

Trends in Sepsis and Pneumonia During COVID-19: Lessons From BPCIA

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The onset of the COVID-19 pandemic had a profound impact on patients nationwide, both for those with COVID-19 and for others who experienced delayed care for acute and chronic conditions. From January 2020 to April 2021, approximately 4.3 million Medicare patients received a diagnosis of COVID-19, of whom approximately 1.2 million were hospitalized.¹ Additionally, the mortality rate for those 65 years and older was approximately 60% higher than that for the overall population hospitalized for COVID-19.² With the high rate of COVID-19 hospitalizations and mortality, 8% of Medicare patients opted to delay care, which had negative results for patients with both chronic and acute care conditions.³ Given the disproportionate impact of the pandemic on the Medicare population, it is important to better understand the care patterns for Medicare patients with serious clinical conditions, including those with and without COVID-19. These care patterns also reflect changes in a patient's risk tolerance, postponing care to prevent exposure to COVID-19. Hospitals participating in the Bundled Payments for Care Improvement Advanced (BPCIA) model received data on the full scope of care for Medicare patients in this model, both prior to and during the pandemic. These data showed that sepsis and pneumonia diagnoses were prevalent among patients both with and without COVID-19, allowing for a reliable comparison. Additionally, these conditions are generally urgent and require high utilization, so significant changes in care patterns for these acute care episodes were more apparent. This analysis used BPCIA data to assess changes in care delivery and to identify opportunities for improved care coordination by comparing care for patients with and without COVID-19 during the pandemic, as well as differences in care for patients without COVID-19 prior to and during the pandemic.

This analysis examines the cost and utilization patterns for 8 hospitals that participated in BPCIA episodes for sepsis and pneumonia in 2020. These 8 hospitals, half of which were safety-net hospitals serving vulnerable populations, were located in areas with high prevalence of COVID-19 early in the pandemic, as well as high rates of resurgence in 2021.⁴ The analysis addresses 2 key questions: First, how did care change for patients with sepsis

ABSTRACT

OBJECTIVES: The COVID-19 pandemic affected care delivery nationwide for all patients, influencing cost and utilization for patients both with and without COVID-19. Our first analysis assessed changes in utilization for patients with sepsis without COVID-19 prior to vs during the pandemic. Our second analysis assessed cost and utilization changes during the pandemic for patients with sepsis or pneumonia both with and without COVID-19.

STUDY DESIGN: A retrospective case-control study was utilized to determine differences in cost and utilization for patients with sepsis or pneumonia, relative to a COVID-19 diagnosis.

METHODS: Claims data from 8 teaching hospitals participating in sepsis and pneumonia episodes in the Bundled Payments for Care Improvement Advanced (BPCIA) model were utilized. BPCIA is a Medicare value-based care bundled payment program that aims to decrease costs and increase quality of care through a 90-day total cost of care model.

RESULTS: The first analysis (N = 1092) found that non-COVID-19 patients with sepsis had 26% higher hospice utilization ($P < .05$) and 38% higher mortality ($P < .0001$) during the pandemic vs the prepandemic period. The second analysis (N = 640) found that during the pandemic, patients with sepsis or pneumonia with COVID-19 had 70% more skilled nursing facility (SNF) use ($P < .0001$), 132% higher SNF costs ($P < .0001$), and 21% higher total episode costs ($P < .0001$) compared with patients without COVID-19.

CONCLUSIONS: COVID-19 has affected care patterns for all patients. Patients without COVID-19 postponed care and used lower-acuity care settings, whereas patients with COVID-19 were more costly and utilized postacute care at a higher rate. These analyses inform future care coordination initiatives, given the ongoing pandemic.

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TAKEAWAY POINTS

We analyzed cost and utilization changes for sepsis and pneumonia non-COVID-19 episodes prior to and during the pandemic, and during the pandemic for patients with and without COVID-19. These analyses can help clinicians, administrators/business leads, and C-suite executives understand changes in cost and utilization resulting from the pandemic.

