BRIEF

COVID-19

The Projected Economic Impact of the COVID-19 Pandemic on the US Healthcare System

A FAIR Health Brief, March 25, 2020

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Summary

The current pandemic of coronavirus disease 2019 (COVID-19) is exacting heavy economic and social costs around the world. In the United States, one aspect of the costs of COVID-19 that is of great interest but little understood is the potential cost to the nation of inpatient services for those with the disease. In this study, FAIR Health draws on its database of over 30 billion private healthcare claim records, and on estimates of Medicare and Medicaid costs, to project US costs for COVID-19 patients requiring inpatient stays. We estimated the costs of COVID-19 medical care based on proxy codes used by providers. We did so first on the basis of inpatient ICD-10 procedure codes and revenue codes[1] (IIR) associated with influenza and pneumonia, then, as an alternative, on the basis of diagnosis-related groups (DRGs) associated with pneumonia. We also examined telehealth codes commonly used for respiratory infections and their costs. Among our findings:

- On the basis of IIR, the total costs for all hospitalized COVID-19 patients range from a low of $362 billion in charges and $139 billion in estimated allowed amounts to a high of $1.449 trillion in charges and $558 billion in estimated allowed amounts, depending on the incidence rate of the infection in the US population.[2,3] This is based on FAIR Health data regarding charges and allowed amounts for similar conditions, and published projections indicating that from 66 million to 198 million Americans may become infected with the novel coronavirus that causes COVID-19, and that from 4.9 million to 19.8 million of them may require inpatient stays.[4,5] We also used current estimates from the Centers for Disease Control and Prevention of the age-range distribution of hospitalized COVID-19 patients, estimates of Medicare and Medicaid spending for similar procedures, and estimates of the proportion of the population that is covered by commercial insurance, Medicare and Medicaid.
- On the basis of IIR, the total average charge per COVID-19 patient requiring an inpatient stay is $73,300 and the total average estimated allowed amount per commercially insured patient is $38,221.
- On the basis of DRG, the per-patient average costs for hospitalized COVID-19 patients vary depending on severity. The total average charges per patient range from $74,310 for patients with major complication or comorbidity (indicated by DRG code 193), to $42,486 for patients with no complication or comorbidity (indicated by DRG code 195). The total average estimated allowed amounts per commercially insured patient range from $38,755 for DRG 193 to $21,936 for DRG 195.
- Total costs for all hospitalized COVID-19 patients vary on the basis of which DRG code is used. Assuming the highest projected numbers of infected patients needing inpatient stays, the costs range from $1.469 trillion in charges and $575 billion in estimated allowed amounts (for DRG

[1] UB-04 Manual. THE UB-04 DATA FILE, 2020, is copyrighted by American Hospital Association ("AHA"), Chicago, Illinois. No portion of THE UB-04 DATA FILE may be reproduced, sorted in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior express, written consent of AHA.

[2] A charge amount is the amount charged to a patient who is uninsured or obtaining an out-of-network service. An allowed amount is the total fee negotiated between an insurance plan and a provider for an in-network service. Thus, the allowed amount includes both the portion to be paid by the plan member and the portion to be paid by the plan.

[3] Because payors' contracted network rates are proprietary and cannot be shared, FAIR Health employs an imputation methodology to determine benchmarks for allowed amounts. First, FAIR Health calculates the ratios of actual allowed amounts to charges for groups of procedure codes on a regional basis. The resulting ratios are applied to the actual charges for each specific procedure at the local (geozip) level to develop an "imputed" allowed amount for each claim line.

[4] Jonathan Shaw, "Cooperating to Combat Coronavirus," *Harvard Magazine*, March 3, 2020, https://harvardmagazine.com/2020/03/fighting-sars-2.

[5] Zunyou Wu and Jennifer M. McGoogan, "Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China," *JAMA*, February 24, 2020, https://doi.org/10.1001/jama.2020.2648.

193) to $840 billion in charges and $329 billion in estimated allowed amounts (for DRG 195). (Total estimated allowed amounts include figures for commercially insured, Medicare and Medicaid patients.)

- The telehealth code most often associated with all respiratory infections in 2019 was CPT®[6] 99441 (physician/qualified healthcare professional telephone evaluation and management [E&M],[7] 5-10 minutes), accounting for 50 percent of all such services. The average charge for CPT 99441 is $43 and the average estimated allowed amount is $34 for commercially insured patients, making it the lowest-cost service of CPT codes that are used only for telehealth.
- Four of the top 10 codes most often associated with respiratory infections in 2019 were E&M codes that may be billed both for telehealth and non-telehealth. Among these codes, having telehealth as the place of service in most cases yields cost savings by comparison with all places of service for the same code.

Background

The current pandemic of coronavirus disease 2019 (COVID-19) has caused illness, death and disruption around the world. As of March 22, 2020, the World Health Organization reported 292,142 confirmed cases globally and 12,784 deaths.[8] The number of reported cases grows daily. Nations worldwide are incurring heavy economic and social costs as they scale up treatment resources and take emergency measures to delay the spread of SARS-CoV-2, the novel coronavirus that causes COVID-19. In the United States, where the first case of COVID-19 was confirmed in January,[9] the full extent of the costs remains to be seen. According to Dr. Anthony Fauci, the Director of the National Institute of Allergy and Infectious Diseases, "People need to understand that things will get worse before they get better."[10]

One aspect of the costs of COVID-19 that is of great interest but little understood is the cost of inpatient services for this disease in the United States. Part of the difficulty is that, because COVID-19 is a new disease that emerged only in December, there are insufficient data on such costs. A claims-based study by Peterson-KFF Health System Tracker used typical spending for hospital admissions for pneumonia in 2018 as a proxy for COVID-19.[11] Based on admissions for three diagnosis-related groups (DRGs) for pneumonia, the researchers found that the average cost of an admission for pneumonia with major complications and comorbidities was $20,292. For patients with less serious complications or comorbidities, the average was $13,767, and for those without any complications or comorbidities $9,763. The analysis was limited to people under age 65 and used employer health plan claims for fewer than 18 million people.

[6] CPT © 2019 American Medical Association (AMA). All rights reserved.
[7] Evaluation and management codes, or "E&M" codes, are CPT codes associated with most patient visits.
[8] "Coronavirus Disease 2019 (COVID-19) Situation Report—62," World Health Organization, March 22, 2020, https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200322-sitrep-62-covid-19.pdf?sfvrsn=f7764c46_2.
[9] Michelle L. Holshue et al., "First Case of 2019 Novel Coronavirus in the United States," *N Engl J Med* 382 (March 5, 2020): 929-936, https://doi.org/10.1056/NEJMoa2001191.
[10] "Dr. Fauci Confident in Federal Government's Response to Coronavirus Pandemic," ABC News, March 15, 2020, https://abcnews.go.com/Politics/dr-fauci-confident-federal-governments-response-coronavirus-pandemic/story?id=69599658.
[11] Matthew Rae et al., "Potential Costs of Coronavirus Treatment for People with Employer Coverage," Peterson-KFF Health System Tracker, March 13, 2020, https://www.healthsystemtracker.org/brief/potential-costs-of-coronavirus-treatment-for-people-with-employer-coverage/.

Beyond the costs of hospitalization, another area of interest is costs related to telehealth or telemedicine, the remote provision of clinical services through telecommunications technology.[12] Although telehealth has been growing rapidly in recent years, it continues to represent a relatively small share of healthcare utilization.[13] In light of the need for expanded healthcare resources, particularly those that do not require in-person contact that may promote disease transmission, telehealth is widely seen as having potential to extend its reach at this time.[14] Some federal regulations restricting it are being relaxed in response to the crisis,[15] and some private health plans are making related changes.[16,17]

As a national, independent nonprofit organization dedicated to bringing transparency to healthcare costs and health insurance information, FAIR Health is able to shine a light on the healthcare costs that may be associated with COVID-19. Our repository of private healthcare claims data, the nation's largest, includes over 30 billion claim records from 2002 to the present. The data are contributed by over 60 payors and administrators who insure or process claims for private insurance plans covering more than 150 million individuals—an estimated 75 percent of the nation's privately insured population. This affords a considerably larger dataset than has yet been used to estimate the potential costs associated with COVID-19. The dataset includes data on commercially insured and Medicare Advantage (Medicare Part C) enrollees, but not that of uninsured individuals or those on Medicaid or on Medicare Parts A, B and D.[18] For this analysis, FAIR Health estimated costs for Medicare and Medicaid patients hospitalized with COVID-19 using Medicare fee schedules and other publicly available information.

FAIR Health data include not only DRGs, previously used to study potential inpatient costs for COVID-19, but ICD-10 procedure codes and revenue codes. In our data, the inpatient ICD-10 procedure codes and their associated revenue codes (IIR) are more commonly used than DRGs for facility billing. In this study, we project costs for COVID-19 patients requiring inpatient stays, first on the basis of IIR, then on the basis of DRGs. As a proxy for COVID-19, we use influenza and pneumonia diagnoses to calculate IIR costs, and pneumonia diagnoses to calculate DRG costs.

We present not only average per-patient costs, but estimates of total costs based on expert projections of the percentage of Americans who may become infected with the novel coronavirus, seek medical care for COVID-19 and be hospitalized. We calculate costs in terms of both non-discounted billed charge and estimated allowed amount values.

In addition, we present findings related to telehealth. These include the most commonly used telehealth codes for all respiratory infections as a proxy for COVID-19, and the average costs for codes used only

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[12] Telehealth is sometimes defined as including not only telemedicine (the remote provision of clinical services via telecommunications technology), but also the provision of certain nonclinical services, such as provider training and continuing medical education. In this paper, telehealth refers only to the former, and is interchangeable with telemedicine.

[13] FAIR Health, *A Multilayered Analysis of Telehealth: How This Emerging Venue of Care Is Affecting the Healthcare Landscape*, A FAIR Health White Paper, July 2019, https://s3.amazonaws.com/media2.fairhealth.org/whitepaper/asset/A%20Multilayered%20Analysis%20of%20Telehealth%20-%20A%20FAIR%20Health%20White%20Paper.pdf.

