

Inpatient Lengths of Stay and Number of ICU Days Among COVID-19 Patients Differ from Common Model Assumptions

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Public policy decisions in the United States have relied on epidemiologic models that predict the course of the COVID-19 pandemic. These models rely on certain assumptions about the impact of the disease on the population, such as inpatient length of stay and ICU days. The model published by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington in Seattle has received the most media attention. Some of its assumptions are based on data from Wuhan, China from December 2019.¹

We compared the IHME assumptions to the median inpatient length of stay and ICU days in a sample of 94,875 admissions across 21 U.S. states.

Medians were calculated separately for patients who were discharged from the hospital and those who died in the hospital, and those who spent any time in critical care and those who did not. All lengths of stay were expressed in whole numbers. We present the data along with the 1st and 3rd quartiles for each group in Figure 1 below, which indicates the distribution of length of stay in the sample.

Figure 2 includes data from the same set of 94,875 admissions further stratified by age.

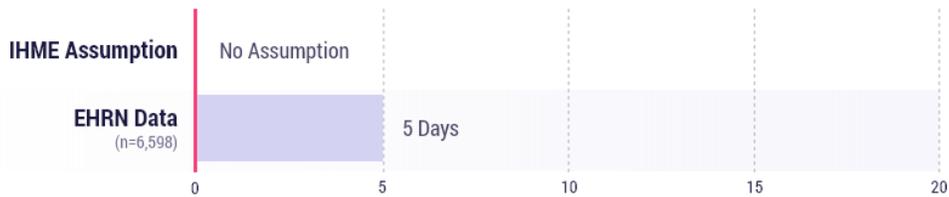
COVID-19 Median Inpatient and ICU Length of Stay

Inpatient Length of Stay: ■ ICU Length of Stay: ■

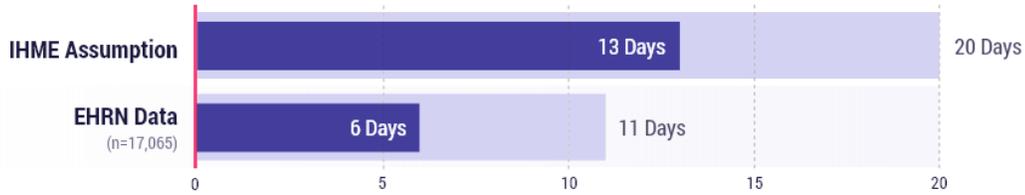
Admissions Ending in Death With ICU Stays



Admissions Ending in Death Without ICU Stays



Admissions Discharged Alive With ICU Stays



Admissions Discharged Alive Without ICU Stays



	Inpatient Length of Stay (Days)			ICU Length of Stay (Days)		
	Median	Bottom Quartile	Top Quartile	Median	Bottom Quartile	Top Quartile
Admissions Ending in Death With ICU	11	6	19	8	3	12
Admissions Ending in Death Without ICU	5	3	9	-	-	-
Admissions Discharged Alive with ICU	11	6	21	6	3	12
Admissions Discharged Alive without ICU	5	3	9	-	-	-

Figure 1. The graph shows the assumptions gleaned from the IHME website against the data from the sample. Median hospital and ICU length of stay for each subgroup is shown. The table includes the same numbers and the associated quartile values.

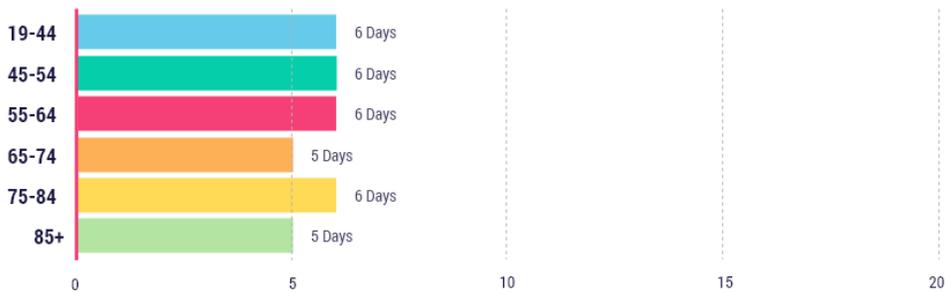
COVID-19 Median Inpatient and ICU Length of Stay by Age

Length of Stay: 19-44: (n=15,750) 45-54: (n=12,602) 55-64: (n=18,980) 65-74: (n=19,266) 75-84: (n=15,792) 85+: (n=11,241) ICU Length of Stay: ■

Admissions Ending in Death with ICU



Admissions Ending in Death without ICU



Admissions Discharged Alive with ICU



Admissions Discharged Alive without ICU



Figure 2. The median length of stay and time spent in the ICU were calculated for COVID-19 patients, and further stratified by age in addition to COVID-19 outcome. Data are not displayed for pediatric patients due to small sample sizes.

These median estimates differ from IHME assumptions. If these differences indeed represent real clinical differences, then they may be due to a change in the characteristics of the COVID-19 disease, or improvement in management, as patients who died are surviving longer and patients who survived are spending shorter periods in both levels of hospital care.

Data are pooled from 54 healthcare organizations representing 526 hospitals that span 21 states and include 94,875 COVID-19 related admissions as of July 29, 2020.

DATA DEFINITIONS

Term	Definition
COVID-19 Patient	Patient with a positive SARS-CoV-2 lab result or a COVID-19 diagnosis.
Length of Stay	The number of calendar days between hospital admission and discharge (inclusive). For example, a patient admitted and discharged on the same day has a length of stay of 1. For currently active admissions, the length of stay is calculated up to the current date.
ICU Days	The number of calendar days where the patient was billed with an ICU bed charge (revenue codes 0200 – 0203 and 0209) or admitted to a department marked as an ICU. Similar to length of stay, ICU days is inclusive. Also, for currently active admissions, ICU days are calculated up to the current date.

REFERENCES

1. IHME COVID-19 Health Service Utilization Forecasting Team. *Forecasting COVID-19 Impact on hospital bed-days, ICU-days, ventilator-days, and deaths by US state in the next 4 months.* medRxiv. March 30, 2020. <https://www.medrxiv.org/content/10.1101/2020.03.27.20043752v1>

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Data Date: July 29, 2020

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<https://ehrn.org/wp-content/uploads/Inpatient-Lengths-of-Stay-Number-of-ICU-Days-Differ-Common-Model-Assumptions.pdf>