- ▶ Changes associated with sepsis and pneumonia are presented, which can help identify approaches for handling fluctuations within these episodes.
- ▶ The data are provided in the context of value-based care, helping hospitals participating in these types of arrangements gain an understanding of how COVID-19 affects cost and utilization rates.
- ▶ COVID-19 has affected every area within health care. This analysis can help identify areas for improvement by establishing trends among patients both with and without COVID-19 in terms of costs and service utilization.

without COVID-19 during the pandemic, and secondly, how did care for patients with sepsis or pneumonia, both with and without COVID-19, compare during the pandemic? The analyses focus heavily on the postacute care space because these episodes are triggered by an inpatient stay, meaning that the most significant changes are often identified in the postacute care that occurs after discharge from the anchor stay.

To date, few analyses have reported on multisetting cost and utilization changes that occurred during the pandemic for the treatment of specific clinical conditions among patients both with and without COVID-19. Additionally, even fewer studies have reported on these issues in the context of value-based care (VBC) programs. Much of the discussion around VBC in the context of COVID-19 highlights the advantages of capitated payment programs and the ability of providers in these types of arrangements to maintain a steady source of revenue despite a pandemic.⁵ VBC models, however, offer access to a wide range of data that can be used to determine changes in care delivery, specifically with regard to postacute care, to inform care coordination.

METHODS

Data

Two analyses were conducted to determine changes in care patterns, as a result of the pandemic, to inform the hospitals' quality improvement and care coordination initiatives. The first analysis examined patients with sepsis without a COVID-19 diagnosis, comparing trends in utilization between the prepandemic period and the 2020 pandemic period. The second analysis evaluated changes in cost and utilization for patients with sepsis or pneumonia, comparing patients both with and without COVID-19. Sepsis and pneumonia were chosen because they are both acute care episodes with high volume, which contributes to the reliability of the data. Pneumonia episodes were not available in the prepandemic period, due to limited participation in this episode in BPCIA. However, pneumonia was included in the second analysis due to the association between COVID-19 and respiratory issues. CMS provided claims-level data

to participants in BPCIA, which included a flag for patients with COVID-19. The COVID-19 flag was defined using the *International Classification of Diseases, Tenth Revision* codes B97.29 (for other coronavirus as the cause of diseases classified elsewhere) and U07.1 (for COVID-19). B97.29 was implemented for COVID-19 episodes that occurred from January 27, 2020, to March 31, 2020, and U07.1 was utilized for COVID-19 episodes that occurred from April 1, 2020, onward. Data were extracted from 8 hospitals that participated in BPCIA episodes for sepsis and pneumonia in 2020. The analysis assessed changes in utilization for patients with sepsis between the period prior to the pandemic and

during the pandemic. In addition to cost, these trends were also analyzed for patients with sepsis or pneumonia both with and without COVID-19 during the pandemic.

Data for both the analyses were pulled based on the anchor end dates. Each episode ran for 90 days after the anchor inpatient stay that triggered the episode, and the data were considered complete after an additional 90 days of runout following the episode end date. No additional claims are dropped in the second 90-day period. This period simply allows for full claims runout from the first 90-day period. Additionally, a 90-day episode for BPCIA includes data from all Medicare Part A and Part B items and services, excluding trauma, cancer-related care, transplants, and ventricular shunts. The first analysis assessed sepsis episodes prior to and during the pandemic. For this analysis, prepandemic episodes served as the control group and had episode start dates from March 1, 2019, through November 8, 2019, with corresponding episode end dates from March 2, 2019, to February 5, 2020. The sepsis episodes during the pandemic were limited to episodes without a COVID-19 diagnosis, with anchor end dates from March 1, 2020, to November 8, 2020, and episode end dates from March 5, 2020, to November 13, 2020. This date range was selected to ensure that an equal amount of time was captured prior to and during the COVID-19 pandemic for comparison. Episodes with a COVID-19 diagnosis code were excluded for this first analysis, and it was limited to sepsis episodes only, due to participant episode selection decisions over model years that affected data availability for respiratory episodes in the prepandemic time period.