[14] Mohana Ravindranath, "Coronavirus Response Could Give Long-Awaited Jolt to Telehealth," Politico, March 19, 2020, https://www.politico.com/news/2020/03/19/coronavirus-response-telehealth-137884.

[15] Sarah Beth S. Kuyers and Ellen L. Janos, "Congress Loosens Telehealth Reimbursement Restrictions in Response to Coronavirus, but State Law Practice Requirements Remain," Mintz, March 17, 2020, https://www.mintz.com/insights-center/viewpoints/2146/2020-03-17-congress-loosens-telehealth-reimbursement-restrictions?_cldee=dHN3aWZ0QGZhaXJoZWFsdGgub3Jn&recipientid=contact-abd47b66244ce51193faa0d3c1f8c3d3-6c3dba69542941279e748c542f2a5eff&esid=dc297aa9-5568-ea11-9438-a0d3c1f8c3d1.

[16] UnitedHealthcare, "Expanded Access to Care, Support and Resources," https://www.uhc.com/health-and-wellness/health-topics/covid-19.

[17] Aetna, "Coronavirus: We're Here to Help," https://www.aetna.com/individuals-families/member-rights-resources/covid19.html.

[18] FAIR Health also receives data for traditional Medicare Parts A, B and D under the Centers for Medicare & Medicaid Services (CMS) Qualified Entity Program, but those data are not a source for this report.

for telehealth. We also provide information comparing the costs for certain services when done through telehealth versus all places of service.

Methodology

Estimating Prevalence

To estimate total costs for hospitalization related to COVID-19, FAIR Health began with the estimate by Harvard epidemiologist Marc Lipsitch that 20 to 60 percent of the adult global population will become infected with the novel coronavirus.[19] We extrapolated that range of percentages to apply to the entire US population of 329,418,119,[20] resulting in the projections in Table 1 of the total infected population depending on whether the incidence rate is low, medium (mid) or high. The projection of the total infected population ranges from 66 million at the low end to 198 million at the high end.

Table 1. Proportion of US population affected by COVID-19 by incidence rate

Incidence Rate		Total Infected Population
Low	20%	65,883,624
Mid	40%	131,767,248
High	60%	197,650,871

The equation used to derive these projections is—

$$\mathrm{P} \times di = \mathrm{P}_{\Sigma}$$

—where P is the total population, *di* the incidence rate and P_{Σ} the total infected population.

It has been estimated that 50 percent of individuals who contract the novel coronavirus either do not have symptoms or have a mild case and do not seek medical care.[21] Of infected patients who seek medical care, it has been estimated that 15 percent to 20 percent will need to be hospitalized.[22,23,24,25] Based on those assumptions, Table 2 shows the estimated numbers of patients affected by low inpatient stay need (15 percent) and high inpatient stay need (20 percent).

[19] Shaw, "Cooperating to Combat Coronavirus."
[20] "U.S. and World Population Clock," United States Census Bureau, March 21, 2020, https://www.census.gov/popclock/.
[21] Jim Axelrod, "Coronavirus May Infect Up to 70% of World's Population, Expert Warns," CBS News, March 2, 2020, https://www.cbsnews.com/news/coronavirus-infection-outbreak-worldwide-virus-expert-warning-today-2020-03-02/.
[22] Lynn Jolicoeur and Lisa Mullins, "Harvard Global Health Expert: Mass. Hospitals Face Capacity Problem If Coronavirus Cases Spike Quickly," WBUR News, https://www.wbur.org/news/2020/03/10/coronavirus-covid-19-massachusetts-hospital-capacity-ashish-jha.
[23] Liz Specht, "What Does the Coronavirus Mean for the U.S. Health Care System? Some Simple Math Offers Alarming Answers," STAT, March 10, 2020, https://www.statnews.com/2020/03/10/simple-math-alarming-answers-covid-19/.
[24] Wu and McGoogan, "Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China."
[25] Some projections assume up to 20 percent of those infected will need hospitalization, not just 20 percent of those infected who seek medical care. In this study, FAIR Health has used the latter, more conservative estimate.

Table 2. Total low and high inpatient stay need due to COVID-19

Incidence Rate		Total Infected Population	50% Seeking Medical Care	Low Estimate of Inpatient Stay Need (15% of Those Seeking Care)	High Estimate of Inpatient Stay Need (20% of Those Seeking Care)
Low	20%	65,883,624	32,941,812	4,941,272	6,588,362
Mid	40%	131,767,248	65,883,624	9,882,544	13,176,725
High	60%	197,650,871	98,825,436	14,823,815	19,765,087

The equation used to derive these projections is—

$$\left(\frac{\mathrm{P} \times di}{2}\right) \times \mathrm{I}s \;=\; \mathrm{I}n$$

—where $\mathrm{I}s$ is inpatient stay need percentage and $\mathrm{I}n$ is inpatient stay need population.

By these calculations, the number of individuals projected to have inpatient stays due to COVID-19 ranges from 4.9 million to 19.8 million.

Calculating Underlying Populations

To estimate the populations of hospitalized patients who have Medicaid, Medicare and commercial insurance, we first used age-based statistics to determine the total number of patients who would be hospitalized by age.

Evidence of age-based differences in risk of serious illness from COVID-19 is still developing. For example, although early data from China suggested that the most severe COVID-19 cases occurred in adults aged 60 or older and those with underlying conditions,[26] more recent evidence from the United States indicates that 38 percent of people hospitalized with COVID-19 are 20 to 54 years old. [27,28]

In our analysis, we striated the data based on the most recent Centers for Disease Control and Prevention (CDC) study of age-based hospitalizations for COVID-19.[29] The CDC estimates that 45 percent of all hospitalized patients are ages 65 and older, 55 percent are between the ages of 20 and 64 and less than 1 percent are children 19 years and younger. Using this information, we assumed that, in our estimates of the population, hospitalizations may be associated with individuals by age as shown in table 3.

[26] The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team, "Vital Surveillances: The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19)—China, 2020," *China CDC Weekly* 2, no. 8 (2020): 113-122, http://weekly.chinacdc.cn/en/article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51.
[27] CDC COVID-19 Response Team, "Severe Outcomes among Patients with Coronavirus Disease 2019 (COVID-19)—United States, February 12-March 16, 2020," *MMWR*, March 18, 2020, https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm?s_cid=mm6912e2_w.
[28] Erin Garcia de Jesus, "Young Adults Can Face Severe Cases of COVID-19, Too," *ScienceNews*, March 19, 2020, https://www.sciencenews.org/article/coronavirus-covid19-young-adults-can-face-severe-cases.
[29] CDC COVID-19 Response Team, "Severe Outcomes among Patients with Coronavirus Disease 2019 (COVID-19)—United States, February 12-March 16, 2020."

Table 3. Projected numbers of patients hospitalized with COVID-19 by age

				Low Estimate			High Estimate		
Incidence Rate		Low Estimate of Inpatient Stay Need (15% of Those Seeking Care)	High Estimate of Inpatient Stay Need (20% of Those Seeking Care)	19 and Younger	20 to 64	65 and Older	19 and Younger	20 to 64	65 and Older
Low	20%	4,941,272	6,588,362	24,706	2,717,700	2,198,866	32,942	3,623,599	2,931,821
Mid	40%	9,882,544	13,176,725	49,413	5,435,399	4,397,732	65,884	7,247,199	5,863,643
High	60%	14,823,815	19,765,087	74,119	8,153,098	6,596,598	98,825	10,870,798	8,795,464

Using these numbers, we estimated that 20 percent of those 64 and younger have Medicaid, and 87.5 percent of those 65 and older have Medicare (approximately 14 percent of individuals are on Medicare and approximately 16 percent of the population is 65 or older → 0.14/0.16 = 87.5 percent).[30,31]

Medicaid Calculation:

$$(\mathrm{I}\eta \times \mathbb{C}_{0-64}) \times 0.2 = \mathrm{P}\mathcal{M}_{caid}$$

$C_{0\text{-}64}$ = CDC percent of hospitalizations for individuals 64 and younger

PM_{caid} = population of estimated Medicaid patients in hospital

Medicare Calculation:

$$(\mathrm{I}\eta \times \mathbb{C}_{>65}) \times 0.875 = \mathrm{P}\mathcal{M}_{care}$$

$C_{>65}$ = CDC percent of hospitalizations for individuals 65 and older

PM_{care} = population of estimated Medicare patients in hospital

Commercial Calculation:

$$\mathrm{I}\eta - (\mathrm{P}\mathcal{M}_{caid} + \mathrm{P}\mathcal{M}_{care}) = \mathrm{P}\mathcal{C}_{omm}$$

PComm = population of estimated commercially insured patients in hospital[32]

[30] "State Health Facts—Health Insurance Coverage of the Total Population," KFF, https://www.kff.org/other/state-indicator/total-population/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

[31] For purposes of this study, we include patients with Medicare Advantage coverage in our Medicare calculations.

[32] In this analysis, uninsured patients are treated as commercially insured, as they may negotiate rates similar to the allowed amounts negotiated by commercial insurers.

Estimating Procedures and Costs

As a proxy for patients with COVID-19, FAIR Health used patients with influenza and pneumonia diagnoses (Table 4). The data on the patients came from FAIR Health's longitudinal dataset, a subset of our private claims repository containing data on over 65 million covered lives annually that are trackable over time.[33]

Table 4. Influenza and pneumonia diagnosis codes

ICD-10 Diagnosis Code	Diagnosis Description
J09X1	INFLUENZA DUE TO IDENTIFIED NOVEL INFLUENZA A VIRUS WITH PNEUMONIA
J1000	INFLUENZA DUE TO OTHER IDENTIFIED INFLUENZA VIRUS WITH UNSPECIFIED TYPE OF PNEUMONIA
J1001	INFLUENZA DUE TO OTHER IDENTIFIED INFLUENZA VIRUS WITH THE SAME OTHER IDENTIFIED INFLUENZA VIRUS PNEUMONIA
J1008	INFLUENZA DUE TO OTHER IDENTIFIED INFLUENZA VIRUS WITH OTHER SPECIFIED PNEUMONIA
J1100	INFLUENZA DUE TO UNIDENTIFIED INFLUENZA VIRUS WITH UNSPECIFIED TYPE OF PNEUMONIA
J1108	INFLUENZA DUE TO UNIDENTIFIED INFLUENZA VIRUS WITH SPECIFIED PNEUMONIA

To determine the most typically billed codes for patients with these diagnoses, we examined their claims during a 25-day period defined as 3 days prior to the first occurrence of the diagnosis for the patient and 21 days afterward. We included inpatient claims where the first admission date was within this time frame. Inpatient claims could include services more than 21 days after diagnosis, if the discharge date was after the 21-day window.

