

Steep but Short: COVID-19 Pandemic-Related Spending Drop for Medicare Beneficiaries with Chronic Conditions



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After a steep drop early in the COVID-19 pandemic, spending rebounded to pre-pandemic levels by the end of 2020 for most Medicare fee-for-service beneficiaries aged 65 and older with hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease, according to a new American Institutes for Research (AIR) study using Medicare claims data (see Methods on page 12). The five chronic conditions are a subset of prevalent ambulatory care sensitive conditions (ACSCs)—or conditions where hospitalizations generally can be avoided if patients receive effective primary care. Care disruptions—like those early in the pandemic—can be particularly harmful if people with ACSCs must delay or go without care.

Overall, average spending for both ambulatory and inpatient services for Medicare beneficiaries with ACSCs nearly returned to pre-pandemic levels by the end of 2020. Ambulatory spending for Black and Hispanic beneficiaries with ACSCs did not rebound as quickly as other racial and ethnic groups, after the 2020 second quarter low point, indicating they experienced more sustained care disruptions and a slower return to pre-pandemic spending levels.

Although spending patterns differed by both race and sex, the starkest difference was between beneficiaries with and without a COVID-19 diagnosis during the study period. Beneficiaries diagnosed with COVID-19 saw no change in ambulatory spending and, unsurprisingly, a significant increase in inpatient spending, whereas those without a COVID-19 diagnosis experienced significant decreases in both ambulatory and inpatient spending. Although the findings indicate care disruptions related to COVID-19 were short-lived, continued monitoring of longer-term pandemic impacts on spending can help policymakers better prepare for public health emergencies.

Key Findings

- Spending for ambulatory and inpatient care dropped precipitously in 2020 Q2 for Medicare beneficiaries aged 65 and older with ACSCs but largely rebounded to pre-pandemic levels by the end of 2020, indicating the pandemic caused a large but short-lived disruption to care.
- Ambulatory and inpatient visit rates decreased early in the pandemic, with ambulatory visit rates returning to pre-pandemic levels within a year, but inpatient visit rates remaining below pre-pandemic levels through 2021.
- Ambulatory spending for Black and Hispanic beneficiaries with ACSCs did not rebound as quickly as other racial and ethnic groups, suggesting they had more sustained care disruptions and a slower recovery from pandemic impacts.
- Beneficiaries diagnosed with COVID-19 experienced no change in ambulatory spending and a significant increase in inpatient spending, whereas those without a COVID-19 diagnosis saw decreased ambulatory and inpatient spending.

COVID-19 and Care Disruptions

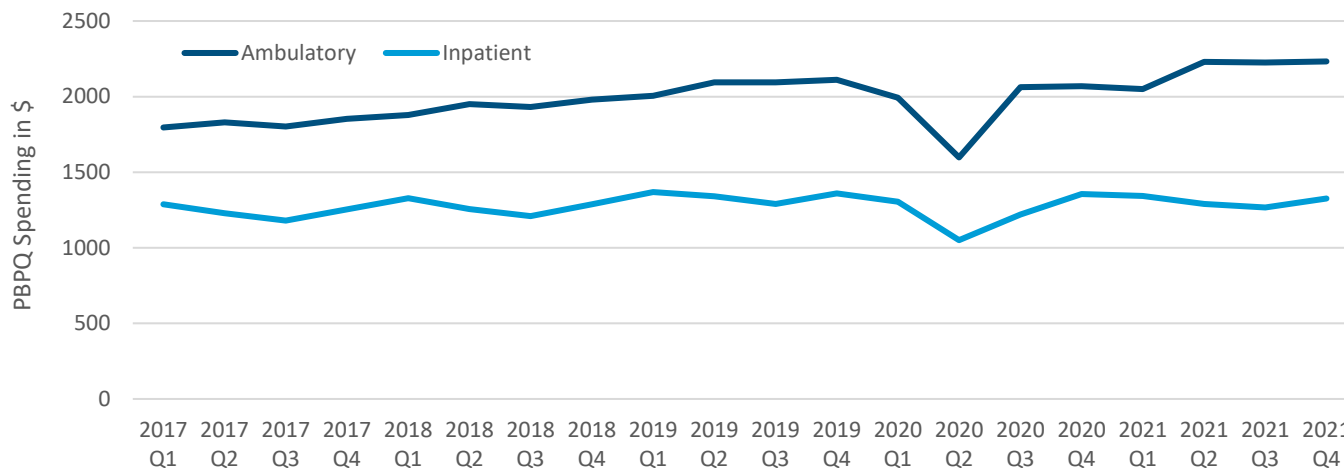
The pandemic has placed unprecedented strains on the U.S. health care system, contributing to significant disruptions of care, including missed follow-up care for patients, decreased medication adherence,¹ delayed appointments,² and intentional avoidance or delaying of care.³ This study examined how spending

for different categories of Medicare services—inpatient, hospital outpatient, and professional providers, including physicians, physician assistants, clinical social workers, and nurse practitioners—changed from the start of the pandemic through the end of 2021.ⁱ For ease of reference, the term ambulatory care is used throughout to refer to services provided in hospital outpatient settings or by professional providers. Although previous studies have examined health care spending in early 2020,⁴ this study utilized Medicare Parts A and B fee-for-service claims data through 2021, enabling a longer examination of spending patterns. Additionally, the study focused on beneficiaries with ACSCs because care disruptions are likely to have a larger impact on these beneficiaries relative to other Medicare beneficiaries.⁵ The analysis also explored changes in spending by beneficiary characteristics, including COVID-19 diagnosis status, to help identify population groups most affected by care disruptions.