The second analysis assessed patients with and without COVID-19 diagnoses who were admitted for sepsis or pneumonia episodes. Episodes during the pandemic were defined as those with anchor end dates starting on March 1, 2020, which corresponds with the time that the COVID-19 pandemic escalated in the northeastern United States. Based on the availability of data at the time of this analysis, the episodes in this analysis had end dates through November 13, 2020.

Multiple outcomes were included in this analysis to understand the overall impact of the COVID-19 pandemic on cost, utilization,

and mortality rates among Medicare patients with sepsis and pneumonia. The analyses investigated changes in postacute care, specifically looking at readmissions, home health, hospice, inpatient rehabilitation, long-term care hospitals (LTCHs), and skilled nursing facilities (SNFs). Payments were represented in standardized dollars to control for hospital-specific price differences.

All 8 hospitals included in the analyses were teaching hospitals and were also designated as nonprofit hospitals. Additionally, bed size ranged from approximately 200 beds to 925 beds, with a mean of 490 beds for all 8 hospitals.

Statistical Methods

Because of the observational nature of the source data, propensity score matching was selected as the statistical technique for this analysis to reduce the impact of confounding factors in estimating the effects of the COVID-19 pandemic on the BPCIA model.^{6,7} Nearest neighbor and exact matching were used in the analysis to control for known potential confounding factors. After episodes were matched by propensity score methods, paired *t* test analyses were conducted between comparison groups for multiple outcome measures in parallel.⁸ The *P* value was adjusted using the Benjamini-Hochberg method to reduce the risk of false positives due to evaluating multiple outcomes.⁹ Significance was determined at an adjusted *P* value less than .05. R software version 4.0.4 (R Foundation for Statistical Computing) and the *rstatix*, *MatchIt*, *dplyr*, and *tidyr* packages were utilized for the statistical methods.

For the first analysis, episodes prior to and during the COVID-19 pandemic were exactly matched on the anchor admission's Medicare Severity Diagnosis Related Group (MS-DRG) for sepsis (MS-DRGs 870-872) and pneumonia (MS-DRGs 177-179 and 193-195), beneficiary age category (< 65, 65-74, 75-84, ≥ 85 years), Hierarchical Condition Category (HCC) frequency grouping (0, 1-3, 4-6, ≥ 7), and episode calendar quarter for the episode's anchor discharge date. Episode calendar quarter was included in the analyses to control for seasonal trends affecting health care utilization. The age categories reflect ranges that CMS applies in the BPCIA model. HCCs for all episodes included in this study were provided by CMS through the BPCIA participant data and were calculated using version 22 of the CMS Medicare Advantage Risk Adjustment software. Furthermore, a look-back period of 90 days before the BPCIA episode was utilized for determining relevant HCCs. The analysis also adjusted for anchor hospital and missing claims status. Missing claims status indicated episodes where claims were suppressed by CMS due to mental health or substance use disorder diagnoses, which can affect setting-specific outcomes. This same methodology was also applied to non-COVID-19 and COVID-19 episodes occurring during the pandemic for patients with sepsis or pneumonia. HCC matching for the second analysis was based on the identified COVID-19 cases, making the HCC count understandably higher, as patients with several comorbidities are more susceptible to COVID-19.