To determine what professional services the patients received, we established a list of CPT and HCPCS codes being billed most frequently in this time frame. To determine what facility services they received, we established the most commonly billed ICD-10 procedure codes and their corresponding revenue codes, as well as the most commonly billed DRG codes.

To assess how many times these services were rendered for the typical patient, we calculated the number of times each service was billed in the time frame for each patient, then calculated the geometric mean (or average) of the service counts.[34] Similarly, to assess the typical length of stay (LOS) in an inpatient facility, we calculated the LOS for each patient who stayed in an inpatient facility (using the admission date and discharge date), then calculated the geometric mean for those LOS.

On this basis, we arrived at the following assumptions for inpatient care of patients with COVID-19. The geometric average LOS is six days. Of those days, the geometric average number of days in the intensive care unit (ICU) is three days, the estimated number of days in a sterile room is one day and the estimated number of days in a regular private room (one bed) is two days.

To determine average dollar amounts for procedures that might be used to treat COVID-19, we used our suite of FH® Benchmarks, which contain benchmark cost data based on recent claims. The benchmarks

[33] Patients in the FAIR Health dataset are de-identified in accordance with HIPAA. A unique number assigned to each de-identified patient was used for this longitudinal study.

[34] The geometric mean uses the product of the values of a set of numbers, as opposed to an arithmetic mean, which uses the sum. The geometric mean is the nth root of the product of n numbers.

used for this study, with their release dates in parentheses followed by the dates of service they represent, were:

- FH Medical (November 2019)—dates of service September 2018-August 2019
- FH Allowed Medical (February 2020)—dates of service September 2018-August 2019
- FH HCPCS (December 2019)—dates of service October 2018-September 2019
- FH Allowed HCPCS (February 2020)—dates of service October 2018-September 2019
- FH Inpatient Facility DRG (October 2019)—October 2016-September 2017
- FH Inpatient Facility ICD Proc/Rev (October 2019)—April 2018-March 2019

In this study, we offer both non-discounted billed charge and estimated allowed amount values. For medical and HCPCS codes, our FH Allowed Medical and FH Allowed HCPCS, respectively, provide estimated allowed amounts for commercially insured patients. Our inpatient facility benchmarks do not contain allowed amount data, but we estimated that the allowed inpatient value for commercially insured patients is 0.5083 of the charges. That value is based on algorithms run against our data and vetted by an actuarial expert.

The professional codes included in our analysis, along with their geometric mean of frequencies, are shown in Table 5.

Table 5. Professionally billed procedure codes with geometric mean of frequencies

Professionally Billed Procedure Code	Description	Geometric Mean of Frequencies
CPT 36415	COLLECTION VENOUS BLOOD VENIPUNCTURE	5
CPT 71046	RADIOLOGIC EXAM CHEST 2 VIEWS	5
CPT 71250	CT THORAX W/O CONTRAST MATERIAL	2
CPT 80053	COMPREHENSIVE METABOLIC PANEL	3
CPT 85025	BLOOD COUNT COMPLETE AUTO & AUTO DIFRNTL WBC	3
CPT 87635[35]	IADNA SARS-COV-2 COVID-19 AMPLIFIED PROBE TQ	1
CPT 93010	ECG ROUTINE ECG W/LEAST 12 LDS I&R ONLY	3
CPT 94640	PRESSURIZED/NONPRESSURIZED INHALATION TREATMENT	10
CPT 94760	NONINVASIVE EAR/PULSE OXIMETRY SINGLE DETER	10
CPT 99213	OFFICE OUTPATIENT VISIT 15 MINUTES	1
CPT 99214	OFFICE OUTPATIENT VISIT 25 MINUTES	1
CPT 99223	INITIAL HOSPITAL CARE/DAY 70 MINUTES	1
CPT 99233	SUBSEQUENT HOSPITAL CARE/DAY 35 MINUTES	4
CPT 99239	HOSPITAL DISCHARGE DAY MANAGEMENT > 30 MIN	1

[35] For CPT 87635, which was established to test for the COVID-19 virus, we used as a proxy the Medicare and UnitedHealthcare allowed amount, which is $51.33. Estimating that the typical charge for one of the lab codes for influenza testing is approximately 2.47 times the allowed amount, we estimated that the charges are $126.79. See UnitedHealthcare, "Diagnosis Coding and Reimbursement Updates," March 18, 2020, https://www.uhcprovider.com/en/resource-library/news/diagnosis-coding-update-covid-19.html.

Professionally Billed Procedure Code	Description	Geometric Mean of Frequencies
CPT 99285	EMERGENCY DEPT VISIT HIGH SEVERITY & THREAT FUNCT	1
CPT 99291	CRITICAL CARE ILL/INJURED PATIENT INIT 30-74 MIN	1
E1390	OXYGEN CONCENTRATOR (NEW)	1
J0696	INJECTION, CEFTRIAXONE SODIUM, PER 250 MG	7

For inpatient facility costs, we used the most common ICD-10 procedure codes associated with influenza and pneumonia (Table 6).

Table 6. Most common ICD-10 procedure codes associated with influenza and pneumonia

ICD-10 Procedure Code	Description
5A09357	ASSISTANCE WITH RESPIRATORY VENTILATION, LESS THAN 24 CONSECUTIVE HOURS, CONTINUOUS POSITIVE AIRWAY PRESSURE
5A1955Z	RESPIRATORY VENTILATION, GREATER THAN 96 CONSECUTIVE HOURS
5A1945Z	RESPIRATORY VENTILATION, 24-96 CONSECUTIVE HOURS

Associated with those ICD-10 procedure codes are revenue codes. For this analysis, we used the revenue codes with the geometric mean of days (length of stay)/occurrences in table 7.

Table 7. Revenue codes with geometric mean of days/occurrences

Revenue Code	Description	Geometric Mean of Days/Occurrences
0301	LABORATORY – PATHOLOGY - GENERAL	6
0450	EMERGENCY ROOM – GENERAL	1
0250	PHARMACY – GENERAL	9
0300	LABORATORY – GENERAL	3
0305	LABORATORY – HEMATOLOGY	3
0324	RADIOLOGY DIAGNOSTIC – CHEST X-RAY	1
0306	LABORATORY – BACTERIOLOGY AND MICROBIOLOGY	3
0730	EKG/ECG ELECTROCARDIOGRAM – GENERAL	1
0636	PHARMACY – EXTENSION OF 025X – DRUGS REQUIRING DETAILED CODING	12
0410	RESPIRATORY SERVICES – INHALATION SERVICES	3

Revenue Code	Description	Geometric Mean of Days/Occurrences
0260	IV THERAPY – GENERAL	2
0320	RADIOLOGY DIAGNOSTIC – GENERAL	1
0258	PHARMACY – IV SOLUTIONS	3
0270	MEDICAL/SURGICAL SUPPLIES AND DEVICES – GENERAL	2
0110	ROOM AND BOARD PRIVATE (ONE BED) – GENERAL	2
0202	INTENSIVE CARE UNIT – MEDICAL	3
0164	OTHER ROOM AND BOARD – STERILE	1

As an alternative to our report based on ICD-10 procedure codes and revenue codes (IIR), we also report based on DRGs. We assumed that the COVID-19 payment structure for DRGs might be similar to that for pneumonia (table 8).

Table 8. DRG codes most commonly associated with pneumonia

DRG Code	Description	# of Days
193	SIMPLE PNEUMONIA AND PLEURISY WITH MAJOR COMPLICATION OR COMORBIDITY (MCC)	6
194	SIMPLE PNEUMONIA AND PLEURISY WITH COMPLICATION OR COMORBIDITY (CC)	6
195	SIMPLE PNEUMONIA AND PLEURISY WITHOUT CC/MCC	6

To account for those who have public insurance, we also calculated the average estimated Medicare reimbursement amounts and average estimated Medicaid reimbursement rates. To do this, we calculated the Medicare rates based on the national Medicare Fee Schedule rates for physicians; laboratories; Durable Medical Equipment, Prosthetics/Orthotics and Supplies (DMEPOS); and Average Sales Price (ASP) pricing. We also used the inpatient prospective payment system (IPPS) reimbursement for DRGs and created a weighted average of the national rates for the DRG codes we assumed above based on prevalence of the national billing of those codes for Medicare patients. We then multiplied the Medicare reimbursement by 0.72[36] to calculate the typical reimbursement of Medicaid for those services, and created a separate weighted average based on the frequencies for the same DRG codes using a more analogous cohort of patients (i.e., those in the commercial data, as Medicaid patients are more similar in age to commercial patients than Medicare patients).

Identifying Telehealth Services

FAIR Health used several methodologies to segregate claims for telehealth services. These included the CMS place of service code for telehealth, 02; telehealth CPT codes such as CPT 99441 (telephone evaluation and management service by a physician or other qualified healthcare professional, 5-10

[36] Based on estimates published by the Urban Institute. Stephen Zuckerman, Laura Skopec and Marni Epstein, "Medicaid Physician Fees after the ACA Primary Care Fee Bump," Urban Institute Health Policy Center, March 2017, https://www.urban.org/sites/default/files/publication/88836/2001180-medicaid-physician-fees-after-the-aca-primary-care-fee-bump_0.pdf.

minutes); and telehealth modifiers GT, GQ and 95. Three additional telehealth codes were added on January 1, 2020; we do not yet have data for those, though we have been able to derive benchmark values.[37] They are CPT 99421 (online digital evaluation and management service, for an established patient, for up to 7 days, cumulative time during the 7 days; 5-10 minutes), CPT 99422 (11-20 minutes) and CPT 99423 (21 or more minutes).