Ambulatory and Inpatient Spending Drop: Short but Significant

Average per-beneficiary, per-quarter (PBPQ) ambulatory spending for Medicare beneficiaries with ACSCs declined 20 percent (\$394 PBPQ) from 2020 Q1 to Q2—followed by a 29 percent (\$466 PBPQ) rebound between 2020 Q2 and Q3 (Exhibit 1). During the same time, inpatient spending for Medicare beneficiaries with ACSCs declined 19 percent (\$253 PBPQ) and then increased 16 percent (\$169 PBPQ); inpatient spending continued to increase 11 percent (\$136 PBPQ) from 2020 Q3 to Q4. These findings show that disruption of care delivery for beneficiaries with prevalent ACSCs was significant but short-lived, with overall ambulatory and inpatient spending returning to pre-pandemic levels by the end of 2020.

Exhibit 1. Average Per-Beneficiary, Per-Quarter Medicare Spending for Ambulatory and Inpatient Services for Beneficiaries with a Select Ambulatory Care Sensitive Condition, 2017–2021



Note: Average PBPQ spending for beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

ⁱ Spending pertaining to a more specific subset of users such as Skilled Nursing Facilities (SNF), Home Health, and Hospice spending was not included in this analysis. We plan to analyze SNF spending in a future issue brief.

A Closer Analysis of Inpatient and Ambulatory Care Trends

The study used interrupted time series (ITS) analysis to estimate changes in Medicare utilization and spending trends affected by COVID-19. Using ITS analysis, researchers can estimate population-level effects of an interruption—in this case, the pandemic—when no appropriate comparison group exists—since everyone was affected by COVID-19. The method assumes that any unmeasured time-varying confounder is changing relatively slowly and is much smaller than the sharp change caused by a shock like the pandemic. By projecting the pre-pandemic trend into the post-interruption period as the counterfactual, researchers can estimate utilization and spending trends before and during the pandemic, examining changes in both the level and slope of the time series after the initial pandemic surge in the second quarter of 2020.⁶

How to Interpret ITS Graphs

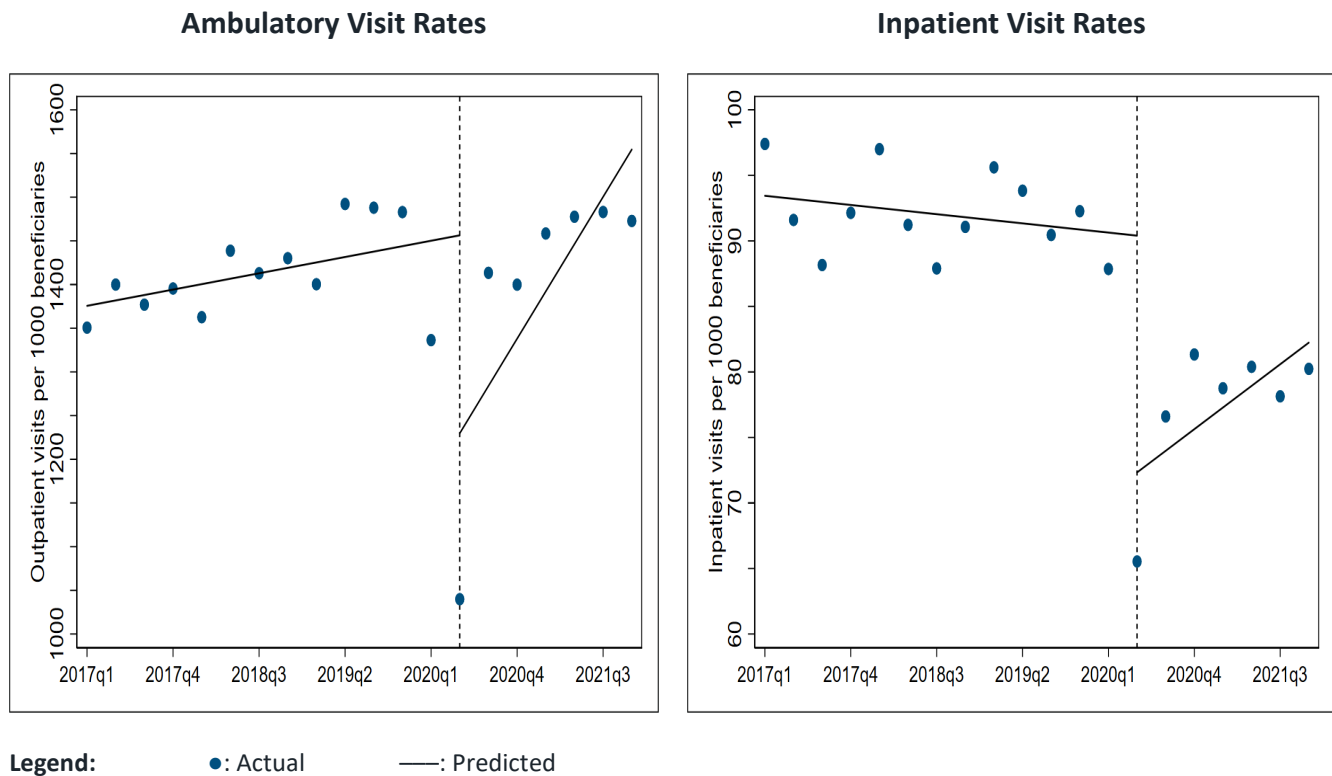
The immediate impact of COVID-19 on an outcome is represented by the difference between the intersection point of the pre-pandemic trend (2017 Q1–2020 Q1) and the dotted vertical line in relation to the intersection point of the pandemic trend (2020 Q2–2021 Q4) and the dotted vertical line. At the same time, the impact of COVID-19 on the growth rate of an outcome is represented by the difference in pre-pandemic and pandemic trend slopes (Exhibits 2–3, 6–8).

