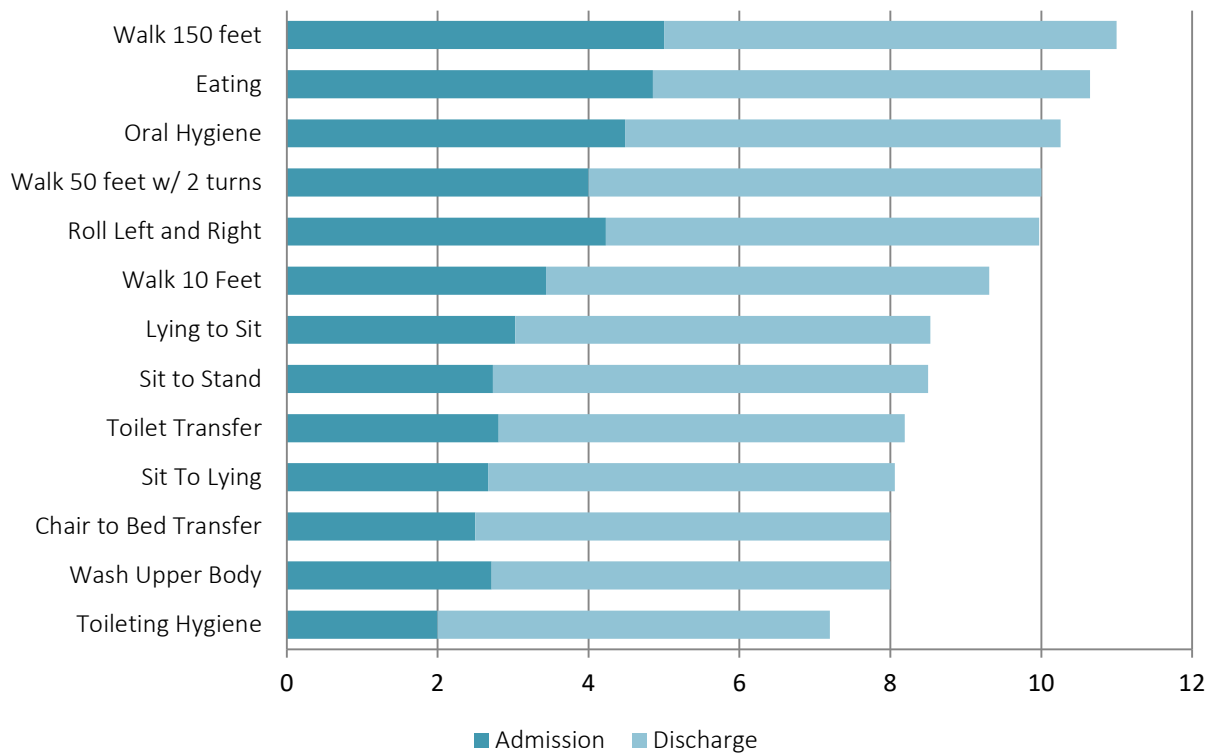
Anxiety





Patient progress in physical rehabilitation measured using the Functional Independence Measure, or FIM, was assessed based on ratings at time of admission and discharge. **Patients, across all demographic and risk factors, demonstrated substantial progress from dependence on another person to a level of modified independence for basic activities of daily living.** At discharge, patient need for supplemental oxygen was substantially decreased from 3.36 average liters per minute on admission to 2.23 average liters per minute. In addition, the average increase in walking distance per patient at the time of discharge was 428 feet.

Patients achieving modified level of independence (Change from admission to discharge)



Patients experiencing COVID-19 infection at a level of severity requiring ICU care are at-risk for a prolonged recovery period, even beyond post-acute intensive rehabilitation. The HFSC COVID-19 recovery team continues efforts to monitor patients’ status and engage them in outpatient pulmonary follow-up and ongoing multidisciplinary rehabilitation. The distribution of patients geographically - patients were admitted from six of Connecticut’s eight counties as well as at least one other New England state - raises challenges in ensuring access to COVID-informed follow-up care.

These challenges may be compounded by transportation barriers and limited access to telehealth services for the disproportionate number of individuals of color enrolled in Medicaid among the patient cohort. Non-emergency medical transportation, funded by Medicaid, is available, however historic mistrust of the system, compounded by the increased logistical complexity created by the pandemic remain barriers. It is no longer simply inconvenient to sit in a waiting room for an extended period of time waiting for transportation – it has become a safety issue for patients and providers alike. Telehealth services are available for many types of care, but not all treatments can be delivered remotely and not all patients have equitable access to appropriate devices or internet services.

With appreciation to the Hospital for Special Care COVID-19 Outcomes Team for individual and collective efforts to support data-informed clinical care through multidisciplinary collaboration. Rebuilding lives...together.

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¹ <https://data.ct.gov/Health-and-Human-Services/COVID-19-Tests-Cases-Hospitalizations-and-Deaths-S/rf3k-f8fg>

Connecticut reported nearly 2,000 patient hospitalizations due to Covid-19 for much of April 2020.

² Functional Independence Measure (FIM) is an 18-item, clinician reported scale that assesses function in six areas including self-care, continence, mobility, transfers, communication and cognition.

³ [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(20\)30462-4/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(20)30462-4/fulltext)

⁴ [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(20\)30462-4/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(20)30462-4/fulltext)