To find the telehealth codes most commonly associated with all respiratory infections, FAIR Health identified all claims and claim lines with any of the following ICD-10 diagnosis codes:

- J00-J06.9: Acute upper respiratory infections;
- J09.X1-J18.9: Influenza and pneumonia; and
- J20.0-J22: Other acute lower respiratory infections.

[37] For an account of benchmark derived methodology, see "FH® Benchmarks," https://s3.amazonaws.com/media2.fairhealth.org/resource/asset/FH%20Product%20Sheet%20-%20Benchmarks%20%2B%20Methodology.pdf.

Results

Projected Costs of Care for COVID-19 Patients Requiring Inpatient Stay

IIR

The projected costs for COVID-19 patients requiring an inpatient stay are first presented on the basis of the inpatient ICD-10 procedure codes and revenue codes (IIR) most commonly billed for influenza and pneumonia. Table 9 and figure 1 project per-patient average costs for COVID-19 patients requiring inpatient stays, using IIR values. The costs are broken down into professional and inpatient facility categories. The total average charges per patient based on influenza and pneumonia charges are $73,300, while the total average estimated allowed amount per patient who is commercially insured (i.e., without public insurance) is $38,221. The average reimbursement for Medicare patients is $10,561 and for Medicaid is $7,533.

Table 9. Projected per-patient average charges, estimated commercial allowed amount, Medicare reimbursement amount and Medicaid reimbursement amount for COVID-19 patients requiring inpatient stays (using IIR values)

	Total Average Charges	Total Average Estimated Commercial Allowed Amount	Total Average Estimated Medicare Reimbursement Amount	Total Average Estimated Medicaid Reimbursement Amount
Professional	$7,788	$3,598	$2,369	$1,705
6 Days Inpatient (IIR)	$65,512	$34,623	$8,192	$5,827
Total Estimated per Patient	**$73,300**	**$38,221**	**$10,561**	**$7,533**

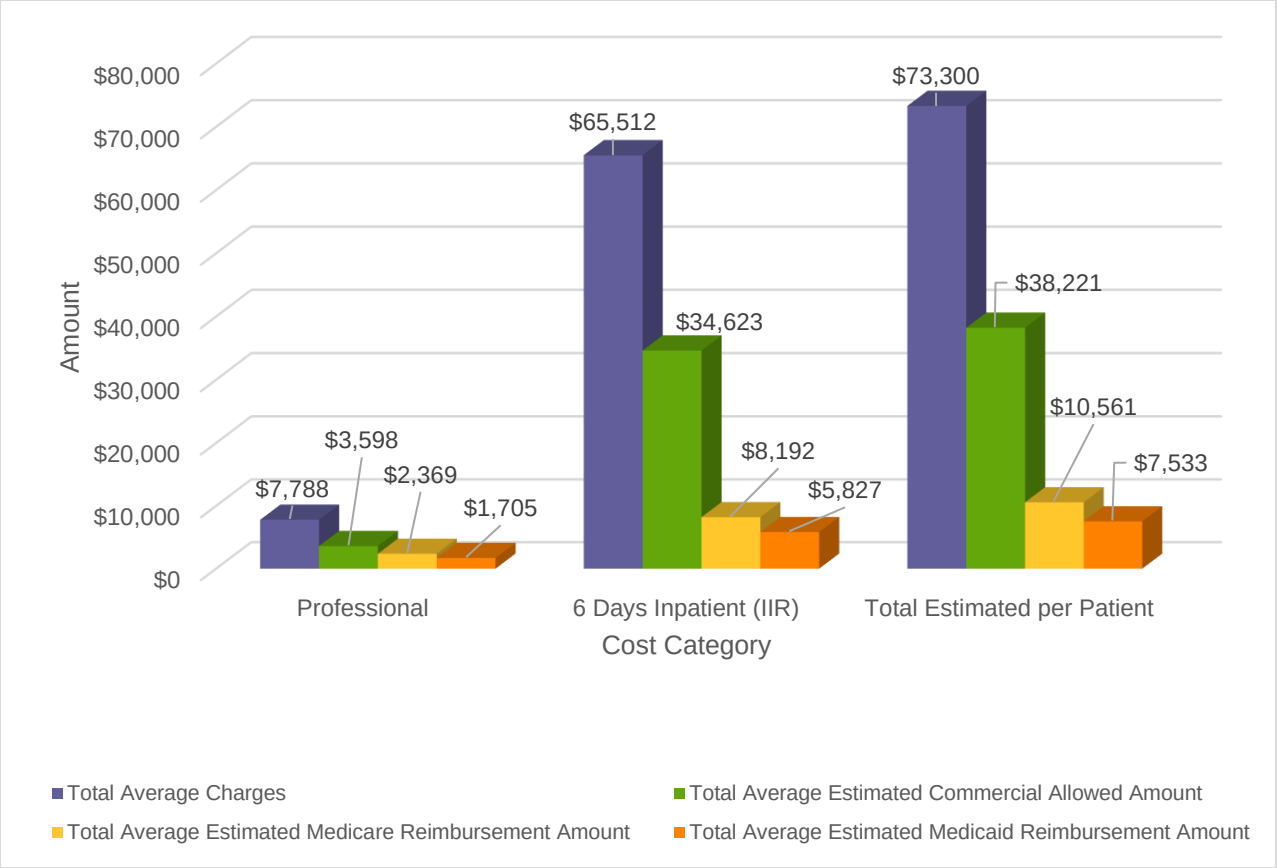

Figure 1. Projected per-patient average charges, estimated commercial allowed amount, estimated Medicare reimbursement amount and estimated Medicaid reimbursement amount for COVID-19 patients requiring inpatient stays (using IIR values)

As shown in table 1 above, the total number of Americans projected to become infected with the novel coronavirus ranges from 66 million at the low end to 198 million at the high end. As shown in table 2, the number of individuals projected to require inpatient stays due to COVID-19 ranges from 4.9 million to 19.8 million, depending on the incidence rate (i.e., what percentage of the population is infected, whether low, mid or high) and whether the need for inpatient stays is low or high among infected patients seeking medical care.

Multiplying the projected numbers of patients with inpatient stay need by the average charges and average estimated commercial, Medicare and Medicaid allowed amounts, we arrive at projected total average costs of care for COVID-19 patients requiring inpatient stays (table 10 and figure 2). The costs range from a low of $362 billion in charges and $139 billion in estimated allowed amounts (for a population with low incidence rate and low inpatient stay need) to a high of $1.449 trillion in charges and $558 billion in estimated allowed amounts (for a population with high incidence rate and high inpatient stay need).

Table 10. Projected total average charges and total average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using IIR values and estimated Medicare and Medicaid reimbursements)

Inpatient Stay Need	Incidence Rate	Total Average Charges	Total Average Estimated Commercial Allowed Amounts	Total Average Medicare Estimated Allowed Amounts	Total Average Medicaid Estimated Allowed Amounts	Total Estimated Allowed Amounts
Low Inpatient Stay Need	Low	$362,197,297,175	$124,647,835,694	$7,305,709,194	$7,444,421,570	$139,397,966,458
	Mid	$724,394,594,349	$249,295,671,388	$14,611,418,388	$14,888,843,140	$278,795,932,915
	High	$1,086,591,891,524	$373,943,481,856	$21,917,126,103	$22,333,263,203	$418,193,871,162
High Inpatient Stay Need	Low	$482,929,729,566	$166,197,097,441	$9,740,944,606	$9,925,894,422	$185,863,936,470
	Mid	$965,859,459,132	$332,394,220,109	$19,481,890,691	$19,851,790,351	$371,727,901,150
	High	$1,448,789,188,699	$498,591,317,550	$29,222,835,297	$29,777,684,772	$557,591,837,619

Figure 2. Projected total average charges and total average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using IIR values and estimated Medicare and Medicaid reimbursements)

In considering these totals, it should be noted that COVID-19 patients' demand for healthcare services may exceed supply. One study found that even an optimal epidemic mitigation scenario would still result

in an eight-fold higher peak demand on critical care beds above surge capacity in both the United States and Great Britain.[38] In order to provide working estimates, the cost totals in the FAIR Health study assume that the healthcare system will expand to meet the demand. We do not, however, assume any increase in charges or allowed amounts to reflect potential increases in prices or costs of supplies and services to meet this additional demand.

DRGs

As an alternative to projected costs based on IIR, this section presents projected costs based on DRGs. Table 11 and figure 3 project per-patient average costs for COVID-19 patients requiring inpatient stays, using DRG values. The costs vary depending on whether the DRG code is 193, 194 or 195 (see table 8 for a description of the codes). The total average charges per patient range from $74,310 for DRG 193 to $42,486 for DRG 195.

Table 11. Projected per-patient average charges for COVID-19 patients requiring inpatient stays (using DRG values)

	DRG 193 – Total Average Charges	DRG 194 – Total Average Charges	DRG 195 – Total Average Charges
Professional	$7,788	$7,788	$7,788
6 Days Inpatient (DRG)	$66,522	$45,480	$34,698
Total Estimated per Patient	**$74,310**	**$53,268**	**$42,486**

[38] Neil M. Ferguson et al., "Impact of Non-Pharmaceutical Interventions (NPIs) to Reduce COVID-19 Mortality and Healthcare Demand," Imperial College COVID-19 Response Team, March 16, 2020, https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf.