Inpatient and Ambulatory Care Responded Differently to the Pandemic

Because fee-for-service Medicare uses an administered pricing system with fixed payments for specific services adjusted annually and by wage and other geographic factors, price changes are unlikely to affect spending trends observed during the study period. Therefore, the sudden spending drop during the second quarter of 2020 is more likely a change in the amount of care used—the volume of visits or services—or the intensity of care—the shift from less expensive to more expensive services per visit—or a combination. To investigate which mechanism may be at play, the study estimated the change associated with the pandemic in terms of both visit rates and spending.

The pandemic was associated with a sharp decrease in ambulatory and inpatient visit rates. Ambulatory visit rates returned to pre-pandemic levels within a year, but inpatient visit rates, although increasing, remained below pre-pandemic levels at the end of 2021. Average quarterly ambulatory visits per 1,000 beneficiaries decreased by 227 visits in 2020 Q2, the first full quarter of the pandemic (16% relative to predicted, or counterfactual, visit trends). At the same time, average quarterly inpatient visits per 1,000 beneficiaries decreased by 18 visits (19% relative to predicted visit trends; Exhibit 2). Following 2020 Q2, both ambulatory and inpatient visit rates grew faster, increasing by 48 additional ambulatory visits per 1,000 beneficiaries each quarter and two additional inpatient visits per 1,000 beneficiaries each quarter. By the end of 2021, ambulatory visit rates for beneficiaries with an ACSC had returned to pre-pandemic levels, but inpatient visit rates remained well below pre-pandemic levels.

Exhibit 2. Ambulatory and Inpatient Visit Rates for Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition, 2017–2021

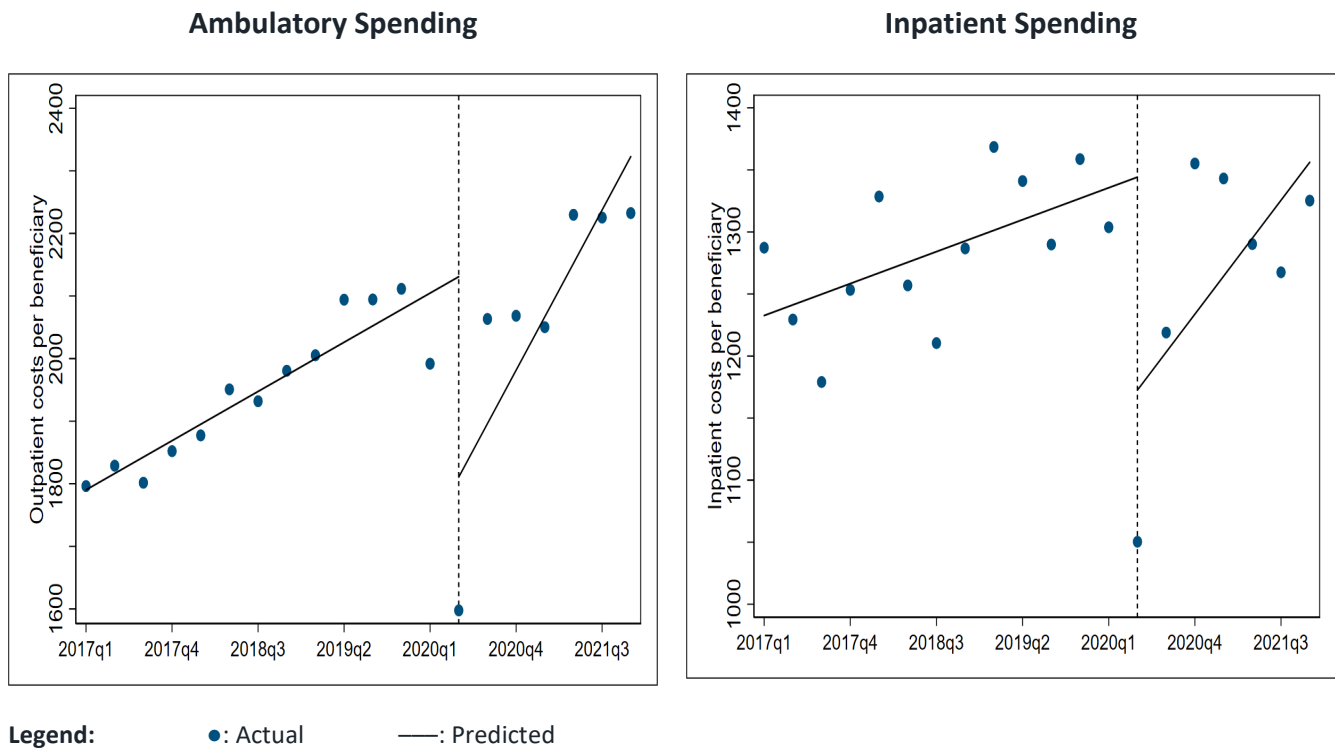


Note: Quarterly visits per 1,000 beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Spending followed a similar pattern, with the pandemic associated with a \$320 decrease in average PBPQ ambulatory care spending (15% drop relative to predicted spending trends) and a \$172 decrease in average PBPQ inpatient spending (13% drop relative to predicted spending trends; Exhibit 3). Although both ambulatory and inpatient PBPQ spending rebounded starting in 2020 Q3, only ambulatory spending showed a statistically significant change in the slope of the time trend. This finding suggests that ambulatory spending rebounded more quickly than inpatient spending, with each additional quarter after 2020 Q2 associated with an increase of \$59 PBPQ in ambulatory spending.