TABLE 1. Analysis 1: Propensity Score-Matched Population Characteristics for Patients Without COVID-19 Prior to and During the Pandemic

Comparison of non-COVID-19 patients with sepsis prior to and during the pandemic*		
Category	Prepandemic	During pandemic
Episode count	1092	1092
Mean age in years	75.4	75.4
Septicemia or severe sepsis with mechanical ventilation > 96 hours (MS-DRG 870)	2.01%	2.01%
Septicemia or severe sepsis without mechanical ventilation > 96 hours (MS-DRG 871)	73.26%	73.26%
Septicemia or severe sepsis without mechanical ventilation > 96 hours; without MCC (MS-DRG 872)	24.73%	24.73%
Hospital A	8.15%	8.61%
Hospital B	6.51%	6.96%
Hospital C	10.07%	9.62%
Hospital D	9.34%	7.51%
Hospital E	20.33%	24.63%
Hospital F	22.53%	16.94%
Hospital G	11.90%	14.93%
Hospital H	11.26%	10.81%
HCC: 0	14.29%	14.29%
HCC: 1-3	42.67%	42.67%
HCC: 4-6	26.56%	26.56%
HCC: ≥ 7	16.48%	16.48%
Missing claims	12.73%	12.91%

HCC, Hierarchical Condition Category; MCC, major complication or comorbidity; MS-DRG, Medicare Severity Diagnosis Related Group.

*Episode payments are excluded for the prepandemic and during-pandemic non-COVID-19 episodes for sepsis, as Bundled Payments for Care Improvement Advanced payment methodology was changed by CMS between these 2 time periods. Payment methodology for the prepandemic period excluded Part B drugs, making an episode payment comparison inappropriate between these 2 time periods.

RESULTS

For the first analysis, there were 1092 non-COVID-19 sepsis episodes included in the data, which were matched to the same number of sepsis episodes prior to the pandemic (Table 1). For the second analysis, there were 640 sepsis and pneumonia episodes in the data for patients with a COVID-19 diagnosis, which were matched to the same number of non-COVID-19 sepsis and pneumonia episodes during the pandemic (Table 2). In both analyses, the mean age of all patients was 75 years. There were no significant differences between the treatment and control groups within each analysis. Additionally, the percentage of each patient population at each hospital and the percentage of each MS-DRG were equivalent across each population included in each analysis.

For the first analysis comparing non-COVID-19 patients with sepsis prior to and during the pandemic, most health care utilization declined during the pandemic. The most significant decrease

TABLE 2. Analysis 2: Propensity Score–Matched Population Characteristics for Patients Without and With COVID-19 During the Pandemic

Comparison of patients without vs with COVID-19 with sepsis and pneumonia during the pandemic		
Category	Patients without COVID-19	Patients with COVID-19
Episode count	640	640
Mean age in years	75.3	75.8
Episode payment	\$31,510.01	\$38,231.81
Respiratory infections and inflammations with MCC (MS-DRG 177)	7.03%	7.03%
Respiratory infections and inflammations with CC (MS-DRG 178)	1.25%	1.25%
Respiratory infections and inflammations without CC/MCC (MS-DRG 179)	0.16%	0.16%
Simple pneumonia and pleurisy with MCC (MS-DRG 193)	2.5%	2.5%
Simple pneumonia and pleurisy with CC (MS-DRG 194)	0.78%	0.78%
Septicemia or severe sepsis with mechanical ventilation > 96 hours (MS-DRG 870)	4.38%	4.38%
Septicemia or severe sepsis without mechanical ventilation > 96 hours (MS-DRG 871)	79.38%	79.38%
Septicemia or severe sepsis without mechanical ventilation > 96 hours; without MCC (MS-DRG 872)	4.53%	4.53%
Hospital A	9.69%	7.03%
Hospital B	10.94%	9.38%
Hospital C	13.91%	16.56%
Hospital D	11.25%	11.72%
Hospital E	15.00%	14.22%
Hospital F	17.34%	18.75%
Hospital G	13.12%	12.97%
Hospital H	8.75%	9.38%
HCC: 0	11.72%	11.72%
HCC: 1-3	25.31%	25.31%
HCC: 4-6	21.25%	21.25%
HCC: ≥7	41.72%	41.72%
Missing claims	15.78%	15.78%