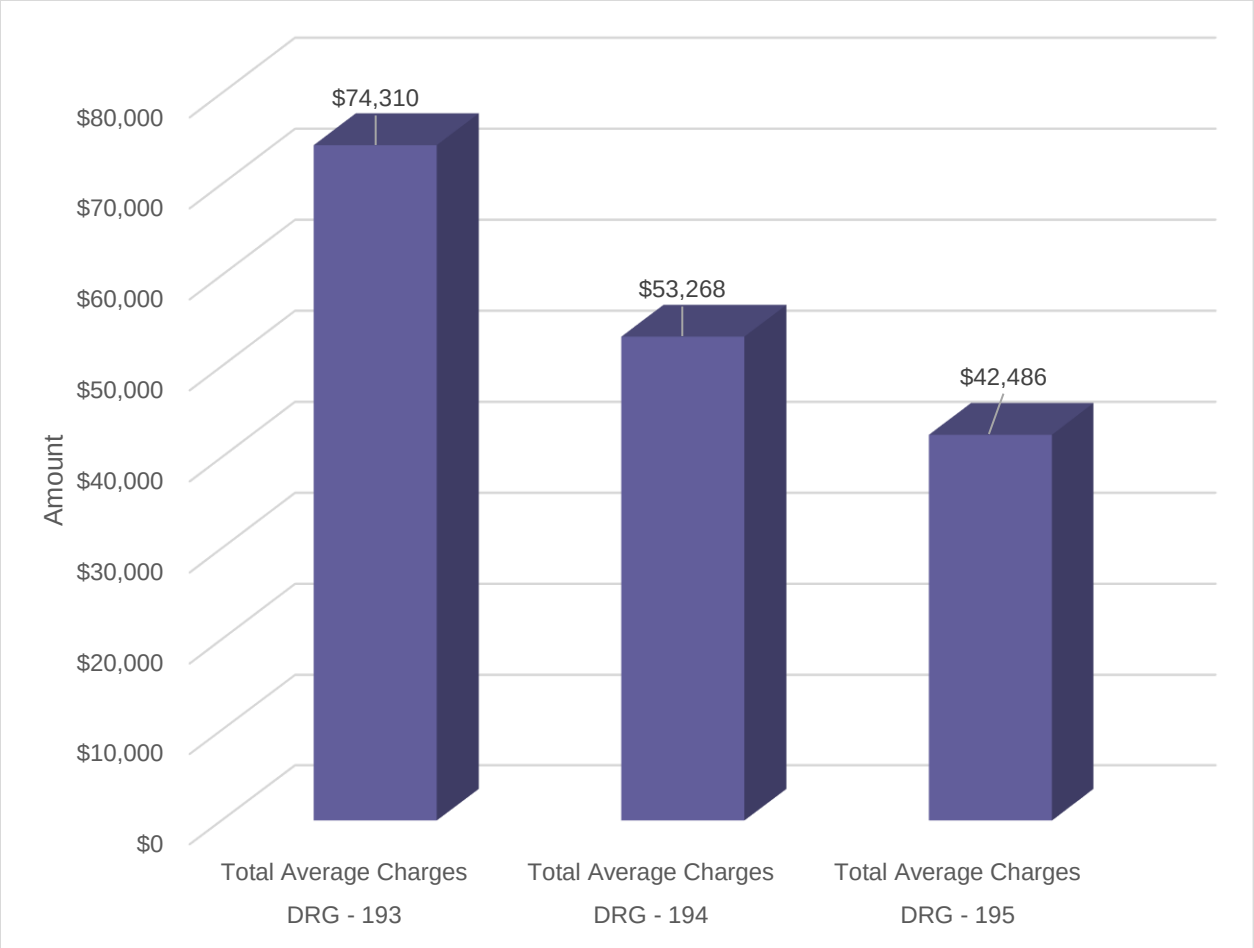

Figure 3. Projected per-patient average charges for COVID-19 patients requiring inpatient stays (using DRG values)

The total average estimated allowed amounts per patient are different for commercial insurance and for Medicare and Medicaid reimbursements (table 12, figure 4). The commercial insurance values range from $38,755 for DRG 193 to $21,936 for DRG 195. For Medicare, the corresponding values range from $12,370 to $7,706 and, for Medicaid, from $8,906 to $5,548.

Table 12. Projected per-patient average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using DRG values)

	DRG 193			DRG 194			DRG 195		
	Average Estimated Commercial Allowed Amount	Average Estimated Medicare Amount	Average Estimated Medicaid Amount	Average Estimated Commercial Allowed Amount	Average Estimated Medicare Amount	Average Estimated Medicaid Amount	Average Estimated Commercial Allowed Amount	Average Estimated Medicare Amount	Average Estimated Medicaid Amount
Professional	$3,598	$2,369	$1,705	$3,598	$2,369	$1,705	$3,598	$2,369	$1,705
6 Days Inpatient (DRG)	$35,157	$10,001	$7,201	$24,036	$7,076	$5,095	$18,338	$5,337	$3,843
Total Estimated per Patient	**$38,755**	**$12,370**	**$8,906**	**$27,634**	**$9,445**	**$6,800**	**$21,936**	**$7,706**	**$5,548**

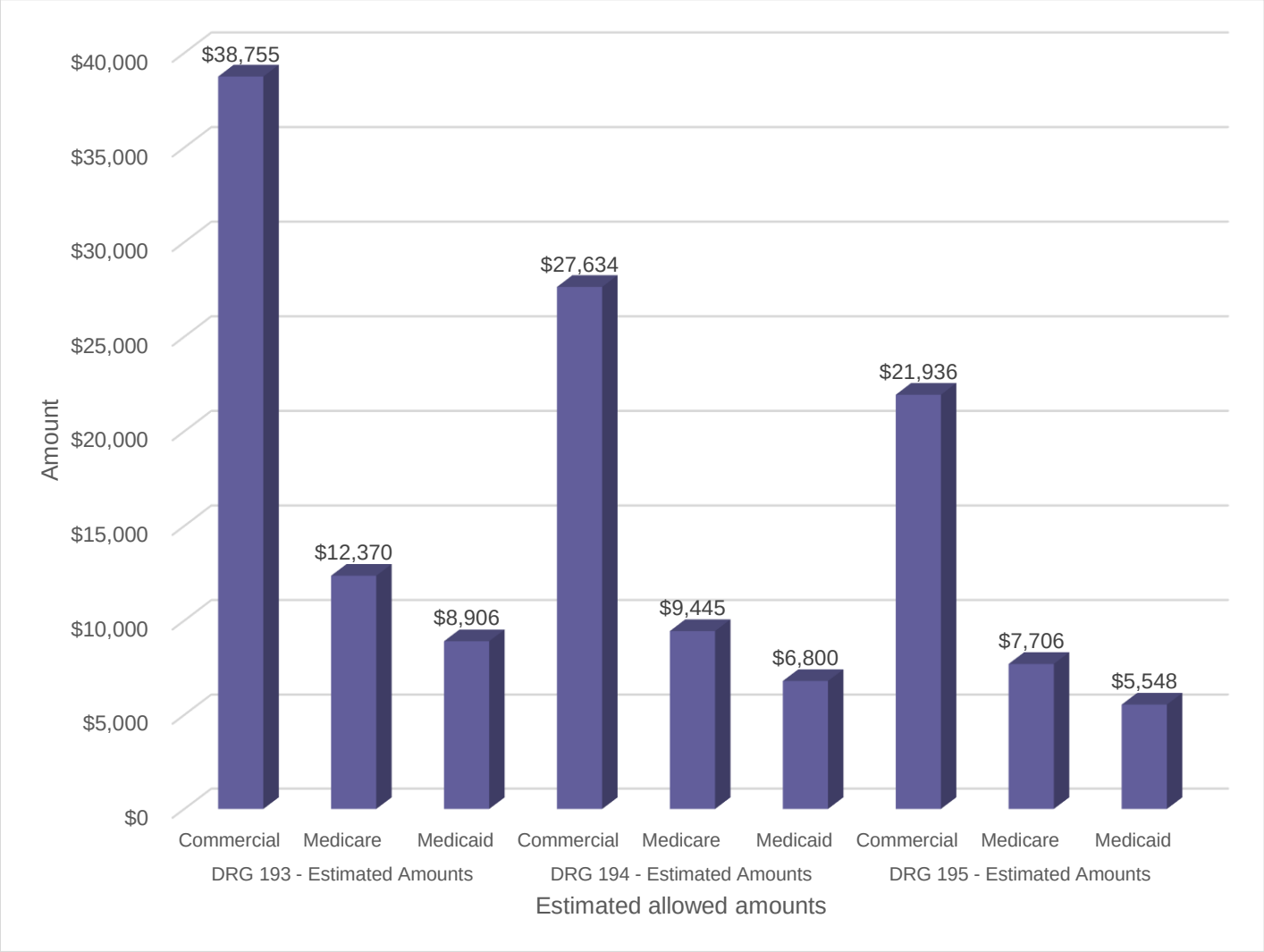

Figure 4. Projected per-patient average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using DRG values)

With DRG values, as with IIR values, it is possible to multiply the projected numbers of patients with inpatient stay need by average charges and average estimated allowed amounts. By such calculations, we arrive at projected total average costs of care for COVID-19 patients requiring an inpatient stay based on DRG values. Figures 5, 6 and 7 show the results of those calculations for, respectively, DRG code 193, 194 and 195. In figure 5, based on DRG code 193, the costs range from a low of $367 billion in charges and $144 billion in estimated allowed amounts (for a population with low incidence rate and low inpatient stay need) to a high of $1.469 trillion in charges and $575 billion in estimated allowed amounts (for a population with high incidence rate and high inpatient stay need). These costs are similar to those obtained using IIR values and are proportioned in the same manner. The estimated Medicare population and Medicaid population are incorporated, with their reimbursements included in the total average estimated allowed amounts.