Exhibit 3. Average Per-Beneficiary, Per-Quarter Ambulatory and Inpatient Spending for Medicare Beneficiaries With a Select Ambulatory Care Sensitive Condition, 2017–2021



Note: Average PBPQ spending for beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease.

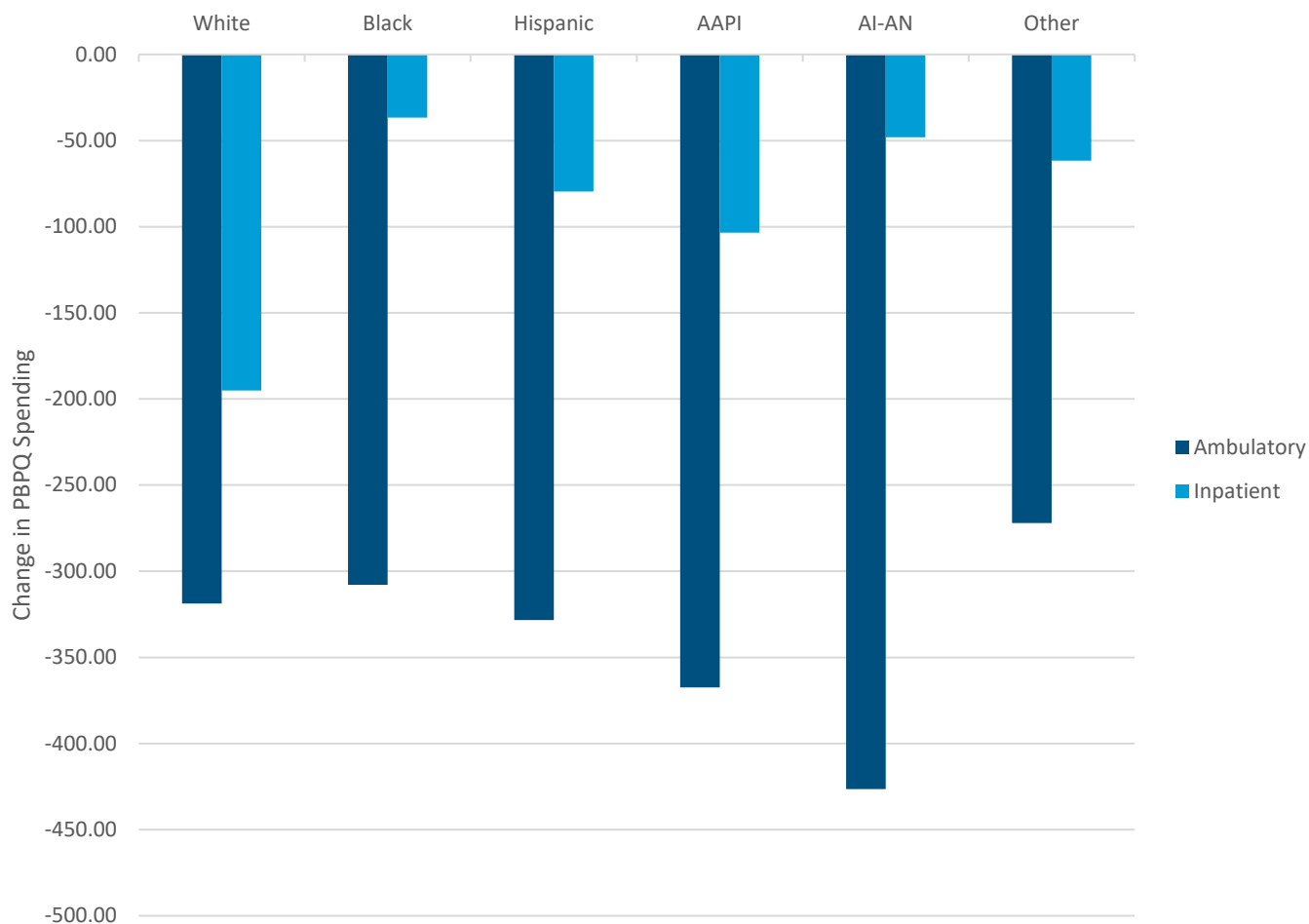
Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Pandemic Impact on Ambulatory and Inpatient Spending Varied by Beneficiary Characteristics

All racial/ethnic groups saw large and statistically significant decreases in PBPQ ambulatory spending associated with the COVID-19 pandemic (Exhibit 4). In rank order from the largest absolute decrease in ambulatory PBPQ spending to the smallest (values in parentheses are relative to the predicted 2020 Q2 values): American Indian–Alaska Native beneficiaries decreased \$426 PBPQ (18%), Asian/Pacific Islander beneficiaries decreased \$367 PBPQ (22%), Hispanic beneficiaries decreased \$328 PBPQ (16%), White beneficiaries decreased \$319 PBPQ (15%), Black beneficiaries decreased \$308 PBPQ (13%), and beneficiaries of other racial/ethnic groups decreased \$272 PBPQ (14%).

