How much are hospitals paid for inpatient COVID-19 treatment?

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This report presents the authors' estimates of the 2020 national average hospital per-admission payments for COVID-19 hospitalizations for patients covered by commercial, Medicaid, and Medicare fee-for-service (FFS) sources of insurance coverage (i.e., market).

Based on the most recent publicly available data, research, and reports through mid-June 2020 on U.S. hospitalizations for COVID-19, as well as the current coding guidance for reporting relevant diagnosis and procedure codes on administrative claims, we estimate the hospitalization severity, length of stay (LOS), and diagnosis-related group (DRG) distributions for COVID-19 hospitalizations. Using the estimated LOS, we then estimate the per-admission DRG payments made to hospitals in each market, taking into consideration federal payment policy changes during the COVID-19 public health emergency. Our estimates of hospital payment do not include payments for other services provided to hospitalized COVID-19 patients, such as professional payments for inpatient physician visits. Finally, we combine the hospitalization age-specific severity distribution with the distribution of hospitalized members by age in each market to estimate the average payment for each market. The results are displayed in Figure 1.

FIGURE 1: 2020 ESTIMATED NATIONAL AVERAGE HOSPITAL PAYMENT PER COVID-19 HOSPITALIZATION

	Inpatient DRG Reimbursement by Type of Payer		
	Commercial	Medicaid	Medicare
National Average	$33,500 - $37,500	$18,000 - $20,000	$21,000 - $23,500

Key findings include:

- The expected average LOS for COVID-19 hospitalizations given current patterns of treatment and mortality is three to seven days for patients with moderate severity disease who do not require intensive care unit (ICU) care, and eight to 12 days for patients with severe disease who require ICU care (with or without invasive mechanical ventilation).
- National average payments to hospitals for hospitalizations that include invasive mechanical ventilation (IMV) are estimated to be substantially higher than hospitalizations not including IMV.

Background

The first cases of the highly contagious coronavirus disease 2019 (COVID-19) were identified in the United States in January 2020[1] and the World Health Organization (WHO) characterized COVID-19 as a global pandemic in March.[2] Over the following months, the new infection spread rapidly in communities throughout the world, resulting in tremendous strain and uncertainty for healthcare systems everywhere, including the United States. New treatment protocols, infection rate estimates, and other data crucial to healthcare providers' understanding are emerging every day in the popular media, scientific journal articles, and other avenues. To effectively plan for community spread and optimize providers' capacity to care for local needs, providers must continuously evaluate analyses and reconcile apparently conflicting clinical and other findings. In response to federal[3] and state[4] directives this spring, U.S. hospitals shifted resources to conserve critical healthcare resources for the treatment of COVID-19 patients, bracing for and subsequently experiencing a large influx of patients in regions with surging infections. At the same time, hospitals and other healthcare providers have seen dramatic decreases in the demand for services not related to COVID-19 treatment, as providers and patients postpone care to reduce the spread of the virus and preserve hospital capacity to care for infected patients.[5]

With no baseline population immunity and relatively high rates of severe disease in the confirmed infected population, especially among older age groups, maintaining sufficient access to hospital care for all patients who need hospitalization is critical to hastening recovery from illness and minimizing severe complications and deaths from COVID-19. This includes ensuring communities have sufficient hospital beds and advanced medical support capabilities, such as ICU beds and ventilators. As COVID-19 infections spike and wane in areas around the United States, hospital bed and ICU bed occupancy (even given significant hospital bed expansion) have reached very high levels, with a large percentage of beds occupied by COVID-19 patients at the initial peak of infections.[6] The hospital resources needed to care for these patients are hard to predict as optimal care pathways have been evolving rapidly with experience, including in areas such as respiratory support, management of organ failure, and anticoagulation. Currently there are no treatments or vaccines approved by the U.S. Food and Drug Administration (FDA) for COVID-19, and only one drug has received emergency use authorization for emergency use in treating severe disease in hospitalized patients.[7] Notably, the hospital resource costs for treating COVID-19 patients are anticipated to exceed proxy historical hospitalizations because of increased patient complexity, requirements for personal protective equipment (PPE), cleaning regimens, and increased utilization of radiology services, drugs, and supplies.[8]