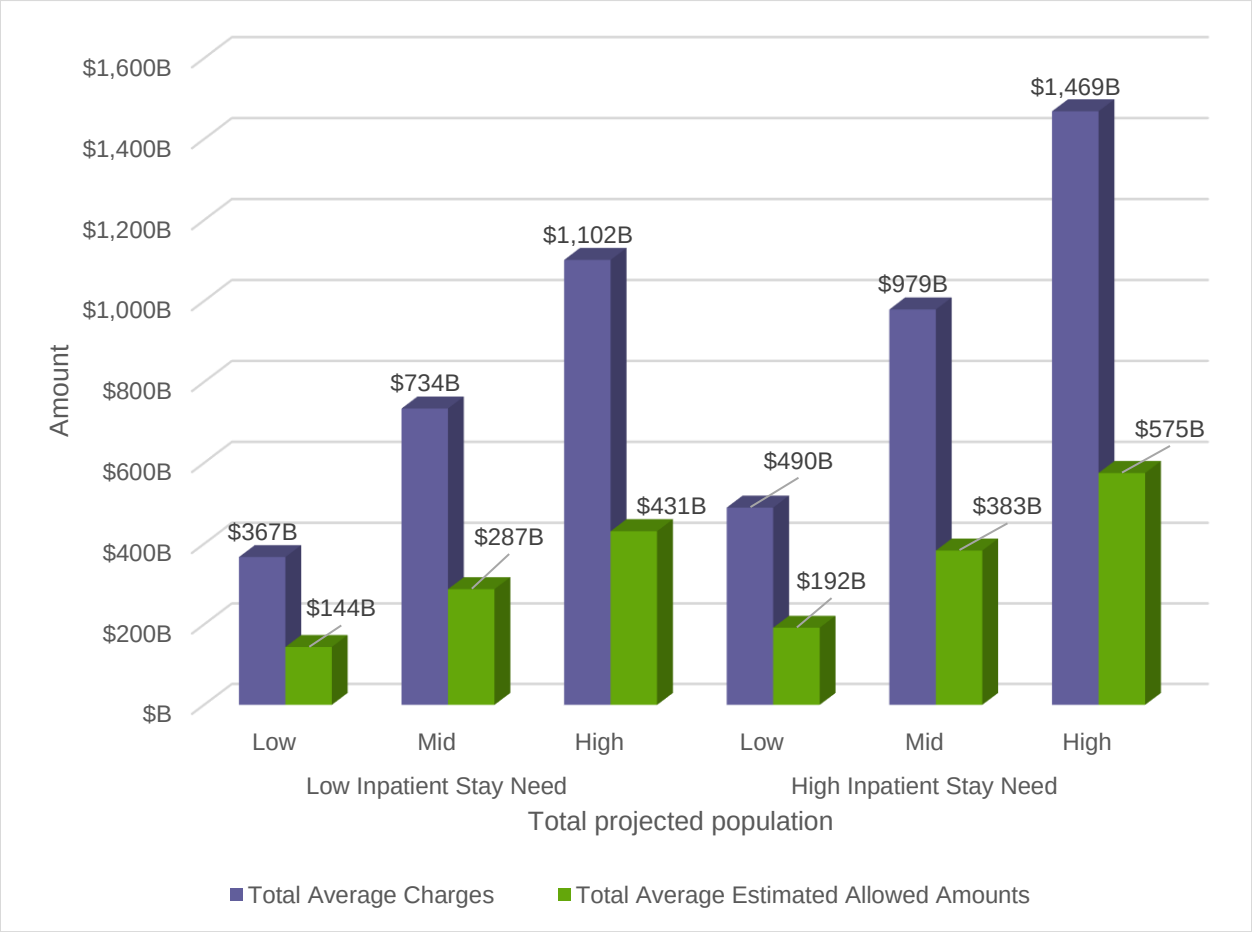

Figure 5. Projected total average charges and total average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using DRG code 193, simple pneumonia and pleurisy with major complication or comorbidity)

In figure 6, based on DRG code 194, the costs range from a low of $263 billion in charges and $103 billion in estimated allowed amounts (for a population with low incidence rate and low inpatient stay need) to a high of $1.053 trillion in charges and $414 billion in estimated allowed amounts (for a population with high incidence rate and high inpatient stay need). These costs are lower than those obtained using IIR values and those obtained using DRG code 193.

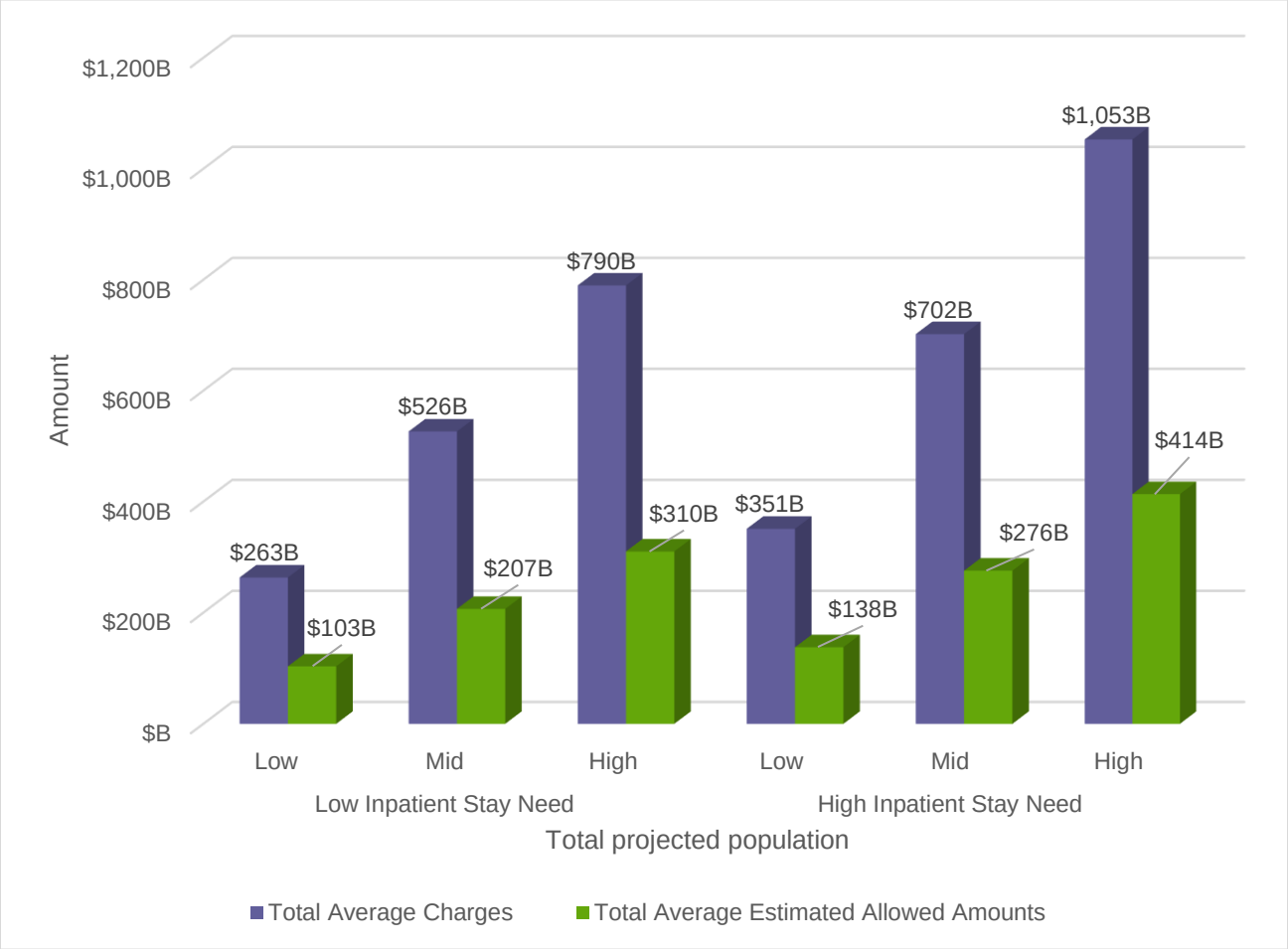

Figure 6. Projected total average charges and total average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using DRG code 194, simple pneumonia and pleurisy with complication or comorbidity)

In figure 7, based on DRG code 195, the costs range from a low of $210 billion in charges and $82 billion in estimated allowed amounts (for a population with low incidence rate and low inpatient stay need) to a high of $840 billion in charges and $329 billion in estimated allowed amounts (for a population with high incidence rate and high inpatient stay need). These costs are lower than those obtained using IIR values and those obtained using either DRG code 193 or 194.

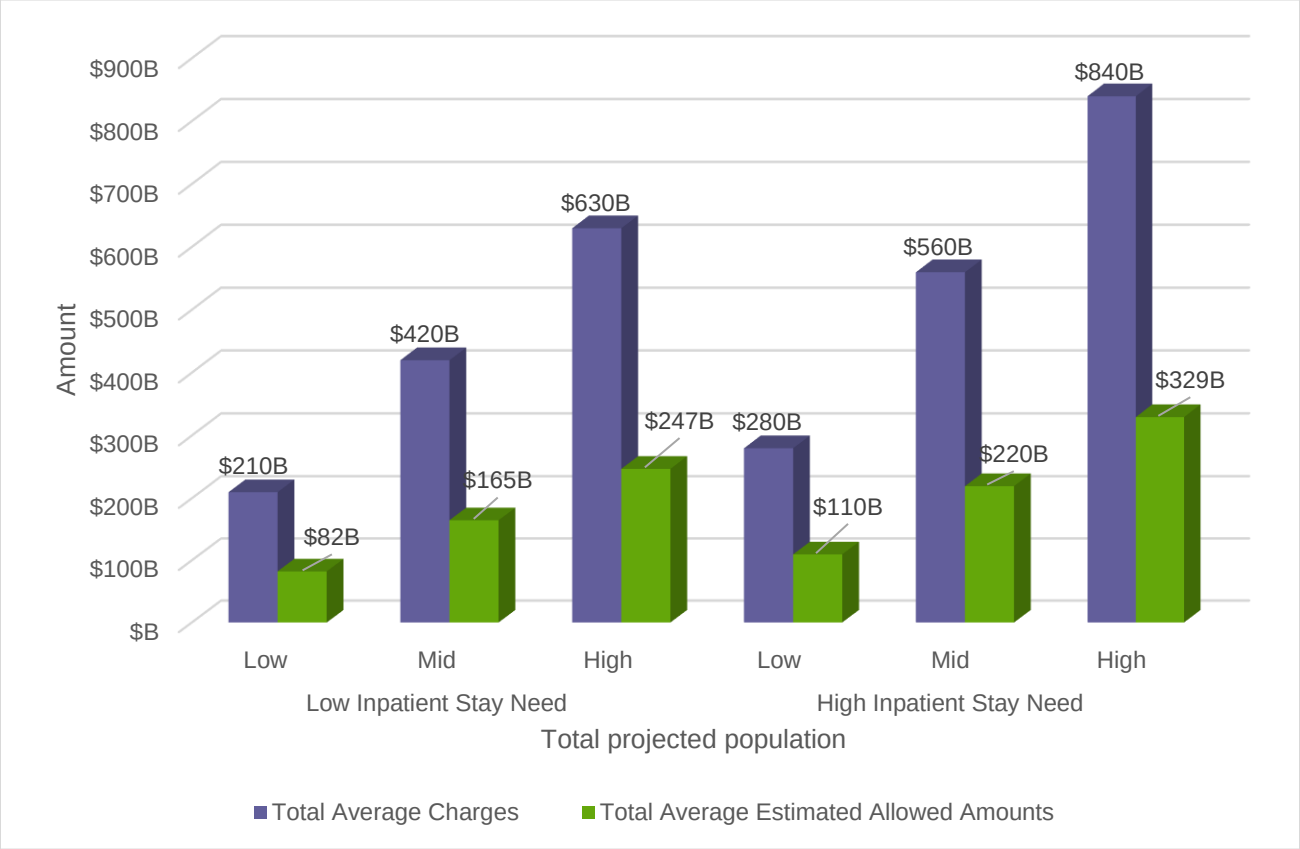

Figure 7. Projected total average charges and total average estimated allowed amounts for COVID-19 patients requiring inpatient stays (using DRG code 195, simple pneumonia and pleurisy without complication or comorbidity/major complication or comorbidity)