CC, complication or comorbidity; HCC, Hierarchical Condition Category; MCC, major complication or comorbidity; MS-DRG, Medicare Severity Diagnosis Related Group.

was in SNF utilization, with a 37% decline in the proportion of patients using an SNF from 35% prepandemic to 22% during the pandemic (Figure 1). Among patients who used an SNF, the mean length of stay (LOS) decreased by 40% during the pandemic, from 10 to 6 days. Additionally, although not significant, increases in the mean age of patients utilizing a SNF increased by approximately

2 years during the pandemic period to 79 years. In addition to the reductions in SNF utilization, there were also significant decreases in readmission rates, readmission mean LOS, and LTCH utilization. The readmission rate decreased from 42% to 34%, whereas the readmission mean LOS decreased from 3 days to 2 days during the pandemic. Additionally, LTCH utilization declined to zero, but this was a minimal change relative to the prepandemic utilization rate of less than 1%.

In contrast, hospice utilization increased for patients with sepsis during the pandemic, as did the mortality rate. Hospice utilization increased by 26%, from 19% to 24%. The mortality rate was approximately 38% higher for patients with sepsis during the pandemic, increasing from 21% to 29%.

For the second analysis, comparing non-COVID-19 and COVID-19 patients with sepsis or pneumonia during the pandemic, increases in utilization and payments were observed across multiple settings (Figure 2). Overall episode payments increased by 21% for patients with COVID-19, from \$31,510 for patients without COVID-19 to \$38,232 for patients with COVID-19. With regard to SNFs, payments increased by 132%, from \$4089 for patients without COVID-19 to \$9483 for patients with COVID-19; mean LOS increased from 6.5 days to 15 days; and utilization increased 65% from 26% to 43%. Furthermore, the change in readmission payments increased by 36%, from \$4622 to \$6309, and mean LOS increased from 2.5 to 4 days.

Conversely, highly significant decreases in home health utilization and payments were also observed. Home health payments decreased by 47% from \$1482 to \$792, mean visits decreased from 6.5 to 3.5 days, and utilization also decreased by 38% from 40% to 25%. All lower rates and payments observed for home health were associated with patients with a COVID-19 diagnosis.

DISCUSSION

This analysis demonstrated changes in care patterns as a result of the pandemic, which mirrored the accounts relayed from clinicians working on the front line. The most significant findings from the first analysis showed that the decline in SNF utilization for non-COVID-19 patients with sepsis during the pandemic corresponded with the increase in the mortality rate. The second analysis found that, during the pandemic, COVID-19 patients with sepsis or pneumonia had higher costs and utilization than those without COVID-19, driven by higher rates of readmission and SNF care. Taken together, these analyses illustrate reports from the front line about the massive deployment of inpatient and SNF resources to address the needs of patients with COVID-19, whereas those without COVID-19 received fewer high-acuity resources than they would have prior to the pandemic.

The 38% increase in the mortality rate for the first analysis can be explained by several factors. First, in the beginning of the pandemic, many non-COVID-19 patients with both acute and chronic health conditions delayed necessary care because of a fear of contracting COVID-19. In many cases, this led to worsening outcomes, as studies

demonstrate that increased mortality is a common trend when care is delayed.¹⁰⁻¹² This trend may also account for the 26% increase in hospice use that was seen in the first analysis, as chronic and acute conditions were exacerbated by care avoidance.

Although some patients did seek care, many staff and resources had been reallocated to the front line, making it more difficult to treat the normal volume of patients in addition to those seeking care for COVID-19. The decline in SNF utilization for patients without COVID-19 during the pandemic demonstrates that more patients were sent home, likely to avoid exposure to COVID-19 and to reduce the volume of lower-acuity patients. Those patients who did receive SNF care were discharged sooner, as shown by the 40% decline in mean LOS.