Recent federal legislation has authorized reimbursement and coverage changes for healthcare for individuals with COVID-19, including increased payment under Medicare FFS for COVID-19-related hospitalizations[9] and funding of uninsured care from the Public Health and Social Services Emergency Fund (PHE Fund).[10] However, because of the rapid initiation and spread of COVID-19 infections and these recent federal policy changes, healthcare payers and providers remain uncertain about reimbursement amounts in different markets for treating patients hospitalized with COVID-19, which, in addition to uncertainties about the amount of reductions in outpatient and elective care, hinders their strategic and financial planning efforts for the remaining months of 2020 and future years.[11,12]

Milliman has previously estimated the potential overall impact of COVID-19 treatment and associated changes in care for other conditions in 2020.[13] As a follow-on analysis, this paper presents average per-admission estimates by market of hospital payment for COVID-19-related hospitalizations. Hospital payment is the payment by the insurer and any applicable patient cost sharing to the hospital for their resources required to care for inpatients, such as room and board, nursing services, drugs, diagnostic tests, and medical equipment and supplies. Hospital payments do not include payment to other providers for services to inpatients, such as professional payments to physician for inpatient visits, procedures, and the interpretation of diagnostic tests. We model the expected payment to hospitals based on what is currently known about the attributed diagnoses and procedures provided to hospitalized U.S. COVID-19 patients of different ages and disease severity, historical payment for similar patients, and specific reimbursement policies for COVID-19 care. Hospitals and other stakeholders need the best estimates to ensure that COVID-19 patients receive essential care, while they manage their operations and planning for 2021 amidst a high level of uncertainty about the changing disease presence in their communities and the overall financial implications of the pandemic.

Results

ESTIMATED 2020 AVERAGE PER-ADMISSION PAYMENT FOR COVID-19 HOSPITALIZATIONS

Using the Milliman COVID-19 Pandemic Modeling Suite, we estimate 2020 hospital reimbursement per COVID-19 hospitalization for three key sources of healthcare coverage: commercial, Medicaid, and Medicare FFS. The cost of treatment of COVID-19 will vary by disease severity. We define COVID-19 hospitalization severity levels as follows:

- Moderate severity: All days during the hospitalization in a regular hospital bed.
- Severe: At least one day during the hospitalization in an intensive care unit (ICU) bed.
- Severe requiring IMV: At least one day with IMV during the hospitalization. All IMV days are spent in an ICU bed.

Within each severity level, the cost of treatment will vary by market due to different reimbursement amounts for each market. Figure 2 displays our estimates of the potential range of national average per-admission payment by market. We estimate payments separately for commercial (i.e., fully insured and self-funded group insurance), Medicaid, and Medicare FFS. Medicare Advantage reimbursement may differ from Medicare FFS reimbursement.

FIGURE 2: 2020 ESTIMATED NATIONAL AVERAGE HOSPITAL PAYMENT PER COVID-19 HOSPITALIZATION, BY SEVERITY LEVEL AND MARKET

Note: The ranges in Figure 2 reflect variation in the national average payments and do not reflect the full spectrum of payments across all geographies or reimbursement structures. Some actual payments will be substantially higher than national averages.

In addition to showing the 2020 projected payments shown in Figure 2, Figure 3 shows the expected severity distribution for each market. The amounts shown in Figure 2 and Figure 3 are hospital payments only and do not include payments for other healthcare services provided to hospitalized COVID-19 patients, such as professional payments for inpatient visits. These amounts are inclusive of any member cost sharing, which has been waived by many payers. The range of average payments shown in Figure 2 and Figure 3 represents our expected range of national average payments. Many actual payments will be outside the ranges shown in Figure 2 and Figure 3 due to geographic variation and payer-specific reimbursement structures. Out-of-network payments may also be significantly higher than national average payments.

FIGURE 3: 2020 ESTIMATED NATIONAL AVERAGE HOSPITAL PAYMENT PER COVID-19 HOSPITALIZATION, WITH SEVERITY DISTRIBUTION

	Inpatient DRG Reimbursement by Type of Payer			Assumed Distribution of Hospitalization by Type of Payer		
Type of Hospitalization	Commercial	Medicaid	Medicare	Commercial	Medicaid	Medicare
Moderate Severity	$24,000 - $26,000	$13,500 - $14,500	$15,000 - $16,000	71.4%	69.0%	66.9%
Severe	$36,000 - $38,000	$14,500 - $15,500	$16,000 - $17,000	14.6%	16.4%	13.7%
Severe Requiring IMV	$79,000 - $94,000	$41,000 - $49,000	$45,000 - $53,500	14.0%	14.6%	19.4%
Average or Total	$33,500 - $37,500	$18,000 - $20,000	$21,000 - $23,500	100.0%	100.0%	100.0%