Telehealth and COVID-19

In the absence of a diagnosis code for COVID-19, FAIR Health analyzed the top 10 telehealth codes most often associated with all respiratory infections in 2019, on the assumption that these telehealth codes are likely to be used for COVID-19 (figure 8). The most commonly used telehealth code in this top 10 was CPT 99441, telephone evaluation and management (E&M) service by a physician or other qualified healthcare professional (QHP), 5-10 minutes. This code was associated with 50 percent of all telehealth services for respiratory infections. CPT 99201, office or other outpatient visit for E&M of a new patient, 10 minutes, was in second place with 13 percent. In third, fourth and fifth place, respectively, were CPT 99212 (office or other outpatient visit, established patient, 10 minutes; eight percent), CPT 99442 (physician/QHP telephone E&M, 11-20 minutes; eight percent) and CPT 99444 (physician/QHP online E&M; seven percent).

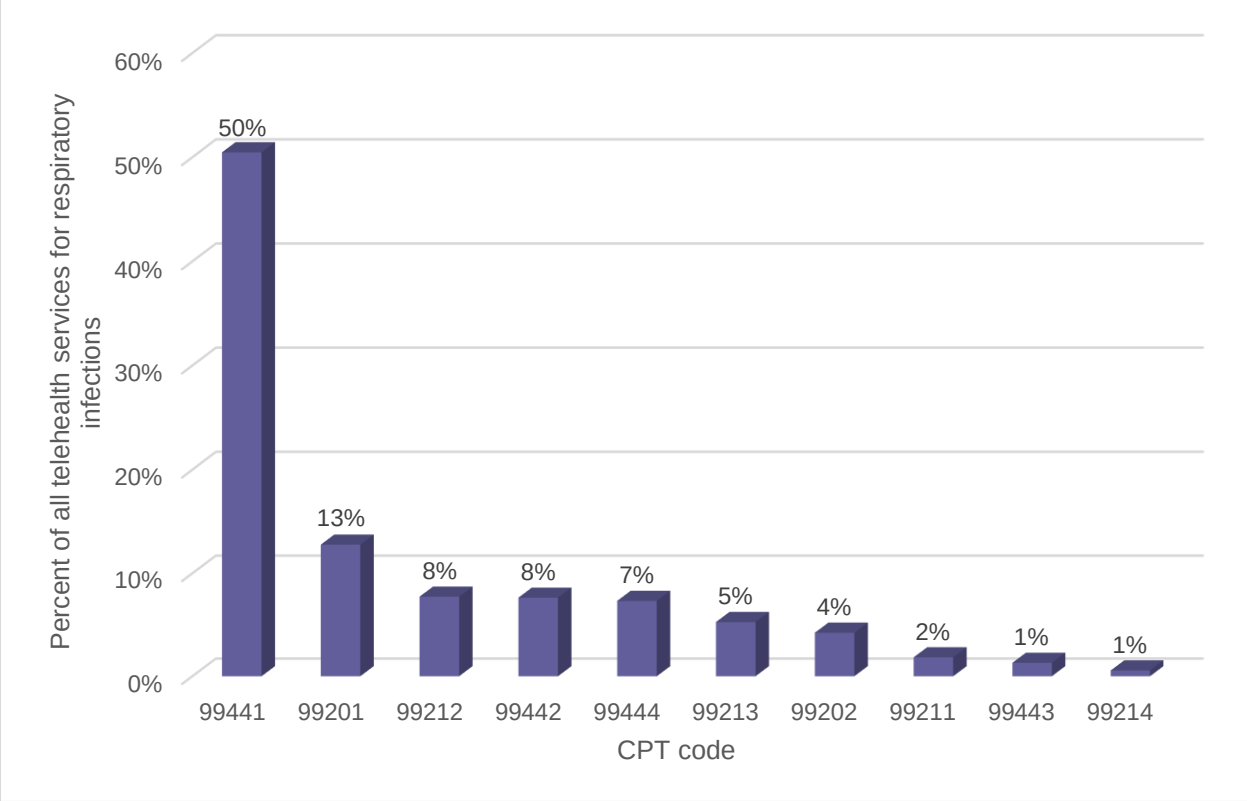

Figure 8. Top 10 telehealth codes associated with the greatest percentage of all telehealth services for respiratory infections, 2019

CPT Code	Description
99441	PHYS/QHP TELEPHONE EVALUATION 5-10 MIN
99201	OFFICE OUTPATIENT NEW 10 MINUTES
99212	OFFICE OUTPATIENT VISIT 10 MINUTES
99442	PHYS/QHP TELEPHONE EVALUATION 11-20 MIN
99444	PHYS/QHP ONLINE EVALUATION & MANAGEMENT SERVICE
99213	OFFICE OUTPATIENT VISIT 15 MINUTES

CPT Code	Description
99202	OFFICE OUTPATIENT NEW 20 MINUTES
99211	OFFICE OUTPATIENT VISIT 5 MINUTES
99443	PHYS/QHP TELEPHONE EVALUATION 21-30 MIN
99214	OFFICE OUTPATIENT VISIT 25 MINUTES

Some of the codes in figure 8 belong to a class of CPT codes that are used only for telehealth. The average charge amounts and average estimated allowed amounts for all CPT codes used only for telehealth, based on data from September 2018 to August 2019, are presented in figure 9. Four of those codes—CPT 99441, CPT 99442, CPT 99444 and CPT 99443—are among the top 10 telehealth codes associated with the greatest percentage of all telehealth services for respiratory infections.

FAIR Health evaluated the average charges and average estimated allowed amounts for commercially insured patients. Among these four codes, the highest costs are associated with CPT 99443 (physician/QHP telephone E&M, 21-30 minutes), with an average charge of $100 and an average estimated allowed amount of $58. The lowest costs are associated with CPT 99441 (physician/QHP telephone E&M, 5-10 minutes), with an average charge of $43 and an average estimated allowed amount of $34.

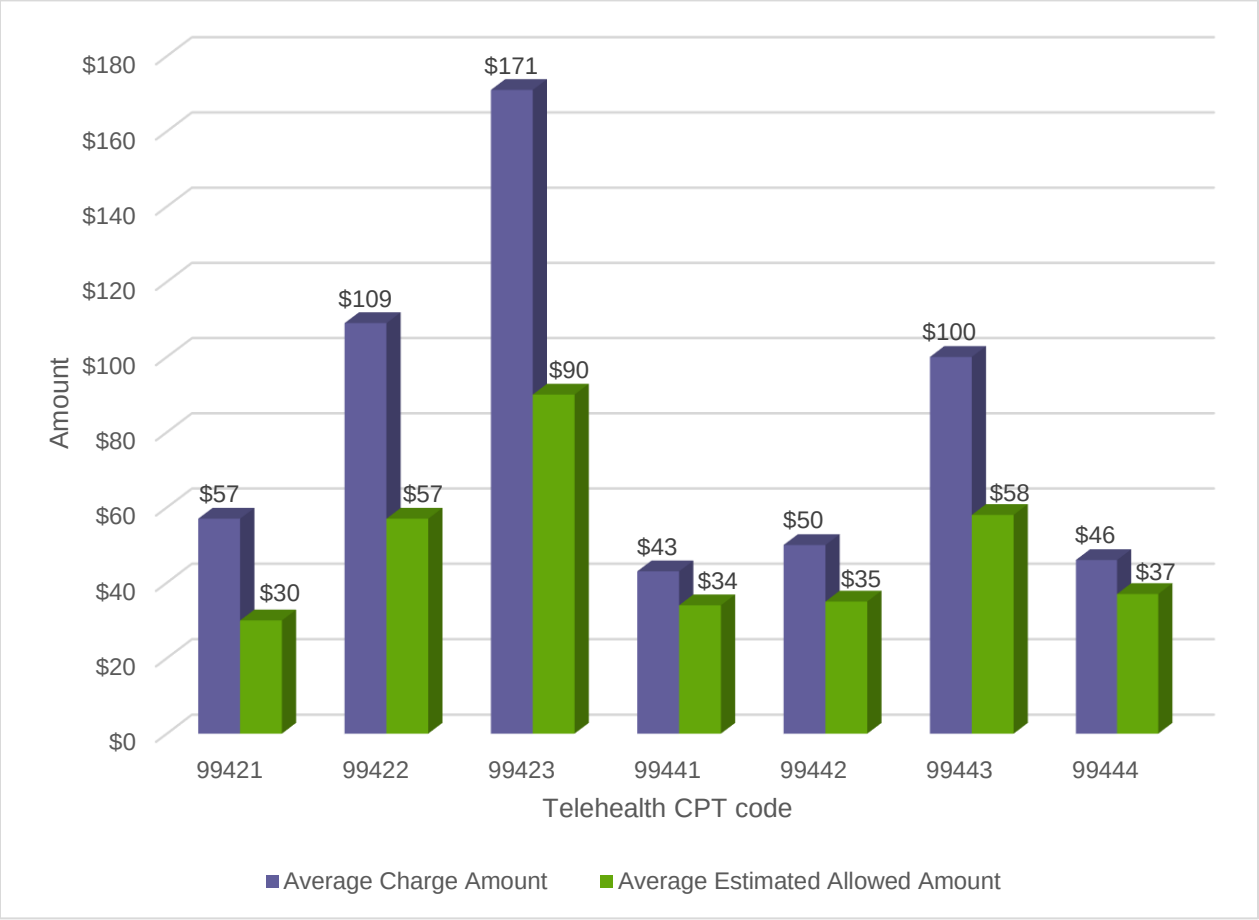

Figure 9. Average charge amounts and average estimated allowed amounts for CPT codes used only for telehealth for commercially insured patients, September 2018-August 2019