Only White beneficiaries experienced a statistically significant decrease in PBPQ inpatient spending (Exhibit 4). White beneficiaries experienced a decrease of \$195 in PBPQ inpatient spending (15% relative to the predicted Q2 2020 value). If inpatient spending had stayed the same, it might have been due to White beneficiaries successfully avoiding COVID-19, but a significant change here suggests a disruption to care, possibly related to decreased availability of services or a desire to avoid potential COVID-19 exposure.

Exhibit 4. Change in Average Per-Beneficiary, Per-Quarter Spending Associated with the Pandemic for Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition, by Race/Ethnicity



Note: The bars represent the average change in spending associated with the COVID-19 pandemic period derived from 12 separate ITS regressions; 1 regression per race/ethnicity group for ambulatory spending (6 total) and 1 regression per race/ethnicity group for inpatient spending (6 total). For beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease. Sample stratified by race/ethnicity: White, Black, Hispanic, Asian/Pacific Islander, American Indian–Alaska Native, and other.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

PBPQ ambulatory spending accelerated for most racial/ethnic groups following 2020 Q2, indicating spending quickly returning to pre-pandemic levels. However, Black and Hispanic beneficiaries did not see statistically significant increases in spending growth rates following Q2 2020 (Exhibit 5). The findings indicate that Black and Hispanic beneficiaries had more sustained care disruptions and a slower recovery after the 2020 Q2 low point, relative to beneficiaries in other racial/ethnic groups.

Exhibit 5. Change to Growth Rate of Per-Beneficiary, Per-Quarter Average Ambulatory Spending for Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition, by Race/Ethnicity,

Race/Ethnicity	White	Black	Hispanic	AAPI	AI-AN	Other
Change in Growth Rate of PBPQ Ambulatory Spending Following Pandemic Start (Q2 2020)	+\$63**	+\$28	+\$40	+\$62**	+\$70**	+\$61*

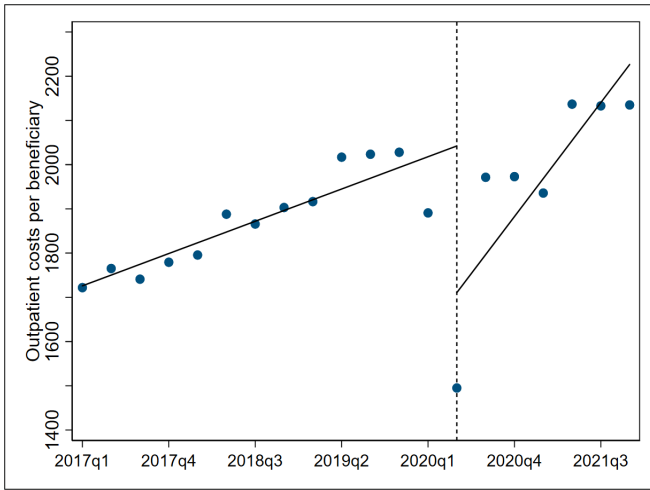
Note: Asterisks indicate statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Changes in growth rates represent the difference in pre-pandemic and pandemic trend slopes from derived from 6 separate ITS regressions; 1 regression per race/ethnicity group for ambulatory spending. For e.g., this means that average PBPQ ambulatory spending for White beneficiaries increased by \$63 for each additional quarter after Q2 2020. Black and Hispanic beneficiaries did not experience a statistically significant change in spending growth rate for PBPQ ambulatory spending. For beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease. Sample stratified by race/ethnicity: White, Black, Hispanic, Asian/Pacific Islander, American Indian–Alaska Native, and other.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

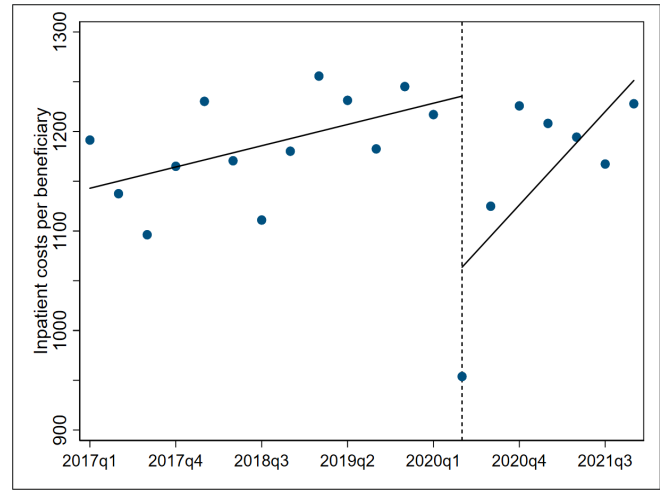
Despite male beneficiaries with ACSCs having higher average PBPQ spending for both ambulatory and inpatient care compared to female beneficiaries with ACSCs in the pre-pandemic period (2017 Q1–2020 Q1), female beneficiaries experienced larger declines in both ambulatory and inpatient PBPQ spending (Exhibits 6a and 6b). Relative to predicted 2020 Q2 values, PBPQ ambulatory spending declined \$332 (16%) for females and \$305 (14%) for males, whereas PBPQ inpatient spending declined \$172 (14%) for females and \$170 (11%) for males. Female beneficiaries also saw a greater increase in the pandemic spending trend for ambulatory care compared to male beneficiaries, suggesting that their ambulatory spending recovered more rapidly after the 2020 Q2 low point. Ambulatory spending growth per quarter was statistically significant and averaged \$62 for females and \$56 for males during the pandemic through the end of 2021. Neither sex saw a significant change in the growth rate for PBPQ inpatient spending after Q2 2020.