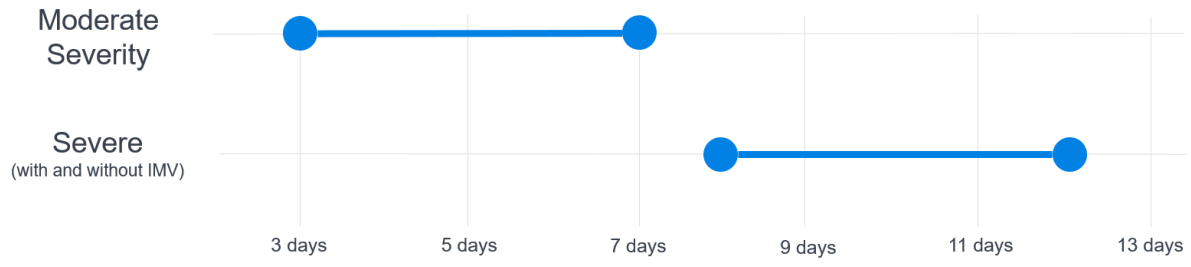
Discussion and sensitivity testing

Our analysis shows there is a variation in the expected national average payment per hospitalization for each market. This is due to market-specific reimbursement amounts and differences in severity mix. Historical Medicare payments to hospitals for DRGs that could be assigned to high-severity COVID-19 hospitalizations involving IMV have exceeded $200,000 for very high-cost cases, and commercial payments could be much higher than that. In general, commercial payers pay more than Medicare or Medicaid for the same level of services. Our analysis also finds that hospital payments increase substantially when IMV is used in the treatment of COVID-19 patients.

The key areas of uncertainty in our analysis are the hospital LOS, commercial and Medicaid reimbursement amounts, and the distribution of COVID-19 hospitalizations by diagnosis-related group (DRG). Commercial reimbursements may vary significantly from our DRG-based estimates due to the wide range of reimbursement structures used in the commercial market, including DRG-based payments, per diem payments, discounts off billed charges, and other methodologies. Medicaid reimbursements may vary from our estimates due to state-specific payment amounts, including the potential application of a 20% increase to the DRG base weights for COVID-19 inpatient treatment as specified in the Coronavirus Aid, Relief, and Economic Security (CARES) Act for Medicare FFS.

We vary the LOS and DRG distribution assumptions in order to produce the range of results shown in Figure 2 and Figure 3 that illustrate the effects of uncertainty for these assumptions. The actual range of payments will be much larger than the range of the averages. To test the sensitivity of the DRG distribution, we shifted a proportion of expected treatments to higher-cost and lower-cost DRGs within each severity level, based on clinical and actuarial judgment. To test the sensitivity of results to LOS, we altered the assumed LOS by ±2 days. Our baseline expectation is a five-day average LOS for moderate severity stays, and a 10-day average LOS for severe stays with and without IMV. While we expect that the LOS for some surviving patients with severe stays that include IMV may be longer, IMV is associated with substantial in-hospital mortality of at least 30%[14] and, therefore, some of the patients in this group will have shorter hospital stays. The average number of ICU days per stay approximates the days of IMV[15] so we use the same baseline average LOS estimate for severe stays with and without IMV for all patients, including those who die in the hospital and those who survive to discharge. Longer stays generally produce higher total billed charge amounts for the hospitalization, so changes in the LOS can cause changes to outlier payments. We do not project significant Medicare Inpatient Prospective Payment System outlier payments for most COVID-19-related stays, so we observe that changes in the LOS do not cause substantial changes in payments.[16] The range of expected average hospital LOS used is shown in Figure 4.

FIGURE 4: 2020 ESTIMATED LOS PER COVID-19 HOSPITALIZATION, BY SEVERITY LEVEL



As treatment of COVID-19 continues to evolve based on greater experience with the infection, we expect that average per-admission payments for hospitalizations will also change. For example, changes in care management resulting from real-world experience and research findings, including the potential introduction of effective therapeutic agents, may reduce patient severity and reduce use of IMV, which has been associated with higher mortality rates.[17,18] A shift of patients between severity levels, from severe requiring IMV to severe, would result in a decrease in average payment per admission. For example, shifting 50% of the severe patients requiring IMV to severe without IMV would reduce the average per-admission Medicare reimbursement by approximately 14% relative to the average results shown at the bottom of Figure 3. In addition, this shift would reduce the utilization of ventilators, which could help to close the gap researchers have estimated between the availability and need for ventilators to care for COVID-19 patients.[19] Furthermore, while the FDA has issued an emergency use

