

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

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 purpose of this project was to investigate the total hospital charges and identify characteristics associated with health services provided to COVID-19 inpatients hospitalized across the US.

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.

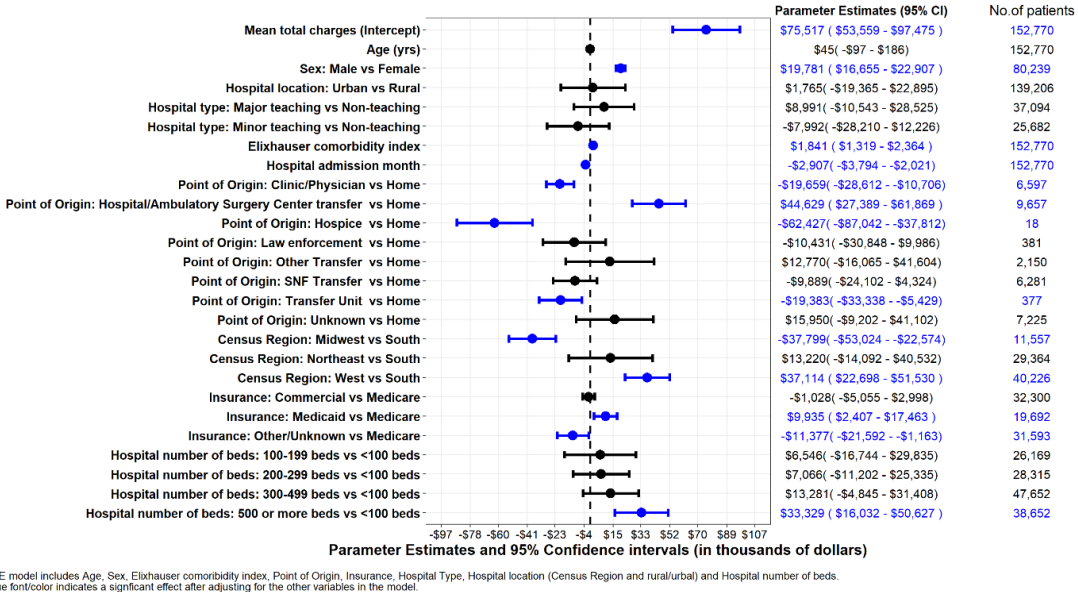
Table 1. Total Medical Charges of the first COVID-19 hospitalization by US patients and hospital characteristics

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			
Hospital Type			<.0001
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 model 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<0.001), were treated in a hospital with ≥500 beds (\$33,329, p<0.001), treated in the West (\$37,114, p<0.001), and were on Medicaid insurance (\$9,935, p<0.001).

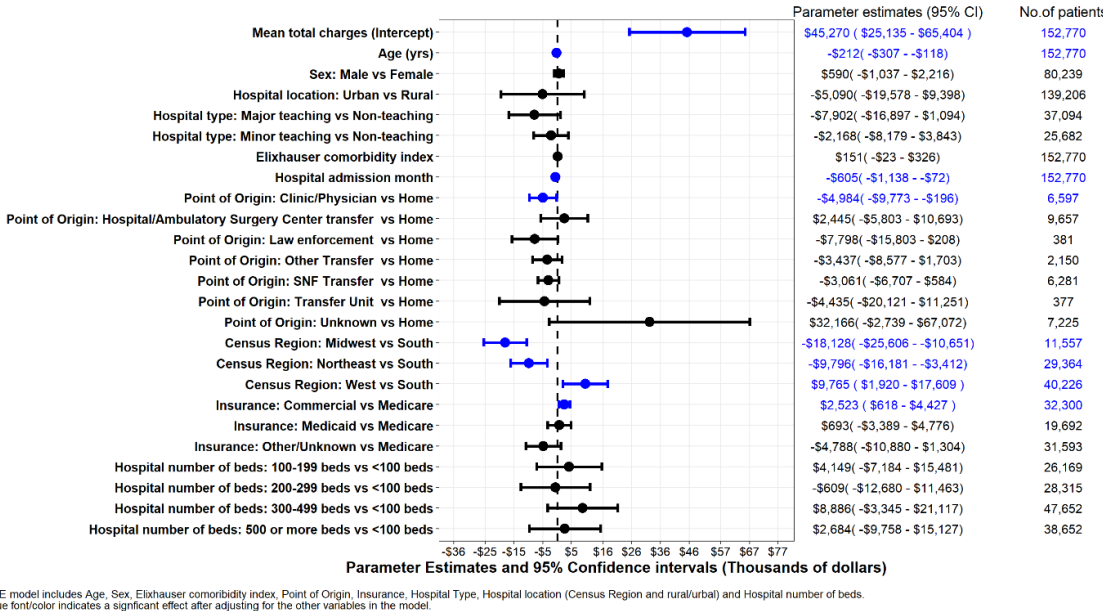
Figure 1. Adjusted total charges of COVID-19 Inpatient Hospitalization



A predictive model 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



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.

Conclusions

COVID-19 hospitalizations were associated with significant healthcare resource utilization.

Risk factors of total elevated hospital charges associated with an inpatient stay and mechanical ventilation included gender, comorbidities and hospital characteristics.

Total hospital charges associated with COVID-19 hospitalizations need to be examined in the future as changes to patient burden may change over the evolution of the disease.

Abbreviations

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



Acknowledgments and Disclosures

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