Exhibit 6a. Average Per-Beneficiary, Per-Quarter Ambulatory and Inpatient Spending for Female Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition, 2017–2021

Ambulatory Spending



Inpatient Spending



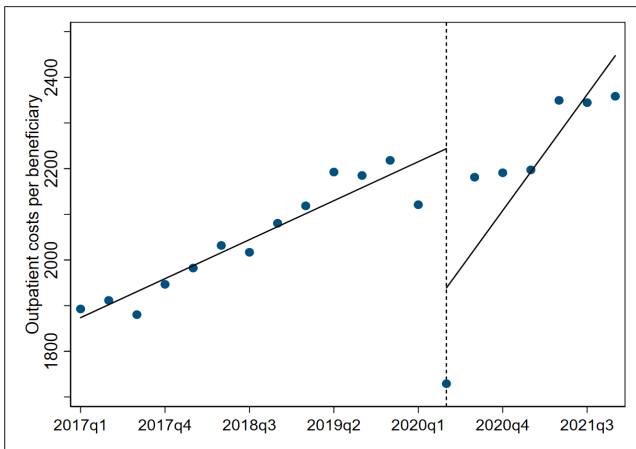
Legend: ●: Actual —: Predicted

Note: Average PBPQ spending for female beneficiaries aged 65 and older with one or more of the following: hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease.

Source: Medicare fee-or-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Exhibit 6b. Average Per-Beneficiary, Per-Quarter Ambulatory and Inpatient Spending for Male Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition, 2017–2021

Ambulatory Spending



Inpatient Spending



Legend: ●: Actual —: Predicted

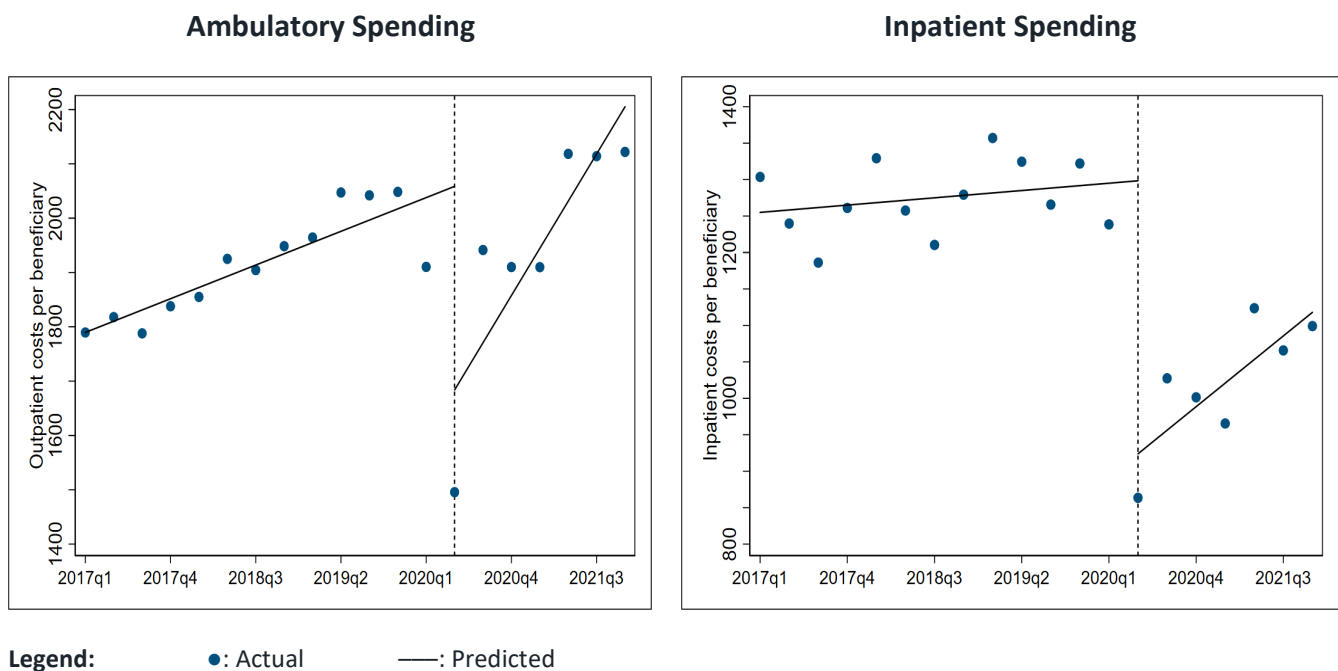
Note: Average PBPQ spending for male beneficiaries aged 65 and older with one or more of hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Pandemic Impact on Ambulatory and Inpatient Spending Moved in Opposite Directions for Beneficiaries with and Without COVID-19

Beneficiaries never diagnosed with COVID-19 during the study period experienced statistically significant declines in the levels and growth rates of both ambulatory and inpatient spending (Exhibit 7). Among beneficiaries never diagnosed with COVID-19, the pandemic was associated with a combined ambulatory and inpatient spending decrease of \$375 PBPQ in 2020 Q2. Relative to predicted pre-pandemic spending, these changes represented an 18 percent decrease for ambulatory spending and 30 percent decrease for inpatient spending. The growth rate for ambulatory spending increased more than twice as much compared to inpatient spending (an additional \$66 versus \$29 PBPQ each quarter) for beneficiaries never diagnosed with COVID-19 during the study period, indicating spending quickly rebounded to pre-pandemic levels.