authorization for remdesivir for hospitalized children and adults with severe COVID-19, many other products are currently being evaluated for treatment of COVID-19, some of which are clinically available for other

indications while their COVID-19 use is investigational.[20] Effective treatments also have the potential to affect the average per-admission payment for hospitalizations due to factors such as changes in the severity mix of hospitalized patients, changes in the average LOS, and charges for the treatment and other hospital services for COVID-19 patients. For example, a shift of the distribution of patients from severe to moderately severe compared to Figure 3 would result in a decrease in average per-admission payment, reduction in the utilization of ICU beds, and reduction in the average COVID-19 hospitalization LOS. These changes would increase hospital capacity to care for additional COVID-19 patients as well as individuals with other conditions requiring hospitalization, affecting the projections of models of hospital resource capacity,[21] which are of great interest to localities managing hospital resources to meet anticipated community needs. The per-admission payment and other effects of changes in any of these parameters will depend upon the market and, in the commercial market, the applicable reimbursement arrangements.

To inform discussions of the financial impact of COVID-19 hospitalizations, several recent studies have relied on historical claims data to estimate the cost of inpatient COVID-19 treatment. Studies from March, April, and May 2020 by America's Health Insurance Plans (AHIP),[22] Health Affairs,[23] Kaiser Family Foundation,[24,25] FAIR Health,[26] and the Brookings Institution[27] rely on historical payer cost per admission for DRGs, typically admissions for respiratory conditions with treatments similar to those reported for hospitalized COVID-19 patients. Another AHIP study published in June 2020 relied on survey responses by payers, including Medicare Advantage (MA), commercial, and Medicaid managed care organizations (MCOs) to estimate the payment per COVID-19 admission by market.[28] Our methodology differs from these approaches in that we estimate the LOS for COVID-19 inpatient hospitalizations from the published literature, and we project the DRG payments specific to those LOS. This methodology produces a result more reflective of anticipated COVID-19 payments than relying on historical average payments for proxy DRGs. Some of the published estimates are roughly in line with our results, and some are not. We did not conduct further analysis to determine the causes of these differences.

Methodology and data sources

METHODOLOGY

We apply assumptions for the following parameters based on the most current COVID-19 experience in estimating hospital payments for COVID-19 hospitalizations:

- Average hospital LOS for each severity level: We estimate an average LOS for each severity level that applies to all ages based on the most current public sources of information on COVID-19 hospitalization LOS in the UnitedStates and Europe.[29,30,31,32,33,34,35,36] We assume the average LOS for each severity level is the same for each market.
- Distribution of hospitalizations across severity levels: We estimate the distribution of hospitalizations across severity levels for each adult age band (18-49, 50-65, 65 and over) based on the most recent data on the interventions/outcomes for COVID-19 hospitalizations (total hospitalizations, ICU use, IMV use) from the COVID-19-Associated Hospitalization Surveillance Network (COVID-NET), the Centers for Disease Control and Prevention's (CDC's) weekly summary of data for COVID-19 laboratory-confirmed hospitalizations as of May 30, 2020.[37] We estimate the distribution of hospitalizations across severity levels for children (0-17) based on the most current public sources of information on pediatric COVID-19 hospitalizations in the United States.[38,39]
- Distribution of DRGs within each severity level: We estimate the DRG distribution of hospitalizations within each severity level that applies to all ages based on the DRG assignment by the Centers for Medicare and Medicaid Services (CMS) of the new ICD-10-CM code for COVID-19 that was effective on April 1, 2020 (U07.1, COVID-19),[40] COVID-19 coding guidelines from the CDC,[41,42] and information on the clinical characteristics and most common diagnoses of hospitalized U.S. COVID-19 patients. [31,37,43]

To estimate the average hospital reimbursement for a COVID-19 hospitalization by severity level and market, we use Milliman proprietary research, claims databases, and public sources of information, as well as emerging reported COVID-19 claims experience from various payer types. Robust claims data for COVID-19 hospitalizations are limited across markets due to diagnosis coding changes and the short U.S. infection experience where treatment patterns are rapidly evolving. We project Medicare FFS DRG payments, and we apply percentage-of-Medicare reimbursement amounts for each market to project market-specific DRG payment estimates.

