

# COVID-19 in Acute Inpatient Rehabilitation (CARE Study): A retrospective analysis of patient functional outcomes and post-infectious complications

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## Introduction

With the global incidence of COVID-19 continuing to rise and many patients moving into the post-infectious period, there is a growing need for physical and medical rehabilitation due to extended hospital stays, COVID-19 complications, and severe debility associated with the disease process. Researchers and clinicians are forced to adapt the standard practice of rehabilitation to the dynamic presentation of post-COVID patients<sup>2</sup>. Case reports, professional opinions, and clinician anecdotes are rapidly evolving the practice of rehabilitation in patients recovering from COVID-19; however, few studies have been done to analyze patients admitted to an acute rehabilitation setting. Researchers have begun to identify risk factors associated with initial infection with COVID-19, but few have looked at the implications of patient demographics, co-morbidities, lab abnormalities, and complications during the subacute phase as they relate to rehabilitation potential and outcome.

By gathering these data from patients recovering from COVID-19 in an acute inpatient rehabilitation setting, we aim to identify risk factors associated with extended rehab stays, poor outcomes, complications in the immediate post-infectious period, and other significant trends. This information may provide significant insight into prognosticating infected patients, predicting outcomes, and identifying risk factors for debility. By identifying trends within recovering COVID-19 patients, this study may help guide future research and provide immediate information on identifying patients at high risk for complications.

DEMOGRAPHICS		
Average age		56.60
Gender	Male	35.71%
	Female	64.29%
Race	Caucasian	50.00%
	African American	16.67%
	Hispanic or Latino	30.95%
	Asian	2.38%

Table 1. Demographics

## Methods

A retrospective chart review was conducted on all patients who came to an Inpatient Rehabilitation Facility recovering from COVID-19. The total sample size of patients admitted from April 4<sup>th</sup> 2020 to May 29<sup>th</sup> 2020 was 44. Table 1 outlines the demographics of the studied population.

Data collected included demographic data (table 1) and co-morbidities. Rehabilitation stay data were collected including rehab complications, Length of Stay, rehab outcomes (Functional Efficiency, Change in Mobility through admission). These were analyzed against demographics and co-morbidities using Chi squared analysis.

**Pulmonary disease comorbidity:** COVID patients with pulmonary disease as a comorbid condition have longer lengths of stay (P value= 0.057)

Pulmonary disease	LOS average
N	14.43
Y	19.57
Total average	15.28

**Obesity:** Positive correlation. The higher the BMI the longer the LOS (P value= 0.054)

**Comorbidity tracheostomy:** COVID patients had higher changes in self-care if they had a tracheostomy.

Trach	Average of Change Self-care
N	12.88
Y	17.69

**Comorbidity PEG:** COVID patients had higher changes in self-care if they had a PEG tube (p value= 0.06)

PEG	Average of Change Self-care
N	12.76
Y	17.92

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## Discussion

Early research shows the highest rates of comorbidities related to severe infection in patients with COVID-19 are hypertension, coronary artery disease and stroke, and diabetes (31%) [5]. Our data redemonstrate some of these findings and further our understanding of prognostic indicators of severe infection. The highest rates of comorbidities were obesity (53.65%), hypertension (50.00%), and diabetes mellitus (26.19%). We found obesity to be the predominant comorbidity among those admitted for inpatient rehabilitation, which has been corroborated by other multi-center studies showing high rates of obesity in patients with severe infection [9]. Whether obesity is the causative factor of this correlation remains unclear, as the deleterious physical effects which led to these patients requiring rehab may be related to other biologic and health factors which are associated with obesity.

In relation to Length of Stay (LoS), obesity demonstrated a strong positive correlation. Higher BMI on admission being associated with extended rehab stays (p value 0.054). There also exists a predilection for post-infectious patients with pulmonary disease to have longer Length of Stays (p value 0.057). Intuitively, patients with preexisting pulmonary disease have higher morbidity and mortality. Further analysis of the population with pulmonary disease showed a longer average LOS. In addition, 42.86% of patients with preexisting pulmonary disease required oxygen throughout their stay and all of these patients required home oxygen upon discharge. It can be extrapolated that patients with preexisting pulmonary disease show a slower respiratory recovery and higher oxygen demands compared to patients without pre-existing pulmonary and respiratory dysfunction.

Functional efficiency was used to determine rehabilitation success and analyzed against multiple variables for statistical significance. While no variables were associated with improved functional efficiency, cerebrovascular accident during acute care stay showed statistically significant lower functional efficiency. The associated demands and slow recovery in stroke patients may be compounded by COVID-19 infection and explain this negative trend. This considerable finding warrants further studies to determine an effective rehab protocol for this population.

Change in Self-Care is another widely used functional outcome which showed a significant trend in our data. Patients admitted to acute rehab with a tracheostomy or PEG tube showed statistically significant improvements in Self-Care through admission (p value 0.01 and 0.06, respectively). This highlights the importance and effectiveness of rehabilitation in patients with these specific morbidities.

## Conclusion

These results further emphasizes the importance of utilizing acute inpatient rehab in post-COVID patients who experienced longer intubations, tracheostomy, and PEG tube feedings. These data add to the paucity of specific knowledge related to acute inpatient rehabilitation and COVID-19. By identifying patient trends, this study helps guide future research and provides immediate information on patients at highest risk for complications