Exhibit 7. Average Per-Beneficiary, Per-Quarter Ambulatory and Inpatient Spending for Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition Without a COVID-19 Diagnosis, 2017–2021

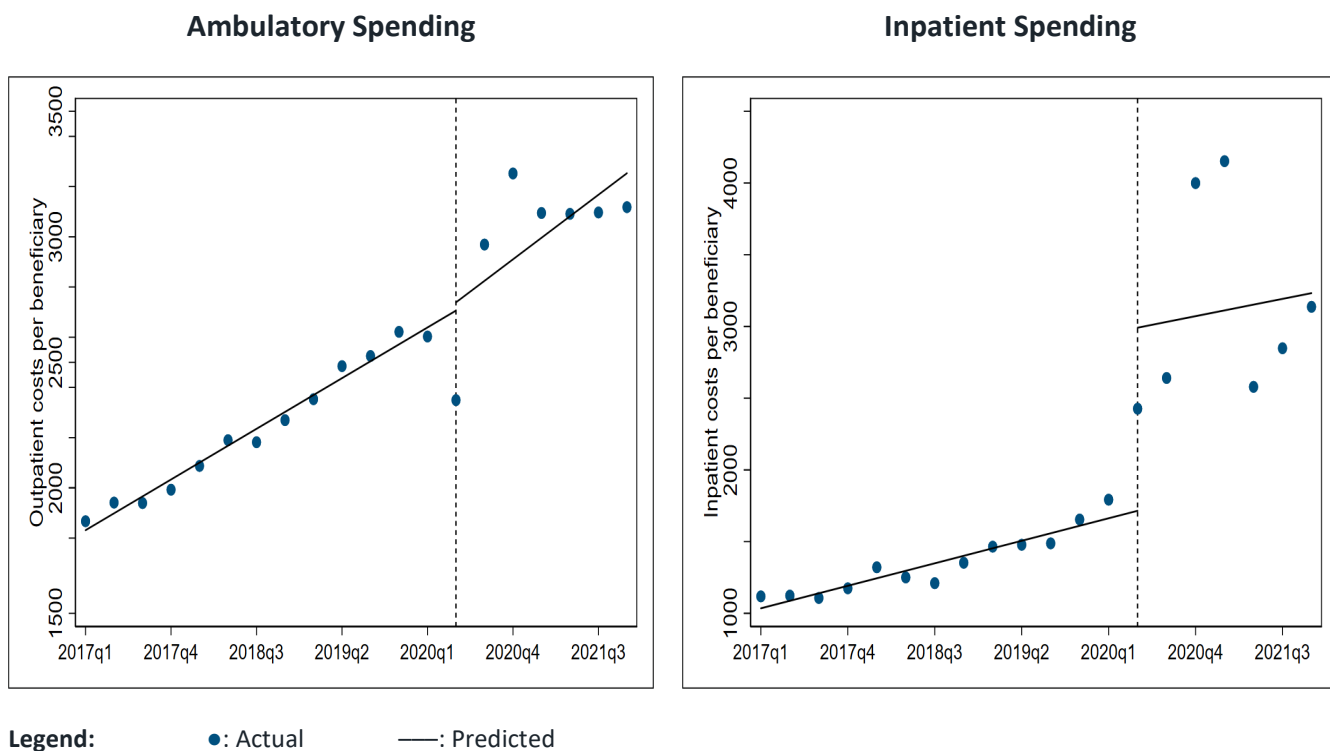


Note: Average PBPQ spending for beneficiaries aged 65 and older with one or more select ambulatory care sensitive conditions (hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease) and who were not diagnosed with COVID-19 during our study period.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Beneficiaries diagnosed with COVID-19 during the study period saw no statistically significant change in the level or growth rate of ambulatory spending related to the pandemic. In contrast, and unsurprisingly, average PBPQ inpatient spending for beneficiaries diagnosed with COVID-19 during the study period, increased \$1,276 PBPQ (74% increase relative to the predicted Q2 2020 value) (Exhibit 8). Neither ambulatory nor inpatient spending for these beneficiaries experienced a change in growth rate following the pandemic. The stratification of beneficiaries by COVID-19 diagnosis is limited by the fact, however, that there was significant underreporting and/or underdiagnosis of COVID-19, especially early in the pandemic. Nonetheless, the study found very different ambulatory and inpatient spending patterns when comparing beneficiaries with and without a COVID-19 diagnosis. The lack of change in ambulatory spending may be a result of beneficiaries diagnosed with COVID-19 not avoiding health care settings because they still needed care or because they were less worried about COVID-19 exposure. The increased inpatient spending seen among beneficiaries diagnosed with COVID-19 is likely a result of need for inpatient care related to COVID-19.

Exhibit 8. Average Per-Beneficiary, Per-Quarter Ambulatory and Inpatient Spending for Medicare Beneficiaries with a Select Ambulatory Care Sensitive Condition With a COVID-19 Diagnosis, 2017–2021



Note: Average PBPQ spending for beneficiaries aged 65 and older with one or more select ambulatory care sensitive conditions (hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease) and who were diagnosed with COVID-19 during our study period.