For each market, we derive an average allowed cost per severity level by blending the projected 2020 payment amounts by DRG with the assumed distribution of DRGs by severity level. We blend projected DRG payments for federal fiscal year 2020 (October 1, 2019, to September 30, 2020) and federal fiscal year 2021 (October 1, 2020, to September 30, 2021), weighting these payments with two-thirds and one-third weights, respectively, to represent payments made for COVID-19 admissions in the last nine months of 2020. We omit payments made in the first three months of 2020 due to the new coding guidance effective April 1, 2020. We adjust for the provider reimbursement arrangements underlying each market. We then produce an overall average allowed cost per hospitalization within each market by weighting the costs by severity level with the assumed distribution of hospitalizations. The assumed distribution of hospitalizations differs by market due to the demographic characteristics for each market: based on published literature cited above, we expect higher ages will have more severe cases.

The CARES Act authorizes a 20% increase to the weighting factor used in determining Medicare FFS DRG payments to hospitals for inpatient COVID-19 treatment, and we apply this factor in our estimates for Medicare payments.[9] We assume this increase does not apply for commercial and Medicaid payments. Because of the complexity of DRG payment calculations, the 20% weighting factor increase does not translate into a 20% increase in the total hospital payment. The CARES Act also eliminates adjustments for sequestration effective May 1, 2020; as a result, estimated 2020 payments for Medicare assume sequestration will only apply through April 30, 2020.

Our assumptions are based on rapidly changing information and emerging claims data; limited data exists to inform some key assumptions. Throughout this analysis, we assume no additional reimbursement changes from known levels or other policy changes within the remainder of federal fiscal year 2020 and federal fiscal year 2021 as of the publication date. It is possible that actual hospital allowed costs are higher or lower than our estimated reimbursement for these patients.

DATA SOURCES

To estimate DRG payments, we rely on the fiscal year 2018 Medicare Provider Analysis and Review (MedPAR) data set from CMS. The MedPAR data set is derived from fiscal year hospital inpatient services for 100% of Medicare beneficiaries and contains over $140 billion in allowed charges. The file contains data from claims for services provided to beneficiaries admitted to Medicare-certified inpatient hospitals and skilled nursing facilities. We exclude claims from skilled nursing facilities and long-term care hospitals. The data has three months of runout after the end of the fiscal year.

To estimate commercial reimbursement as a percentage of Medicare, we rely on proprietary Milliman research and data sets, such as the 2018 Milliman Consolidated Healthcare Database (CHSD). The CHSD contains proprietary historical claims experience from several of Milliman's Health Cost Guidelines™ (HCG) data contributors. The CHSD contains annual enrollment and paid medical and pharmacy claims for over 30 million commercially insured individuals covered by the benefit plans of large employers, health plans, and governmental and public organizations nationwide. To estimate Medicaid reimbursement as a percentage of Medicare, we rely on the fiscal year 2015 through 2017 Medicare Cost Reports. We only include hospitals with valid data for all three years. We normalize the results to account for differences in the service mix between Medicaid and Medicare enrollees. Both the Medicaid and Medicare payments include add-on payments such as state-directed payments (Medicaid), disproportionate share hospital payments, and indirect medical education payments.

Caveats, Limitations, and Qualifications

This report was prepared for Gilead Sciences, Inc. We developed this information to illustrate the range of hospital reimbursement for COVID-19 hospitalizations. This information may not be appropriate, and should not be used, for other purposes.

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In preparing our estimates, we relied upon 2018 claims data from CMS and CHSD data contributors. The data were not audited but were reviewed for reasonableness.

The results presented herein are estimates based on the best information available as of the date of publication. Differences between our estimates and actual payment amounts may result from evolution in disease treatment patterns, payer-specific payment structures, geographic variation in the incidence of hospitalizations, new legislation, federal rulemaking, and other unforeseen events that affect the per-admission payment for COVID-19 hospitalizations in one or more markets. The relevant assumptions underlying this analysis are not only subject to change, but are almost certain to change, as our knowledge of COVID-19 expands and additional experience emerges.

This report represents the opinion of the authors and is not representative of the views of Milliman. Milliman does not endorse any public policy or advocacy position on matters discussed in this report.

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. Matt Kramer, Matt Mraz, and Susan Silseth are consulting actuaries for Milliman. They are members of the American Academy of Actuaries and meet the qualification standards to render the actuarial opinion contained herein.

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