

Healthcare Utilization and Charges Associated with US Hospitalized Adult Patients with COVID-19

Fayolah Richards¹, Antoine C. El Khoury¹, Chantal Holy¹, Lilla Di Scala¹, Brandon J. Patterson¹, Andrea R. Mospan², Julie M. Crawford², Breda Munoz², Heather L. Morris², Michael W. Fried²

Janssen Pharmaceutical Companies of Johnson & Johnson¹; Target RWE, Durham, NC, USA²

Key Findings

- A total of 152,770 patients ≥ 18 years of age had median total hospital charges of \$52,821 (range \$1,005 - \$5,324,068).
- Older adults (60+, \$58,112), males (\$57,131), and Hispanics (\$61,997) had higher median total charges reported for their first COVID-19 hospitalization than their comparators (p<.0001).
- Male patients (\$19,781), those with a higher ECI (\$1,841), transferred from an ambulatory surgical center (\$44,629), and treated in the West (\$37,114) had higher adjusted total charges.
- Patients who received mechanical ventilation during their hospitalization in the West (\$9,785) and recipients of commercial insurance (\$2,523) had higher estimated total charges.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic is a worldwide public health concern that presents an urgent need for understanding the impact on the way healthcare is utilized in the United States.

- COVID-19 hospitalization rates have fluctuated since the onset of the pandemic.
- The total economic cost of COVID-19 in the United States through the Fall of 2021 has been estimated at \$16 trillion.¹

Objectives

The purpose of this project was to estimate the total hospital charges associated with health services provided to COVID-19 inpatients hospitalized across the US during the study period of April – December 2020.

- Primary Objective:** Identify patient and hospital characteristics associated with total hospital charges for healthcare utilization by patients admitted/hospitalized with a diagnosis of COVID-19.
- Secondary Objective:** Identify patients with high care utilization during first COVID-19 hospitalization and investigate whether there are disparities in total charges for healthcare utilization among patients receiving healthcare for COVID-19.

Methods

This is a retrospective, observational study utilizing US hospital chargemaster deidentified data from 330 hospitals from April to December 2020.

- ICD-10 code U07.1 was used to identify patients with a primary diagnosis of COVID-19; patients with a secondary COVID-19 diagnosis and a primary diagnosis that was a complication of COVID-19 (i.e. pneumonia).
- Demographic data were analyzed descriptively and linked with total charges.
- A predictive model for total hospitalization charges related to the first hospitalization with generalized equation estimates (GEE) was developed to model the association between hospital charges and patient-level clinical and demographic variables available at admission, and hospital characteristics.

Results

A total of 152,770 patients were included in the study with a median length of hospital stay of 7 days. The majority of patients were aged 60+ and males. 16% required a stay in the ICU with a median duration of 8 days (1-193 day). 50% of patients were diagnosed with pneumonia within the first 24 hours of admission and 81% were diagnosed at some point during hospitalization.

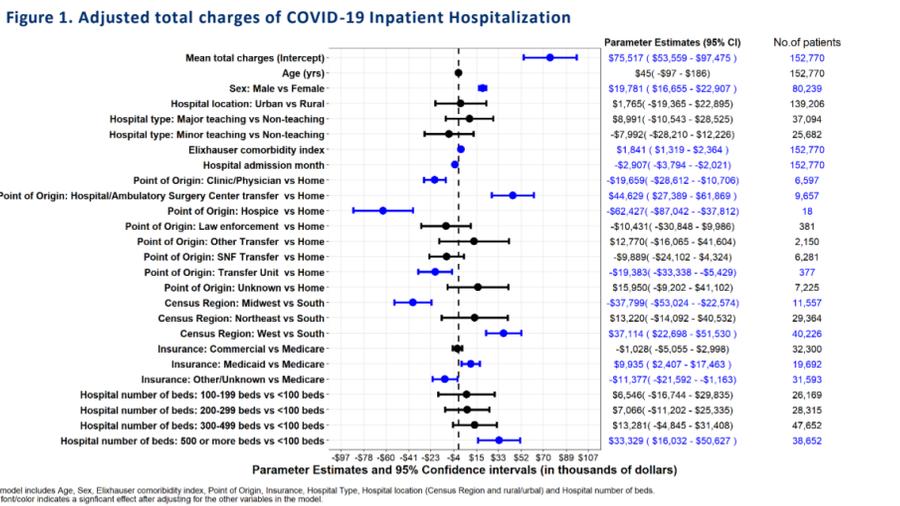
- Adults 60+ (\$58,112), males (\$57,131) and Hispanics (\$61,997) had the highest median total charges within each of the demographic categories. The median total charges during hospitalization for all patients was \$52,821.