CPT	Description
99421	ONLINE DIGITAL E/M SVC EST PT <7 D 5-10 MINUTES
99422	ONLINE DIGITAL E/M SVC EST PT <7 D 11-20 MINUTES
99423	ONLINE DIGITAL E/M SVC EST PT <7D 21+ MINUTES
99441	PHYS/QHP TELEPHONE EVALUATION 5-10 MIN

CPT	Description
99442	PHYS/QHP TELEPHONE EVALUATION 11-20 MIN
99443	PHYS/QHP TELEPHONE EVALUATION 21-30 MIN
99444	PHYS/QHP ONLINE EVALUATION & MANAGEMENT SERVICE

Because the codes in figure 9 are used only for telehealth, it is not possible to compare their costs when used for telehealth to their use in general. There are other codes, however, which may be billed less frequently for telehealth but which are billed both for telehealth and non-telehealth services. Four of these E&M codes—CPT 99201, CPT 99202, CPT 99212 and CPT 99213—are shown in figure 10. All are among the top 10 telehealth codes associated with the greatest percentage of all telehealth services for respiratory infections. The codes are shown with their average charge amount and average estimated allowed amount when billed for a telehealth visit for a commercially insured patient, as compared to their average charge amount as a benchmark value in FH Medical and average estimated allowed amount as a benchmark value in FH Allowed Medical. The benchmark value in those modules represents all places of service, both telehealth and non-telehealth. From this comparison, it is clear that in most cases, having telehealth as the place of service yields cost savings by comparison with all places of service for the same E&M procedure code.

For example, the average FH Medical charge amount for CPT 99201 (office or other outpatient visit for E&M of a new patient, 10 minutes) is $88, but the average telehealth charge amount for the same code is $55. The average estimated allowed amounts for commercially insured patients are more similar, but there is still a difference. The average FH Allowed Medical estimated allowed amount for this code is $47, while the average telehealth estimated allowed amount is $45.

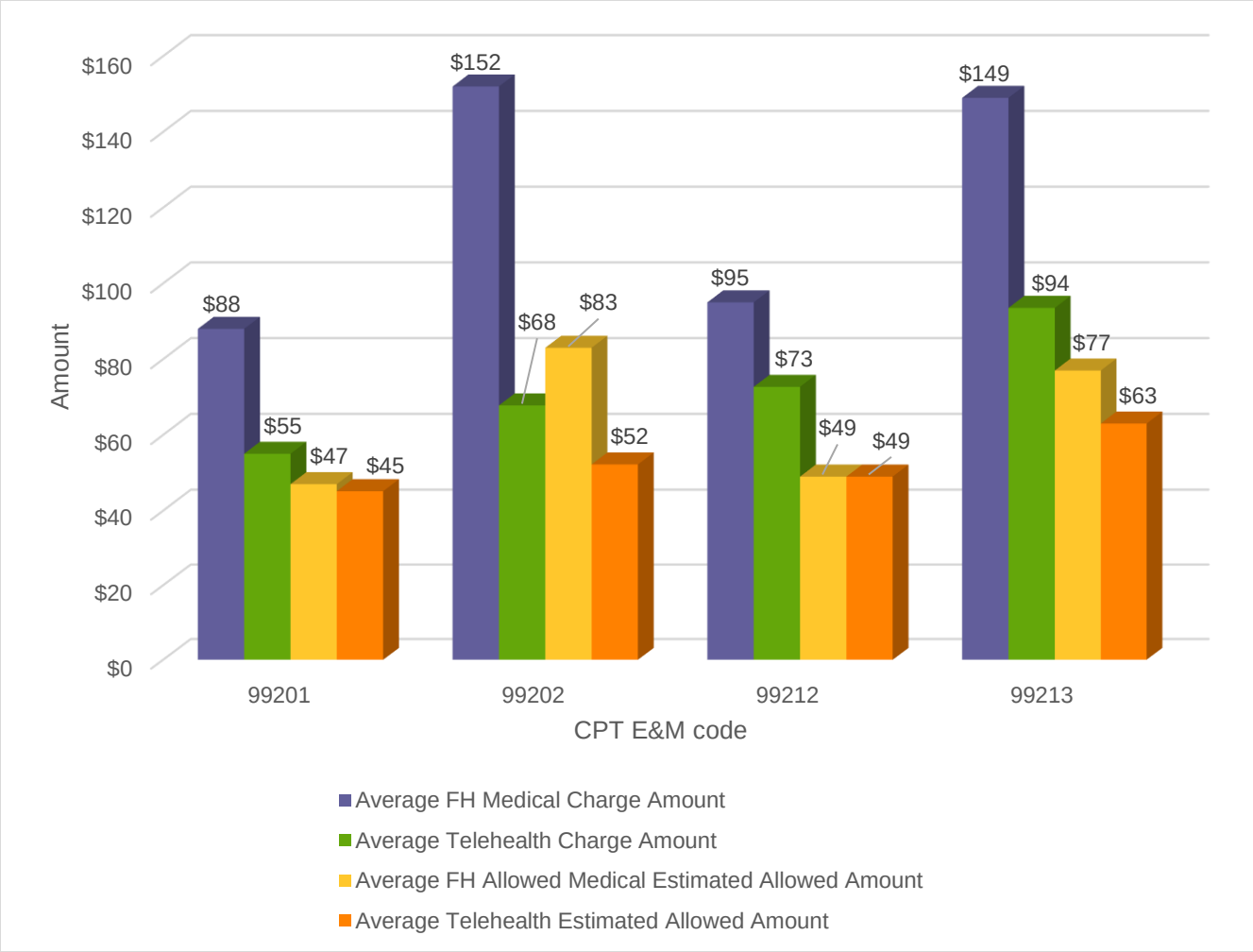

Figure 10. CPT E&M codes with average FH Medical charge amount, average telehealth charge amount, average FH Allowed Medical estimated allowed amount and average telehealth estimated allowed amount for commercially insured patients, September 2018-August 2019

CPT Code	Description
99201	OFFICE OUTPATIENT NEW 10 MINUTES
99202	OFFICE OUTPATIENT NEW 20 MINUTES
99212	OFFICE OUTPATIENT VISIT 10 MINUTES
99213	OFFICE OUTPATIENT VISIT 15 MINUTES

Conclusion

Based on the public estimates of experts, FAIR Health projects that from 4.9 million to 19.8 million Americans may require inpatient stays due to COVID-19. The projected costs of care for those patients are substantial, whether they are calculated on the basis of IIR in the context of influenza and pneumonia, or DRG in the context of pneumonia. On the basis of IIR, total average charges per patient are $73,300 and total average estimated allowed amounts per commercially insured patient are $38,221. The total projected costs for all hospitalized COVID-19 patients range from a low of $362 billion in charges and

$139 billion in estimated allowed amounts to a high of $1.449 trillion in charges and $558 billion in estimated allowed amounts, depending on the assumptions used regarding incidence rate and inpatient stay percentages.

On the basis of DRG, the per-patient average costs for hospitalized COVID-19 patients vary depending on severity as indicated by the DRG code, with DRG 193 for major complication or comorbidity, DRG 194 for complication or comorbidity and DRG 195 for no complication or comorbidity. The total average charges per patient range from $74,310 for DRG 193 to $42,486 for DRG 195. The total average estimated allowed amounts per commercially insured patient range from $38,755 for DRG 193 to $21,936 for DRG 195.

Total projected costs for all hospitalized COVID-19 patients similarly vary on the basis of which DRG code is used. Assuming high incidence rate and high inpatient stay need, the costs range from $1.469 trillion in charges and $575 billion in estimated allowed amounts (for DRG 193) to $840 billion in charges and $329 billion in estimated allowed amounts (for DRG 195).

In the area of telehealth, this study identifies the top 10 telehealth codes most often associated with all respiratory infections, with the predominant one in 2019 being CPT 99441 (physician/QHP telephone E&M, 5-10 minutes), which accounted for 50 percent of all telehealth services for respiratory infections. The average charge for CPT 99441 is $43 and the average estimated allowed amount is $34, making it the lowest-cost service of CPT codes that are used only for telehealth. Among E&M codes billed both for telehealth and non-telehealth, including 4 of the top 10 codes most often associated with respiratory infections, having telehealth as the place of service in most cases yields cost savings by comparison with all places of service for the same code.

We hope that the information in this brief is useful to policy makers, payors, providers, researchers and other healthcare stakeholders, and to the country as a whole, in this time of profound uncertainty and shared purpose.

About FAIR Health

FAIR Health is a national, independent nonprofit organization dedicated to bringing transparency to healthcare costs and health insurance information through data products, consumer resources and health systems research support. FAIR Health qualifies as a public charity under section 501(c)(3) of the tax code. FAIR Health possesses the nation's largest collection of private healthcare claims data, which includes over 30 billion claim records contributed by payors and administrators who insure or process claims for private insurance plans covering more than 150 million individuals. FAIR Health licenses its privately billed data and data products—including benchmark modules, data visualizations, custom analytics and market indices—to commercial insurers and self-insurers, employers, providers, hospitals and healthcare systems, government agencies, researchers and others. Certified by the Centers for Medicare & Medicaid Services (CMS) as a national Qualified Entity, FAIR Health also receives data representing the experience of all individuals enrolled in traditional Medicare Parts A, B and D; FAIR Health houses data on Medicare Advantage enrollees in its private claims data repository. FAIR Health can produce insightful analytic reports and data products based on combined Medicare and commercial claims data for government, providers, payors and other authorized users. FAIR Health's free, award-winning, national consumer websites are fairhealthconsumer.org and fairhealthconsumidor.org. For more information on FAIR Health, visit fairhealth.org.

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