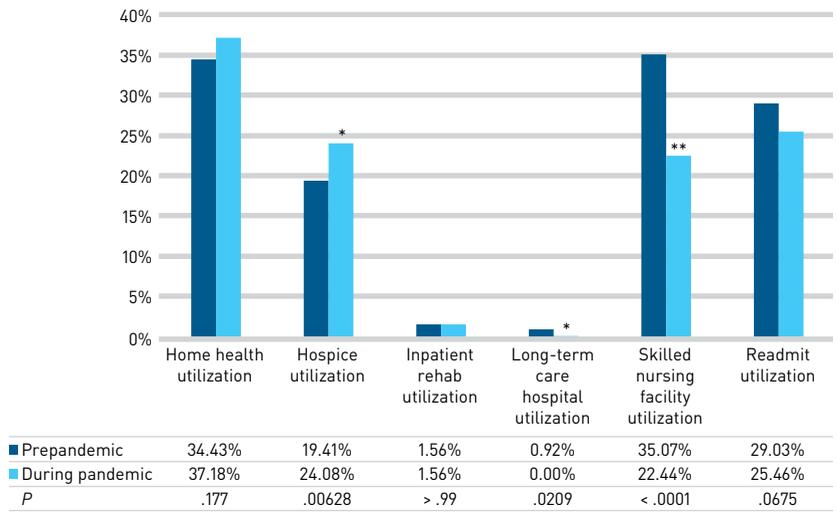
With the influx of COVID-19 cases inundating hospitals nationwide, stabilized patients with COVID-19 were moved out of hospitals to SNFs and other high-acuity postacute care facilities, where they would still receive monitored care.¹³ This trend was evident in the second analysis, which found a significant increase in SNF cost and utilization for patients with COVID-19, as well as higher total costs, compared with the matched cohort of patients without COVID-19. In contrast, home health utilization and cost declined for patients with COVID-19 while increasing for those without COVID-19. This may have been the result of home health workers being unable to care for patients with COVID-19 in their homes, given the high level of personal protective equipment shortages and overall lack of policies implemented to assist home health workers.¹⁴ However, in other studies, overall decreases in home health were observed, regardless of a positive or negative COVID-19 diagnosis.¹⁵ More research on home health visit rates, utilization, and payments would be needed to better understand the associations that occurred.

Limitations

Findings of this analysis should be interpreted with consideration for the following limitations. Pneumonia data could not be included in the first analysis, as BPCIA participation in this episode was limited to 1 hospital system in the period preceding the pandemic and, therefore, the analysis focused solely on sepsis episodes. However, both sepsis and pneumonia were included in the second analysis, as multiple health systems participated in 2020. Cost was also eliminated from the first analysis, due to changes in the BPCIA

methodology, which made it unfeasible to compare the prepandemic and during-pandemic periods in terms of expenditure. A further limitation of the analysis was that Medicare data provided through BPCIA suppress mental health and substance use disorder data, making the cost and utilization information partially incomplete. Furthermore, results may not be generalizable due to location bias. An additional limitation includes the fact that a COVID-19 diagnosis at any point in the 90-day episode would trigger the COVID-19 flag in BPCIA. Therefore, patients with COVID-19 are not all identified during the inpatient stay and may in fact not have had COVID-19 until later in the 90-day episode, limiting the generalizability. Lastly, HCC matching may not fully reflect the current condition of the