Source: Medicare fee-for-service claims for a 5 percent simple random sample of beneficiaries enrolled in Part A and Part B between 2017 Q1 and 2021 Q4 or until date of death.

Conclusions and Policy Implications

The study findings show that PBPQ spending for both ambulatory and inpatient services declined sharply early in the COVID-19 pandemic among Medicare fee-for-service beneficiaries aged 65 and older with one or more select ACSCs. However, the spending decline and associated care disruptions appeared to be relatively short-lived. Both ambulatory and inpatient spending increased steadily after the initial stage of the pandemic, returning almost to pre-pandemic levels by the end of 2020. These spending trend findings are consistent with an earlier AIR study examining Medicare service utilization.⁷

White beneficiaries were the only racial/ethnic group that experienced a statistically significant decrease in inpatient spending related to the pandemic, indicating they faced larger disruptions to inpatient care compared to other groups. At the same time, Black and Hispanic beneficiaries did not see ambulatory spending rebound as quickly as other groups, indicating their care was disrupted in a more sustained manner than observed in other populations—consistent with other findings that the pandemic negatively impacted Black and Hispanic communities more than other racial/ethnic groups.⁸ Compared to male beneficiaries, female beneficiaries with ACSCs experienced larger declines in both ambulatory and inpatient spending early in the pandemic but also faster recovery of ambulatory spending after the 2020 Q2 low point.

Beneficiaries without a COVID-19 diagnosis experienced decreases in both ambulatory and inpatient spending, whereas those diagnosed with COVID-19 saw no change in ambulatory spending and a large increase in inpatient spending. One possible explanation is that increased spending and utilization for COVID-19-related ambulatory and inpatient services for beneficiaries with COVID-19 offset these beneficiaries' reduced spending and utilization from pandemic-related care disruptions. In other words, these beneficiaries likely experienced a greater need for inpatient care as a result of COVID-19 but did not experience much care disruption in the ambulatory setting. The lack of disruption in ambulatory spending among beneficiaries who, at some point, were diagnosed with COVID-19 may be a result of beneficiaries who were less worried about COVID-19 exposure (before their diagnosis) or were unconcerned about reinfection (after their diagnosis). It is also possible that these beneficiaries were unable to avoid health care settings due to their existing medical needs. The much larger declines in ambulatory and inpatient spending for beneficiaries without a COVID-19 diagnosis may be explained by them avoiding interaction with the health care system to prevent infection. The analysis does not enable confirmation of which, if any, of these factors are responsible for the results but do suggest that more research into the role of individual behaviors in the face of a communicable disease outbreak can help policymakers understand how to more effectively deal with this pandemic and future outbreaks.

Although such a sudden decline in utilization and spending among beneficiaries with ACSCs is potentially concerning, evidence to date based on interrupted time series analysis is insufficient to conclude that care disruptions have led to negative downstream outcomes such as disease exacerbations or Medicare spending increases. Spending growth rates generally rebounded following the initial stage of the pandemic, but it is not yet clear if these trends are simply a reversion to pre-pandemic levels or a more lasting impact

of the pandemic. As more data become available, monitoring the potential impact of care disruptions and forgone care on longer term spending is important, especially among Medicare beneficiaries with ACSCs who are at higher risk of complications due to disruptions in care.

Moreover, the COVID-19 pandemic did not affect all regions similarly or at the same time, and state and local responses to the public health emergency varied greatly across geographic jurisdictions.⁹ For these reasons, future research focusing on regional analyses can perhaps provide a clearer picture of how the impact of COVID-19 and responses to the public health emergency varied across the United States.

METHODS

This analysis used fee-for-service claims data from a 5 percent simple random sample of Medicare beneficiaries who were enrolled in Medicare Part A and B for the entire study period between 2017 and 2021 or until date of death. The study sample included 1,248,982 Medicare beneficiaries aged 65 and older with at least one of five ACSCs—hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease. ACSCs were identified based on annual chronic condition flags in Medicare fee-for-service data between 2017 and 2019, before initial COVID-19 cases were detected in the United States. Beneficiary demographic information was based on the Master Beneficiary Summary File. The data were analyzed quarterly.

Interrupted Time Series Model

The interrupted time series (ITS) analyses estimate the changes in utilization and spending associated with the COVID-19 pandemic. The study included a variety of stratified samples to examine how the changes associated with COVID-19 differed by beneficiary characteristics. The ITS regression model has the following specification:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \epsilon_t$$

where Y_t is the outcome variable measured at quarter t , T_t is the number of quarters since the start of the study (in this case, number of quarters since Q1 2017), X_t is a binary variable indicating the COVID intervention (it is 0 for pre-pandemic quarters and is 1 for pandemic quarters). For estimated values, β_0 represents the intercept of starting level of the outcome variable, β_1 represents the slope or trajectory of the outcome variable until the introduction of the COVID intervention (i.e., the pre-pandemic slope), β_2 represents the change in the level of outcomes that occurs in the period immediately following the COVID intervention (i.e., the difference between the intersection point of the pre-pandemic trend and the dotted vertical line, and the intersection point of the pandemic trend and the dotted vertical line, seen in Exhibits 2-3 and 6a-8), β_3 represents the change in outcome growth rate (i.e., the difference between pre-pandemic slope and pandemic slope of the outcome).

Spending Calculations

The spending outcome variables represent the amount of payment due to the provider: the sum of the Medicare payment amount, the beneficiary payment amount, and the primary payer payment amount in the case of beneficiaries with employer coverage where Medicare is the secondary payer.

Endnotes

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