Table 1. Total Medical Charges of the first COVID-19 hospitalization by US patients and hospital characteristics

Characteristics	Total Costs (Number of patients=152,770)		
	Median (n)	Min – Max	P-value
Total	\$52,821 (152,770)	\$1,005-\$5,324,068	
Age group			<.0001
18-40	\$36,274 (16,591)	\$1,057-\$4,140,326	
41-60	\$50,033 (43,430)	\$1,005-\$4,324,068	
>60	\$58,112 (92,749)	\$1,097-\$3,652,729	
Sex			<.0001
Female	\$48,467 (72,531)	\$1,057-\$3,679,920	
Male	\$57,131 (80,239)	\$1,005-\$4,324,068	
Race			<.0001
Black	\$50,535 (9,529)	\$1,333 - \$3,379,743	
Hispanic	\$61,997 (15,924)	\$1,057 - \$4,324,068	
Other	\$54,198 (7,544)	\$1,284 - \$2,925,721	
White	\$46,675 (28,191)	\$1,124 - \$3,856,706	
Insurance			<.0001
Commercial	\$49,084 (32,300)	\$1,124 - \$4,161,629	
Medicaid	\$56,530 (19,692)	\$1,086 - \$4,324,068	
Medicare	\$58,945 (69,185)	\$1,114 - \$3,379,743	
Other	\$48,782 (6,794)	\$1,200 - \$2,820,609	
Unknown	\$42,455 (24,799)	\$1,005 - \$2,604,411	
Hospital Characteristics			<.0001
Hospital Type			
Major Teaching	\$62,302 (37,094)	\$1,005 - \$4,161,629	
Minor Teaching	\$45,390 (25,682)	\$1,097 - \$3,856,706	
Non-Teaching	\$51,871 (89,994)	\$1,086 - \$4,324,068	
Census Region			<.0001
Midwest	\$32,444 (11,557)	\$1,741 - \$1,767,423	
Northeast	\$64,434 (29,364)	\$1,005 - \$4,161,629	
South	\$45,957 (71,623)	\$1,057 - \$3,485,912	
West	\$66,247 (40,226)	\$1,443 - \$4,324,068	
Hospital Location			<.0001
Rural	\$56,948 (13,564)	\$1,505 - \$4,140,326	
Urban	\$52,435 (139,206)	\$1,005 - \$4,324,068	

A predictive model¹ for total COVID-19 hospitalization charges estimated the average total charges as \$75,517 (95% CI = \$53,559 - \$97,475).

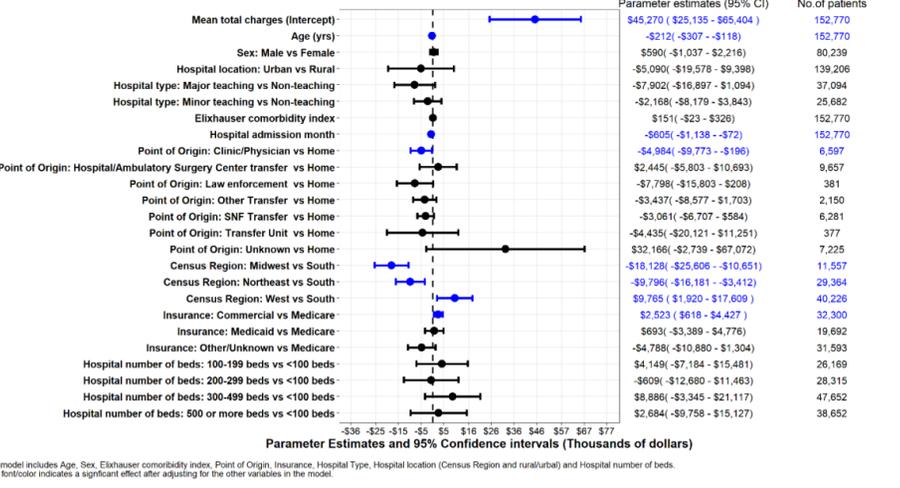
- Charges were higher in male patients (\$19,781, p<.0001) and those with a higher Elixhauser comorbidity index (ECI) score (\$1,841, p<.0001), originated from the hospital/ambulatory surgery center (\$44,629, p<.0001), were treated in a hospital with ≥500 beds (\$33,329, p<.0001), treated in the West (\$37,114, p<.0001), and were on Medicaid insurance (\$9,935, p<.0001).



A predictive model¹ for total COVID-19 hospitalization charges for patients who received mechanical ventilation estimated the average total charges as \$45,270 (95% CI = \$25,135 - \$65,404).

- Charges were higher in for patients receiving care in the West (\$9,785), and those on commercial insurance (\$2,523).

Figure 2. Adjusted total charges for patients who received mechanical ventilation



Abbreviations
 ECI – Elixhauser Comorbidity Index
 GEE – Generalized Equation Estimates
 US – United States

References
 1. Cutler, DM & Summers, LH (2020). The COVID-19 pandemic and the \$16 trillion virus. *JAMA*, 324(15), 1495-1496.



Acknowledgments and Disclosures
 Target RWE is a health evidence solutions company headquartered in Durham, NC.