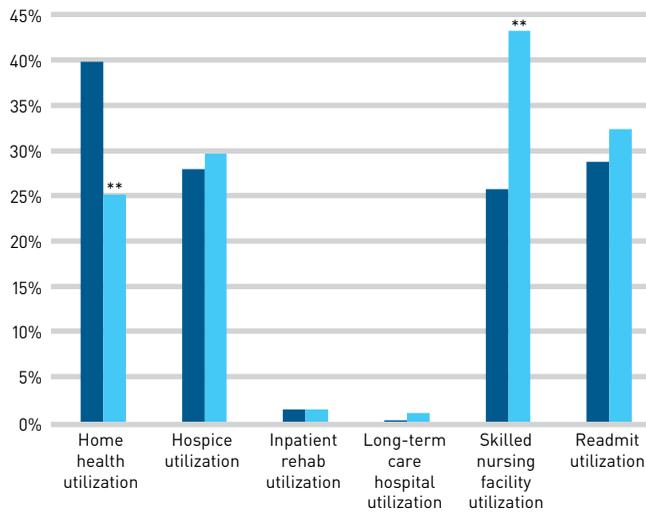
FIGURE 1. Analysis 1 Results: Comparative Utilization for Non-COVID-19 Patients With Sepsis Prior to and During the Pandemic



Category	Prepandemic	During pandemic	P
Episode count	1092	1092	
Mortality rate	20.60%	29.30%	<.0001
Home health mean visits	5.76	5.35	.34
Home health utilization	34.43%	37.18%	.177
Hospice mean LOS	4.37	4.62	.711
Hospice utilization	19.41%	24.08%	.00628
Inpatient rehab mean LOS	0.29	0.25	.71
Inpatient rehab utilization	1.56%	1.56%	>.99
Long-term care hospital mean LOS	0.30	0.07	.0577
Long-term care hospital utilization	0.92%	0.00%	.0209
Skilled nursing facility mean LOS	10.18	5.75	<.0001
Skilled nursing facility utilization	35.07%	22.44%	<.0001
Readmit mean LOS	2.85	2.14	.00575
Readmit rate	41.58%	33.79%	.0159
Readmit utilization	29.03%	25.46%	.0675

*P < .05; **P < .0001.
LOS, length of stay.

FIGURE 2. Analysis 2 Results: Comparative Cost and Utilization for COVID-19 vs Non-COVID-19 Patients With Sepsis or Pneumonia During the Pandemic



	Home health utilization	Hospice utilization	Inpatient rehab utilization	Long-term care hospital utilization	Skilled nursing facility utilization	Readmit utilization
■ Non-COVID-19 patients	39.8%	28.0%	1.4%	0.2%	25.8%	28.8%
■ COVID-19 patients	25.2%	29.7%	1.4%	0.9%	43.3%	32.3%
P	< .0001	.472	> .99	.0587	< .0001	.153

Category	Non-COVID-19 patients	COVID-19 patients	P
Episode count	640	640	
Mortality rate	33.3%	35.8%	.263
Episode payment	\$31,510	\$38,232	<.0001
Home health mean visits	6.6	3.54	<.0001
Home health mean payments	\$1482	\$792	<.0001
Home health utilization	39.8%	25.2%	<.0001
Hospice mean LOS	5.4	5.2	.827
Hospice mean payments	\$1286	\$1377	.611
Hospice utilization	28.0%	29.7%	.472
Inpatient rehab mean LOS	0.2	0.3	.665
Inpatient rehab mean payment	\$340	\$439	.73
Inpatient rehab utilization	1.4%	1.4%	>.99
Long-term care hospital mean LOS	0.1	0.2	.182
Long-term care hospital payment	\$122	\$390	.223
Long-term care hospital utilization	0.2%	0.9%	.0587
Skilled nursing facility mean LOS	6.6	15.4	<.0001
Skilled nursing facility mean payment	\$4089	\$9482	<.0001
Skilled nursing facility utilization	25.8%	43.3%	<.0001
Readmit mean payment	\$4622	\$6309	.00898
Readmit rate	38.1%	47.5%	.0263
Readmit utilization	28.8%	32.3%	.153
Readmit mean LOS	2.6	4.2	.00013

**P < .0001.
LOS, mean length of stay.

patient, as many patients chose to forgo or delay care during the pandemic, resulting in them presenting as sicker when seen.

CONCLUSIONS

Since March 2020, the COVID-19 pandemic has had a significant impact on care patterns for patients both with and without COVID-19 nationwide, as well as on the clinicians caring for these patients. Clinicians have needed to shift their focus to managing the pandemic by providing care for patients with COVID-19, which has created limitations on accessibility for patients without COVID-19. Additionally, the change in risk tolerance, and the subsequent avoidance of care for patients, also contributed significantly to the changes in cost and service utilization observed in these analyses. Although the pandemic has now entered a new stage, this analysis identifies key trends that resulted from surges of patients with COVID-19, which are critical to understand as hospitals seek to maintain high quality of care for all patients during resurgences, as well as areas of focus for future pandemic preparedness. ■

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REFERENCES

1. Preliminary Medicare COVID-19 data snapshot. CMS. Updated March 29, 2022. Accessed February 15, 2022. <https://www.cms.gov/research-statistics-data-systems/preliminary-medicare-covid-19-data-snapshot>
2. COVID-NET laboratory confirmed COVID-19 hospitalizations. CDC. Accessed February 15, 2022. <https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalization-network>
3. Medicare Current Beneficiary Survey Fall 2020 COVID-19 data snapshot. CMS. Updated November 5, 2021. Accessed February 15, 2022. <https://www.cms.gov/medicare-current-beneficiary-survey-fall-2020-covid-19-data-snapshot>
4. Umlauf T, Ulick J. Old U.S. Covid-19 hot spots are the new hot spots. *Wall Street Journal*. April 21, 2021. Accessed February 15, 2022. <https://www.wsj.com/articles/old-u-s-covid-19-hot-spots-are-the-new-hot-spots-11618937100>
5. Blumenthal D, Fowler E, Abrams M, Collins S. Covid-19—implications for the health care system. *N Engl J Med*. 2020;383(15):1483-1488. doi:10.1056/NEJMs2021088

6. Rosenbaum P, Ruben D. The central role of the propensity score in observational studies for causal effects. *Biometrika*. 1983;70(1):41-55. doi:10.1093/biomet/70.1.41
7. Ho D, Imai K, King G, Stuart E. Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Polit Anal*. 2007;15(3):199-236. doi:10.1093/pan/mpi013
8. Austin PC. Comparing paired vs non-paired statistical methods of analyses when making inference about absolute risk reduction in propensity score matched samples. *Stat Med*. 2011;30(11):1292-1301. doi:10.1002/sim.4200
9. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc Series B Stat Methodol*. 1995;57(1):289-300. doi:10.1111/j.2517-6161.1995.tb02031.x
10. Czeisler MÉ, Marynak K, Clarke KEN, et al. Delay or avoidance of medical care because of COVID-19–related concerns — United States, June 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(36):1250-1257. doi:10.15585/mmwr.mm6936a4
11. Barach P, Fisher SD, Adams MJ, et al. Disruption of healthcare: will the COVID pandemic worsen non-COVID outcomes and disease outbreaks? *Prog Pediatr Cardiol*. 2020;59:101254. doi:10.1016/j.ppedcard.2020.101254
12. Excess deaths associated with COVID-19. CDC. Updated February 1, 2023. Accessed February 15, 2022. https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm
13. Goldstein BA, Cerullo M, Krishnamoorthy V. Development and performance of a clinical decision support tool to inform resource utilization for elective operations. *JAMA Netw Open*. 2020;3(11):e2023547. doi:10.1001/jamanetworkopen.2020.23547
14. Sterling MR, Tseng E, Poon A, et al. Experiences of home health care workers in New York City during the coronavirus disease 2019 pandemic: a qualitative analysis. *JAMA Intern Med*. 2020;180(11):1453-1459. doi:10.1001/jamainternmed.2020.3930
15. Shang J, Chastain A, Perera UGE, et al. COVID-19 preparedness in US home health care agencies. *J Am Med Dir Assoc*. 2020;21(7):924-927. doi:10.1016/j.jamda.2020.06.002

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