

CHAPTER 4

**Mandated report:
Relationship between
physician and other
health professional services
and other Medicare services**

Mandated report: Relationship between physician and other health professional services and other Medicare services

Chapter summary

Section 101(a)(3) of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) directs the Commission to submit a report to the Congress on the relationship between use of and expenditures for services provided by physicians and other health professionals (whom we refer to as “clinicians”) and total service use and expenditures under Part A, Part B, and Part D of Medicare. This study has two parts. One evaluates the relationship between beneficiaries’ use of and Medicare program spending on clinician services and all services covered under Part A and Part B of Medicare. The other part of the study assesses the relationship between beneficiaries’ use of and Medicare program spending on clinician services and use of and spending on prescription drugs (as measured by gross drug spending) covered under Medicare Part D. Because the legislation directs us to evaluate Medicare Part A, Part B, and Part D but not Part C (Medicare Advantage), we report on use and spending for the Medicare fee-for-service (FFS) population only.

A positive correlation between services provided by clinicians and all other Part A, Part B, and Part D services would suggest that the services may be complements (which means that, when considering two services, greater use of one service always correlates with greater use of the other service). Alternatively, clinician services and all other services covered under Part A, Part B, and Part D of Medicare may be substitutes if there is a negative correlation.

In this chapter

- Background
- Evaluating spending on and use of clinician services relative to all Part A and Part B services
- Relationship between use and spending for clinician services and Part D drugs
- Summary

We found that spending for clinician services as a share of spending for all Part A and Part B services did not change much from 2008 through 2013, indicating that spending for clinician services and for all Part A and Part B services grew at about the same rate. We caution against placing a great deal of meaning on this result, which is based on raw, unadjusted expenditures, because payment rates in the Medicare physician fee schedule were increased at a lower rate than the payment rates in other Medicare payment systems.

We assert that comparisons of service use are more meaningful than comparisons of spending when evaluating whether a given service is a complement to or a substitute for clinician services. Our assertion is based on the fact that unadjusted Medicare spending reflects various price and payment adjustments, which would distort the relationship that may exist between the use of clinician and other services.

We estimated per capita service use in 2008 and 2013 for geographic areas that are based on metropolitan statistical areas (MSAs). We estimated service use for each geographic area by adjusting Medicare program spending for regional differences in Medicare prices and for beneficiary differences in demographics and health status. Our analysis of service use found the following:

- In the aggregate, use of clinician services as a share of all Part A and Part B services increased from 24.4 percent in 2008 to 26.3 percent in 2013. We based use of clinician services on a variable that uses claims from Medicare carriers (contractors that process Medicare claims) and includes all clinician claims plus claims from other sources such as ambulatory surgical centers and ambulance providers. We estimate that claims for clinician services account for about 90 percent of the Medicare spending on all carrier claims.
- For each of the geographic areas in our analysis, we estimated the percentage change from 2008 to 2013 in per capita use of clinician services and per capita use of all Part A and Part B services. We found a moderately positive correlation between these two measures. However, when we removed clinician services from use of all Part A and Part B services, we found a weaker (almost neutral) relationship between percentage change in clinician services and percentage change in all other Part A and Part B services.
- Among geographic units in our analysis, there was a moderately positive correlation in 2013 between per capita use of clinician services and per capita use of all Part A and Part B services. However, we also found that the correlation between per capita use of clinician services and per capita use of all

Part A and Part B services with clinician services excluded was weak and not statistically significant. This finding implies that increasing clinician services had little or no effect on use of all other services.

In our assessment of use and spending from 2008 to 2013 for clinician services and Part D drugs, we found that Medicare spending on services covered under the physician fee schedule and on drugs covered under the Part D benefit grew at similar rates. However, because the two sectors use different payment methods, a similar growth in spending does not necessarily reflect comparable growth in service use.

For a subset of FFS beneficiaries who receive their drug coverage through the Part D program, we used a regression-based method to examine the relationship between the level of and growth in clinician service use and drug use (drug spending adjusted for regional variation in prices, demographic characteristics, and health status) across the MSA-based geographic areas.

Our analysis for the years 2008 and 2013 found weak to modest correlations between the clinician and Part D service use:

- In both years, clinician service use was positively correlated with drug use; that is, areas with high (or low) clinician service use tended to have high (or low) drug use.
- The change in clinician service use was negatively correlated with the area's change in drug use.

The estimated changes were generally small in magnitude and the regression models explained very little of the variation observed across geographic areas.

In summary, our findings suggest that clinician services and other services are neither clear complements nor substitutes. There are a few caveats in interpreting these findings. First, findings of correlation (or no correlation) of service use among different sectors do not prove or disprove causality. Second, our results are based on aggregate trends and do not represent any individual circumstances or specific geographic areas. An examination at a more disaggregated level may reveal different relationships from those observed at the aggregate level. ■

Section 101(a)(3) of the Medicare Access and CHIP Reauthorization Act of 2015

(3) MEDPAC REPORTS.—

(A) INITIAL REPORT.—Not later than July 1, 2017, the Medicare Payment Advisory Commission shall submit to Congress a report on the relationship between—

(i) physician and other health professional utilization and expenditures (and the rate of increase of such utilization and expenditures) of items and services for which payment is made under section 1848 of the Social Security Act (42 U.S.C. 1395w–4); and

(ii) total utilization and expenditures (and the rate of increase of such utilization and expenditures) under parts A, B, and D of title XVIII of such Act. Such report shall include a [method] to describe such relationship and the impact of changes in such physician and other health professional practice and service ordering patterns on total utilization and expenditures under parts A, B, and D of such title.

(B) FINAL REPORT.—Not later than July 1, 2021, the Medicare Payment Advisory Commission shall submit to Congress a report on the relationship described in subparagraph (A), including the results determined from applying the [method] included in the report submitted under such subparagraph. ■

Background

Section 101(a)(3) of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) directs the Commission to submit a report to the Congress on the relationship between beneficiary use of and Medicare spending on services provided by physicians and other health professionals and total service use and Medicare spending under Part A, Part B, and Part D of Medicare. MACRA directs the Commission to submit an initial report no later than July 1, 2017, and a final report no later than July 1, 2021 (see text box). In the interest of brevity, throughout this report, we use the term *clinicians* to mean physicians and other health professionals.

This chapter has two broad parts. The first assesses the relationship between beneficiaries' use of and Medicare spending on (1) clinician services and (2) all services covered by Part A and Part B of Medicare. The second part assesses the relationship between beneficiaries' use of and Medicare spending on (1) clinician services and (2) Part D drugs. Section 101(a)(3) of MACRA specifies that we evaluate Part A, Part B, and Part D of Medicare but not Part C (Medicare Advantage). Therefore, our analysis reports on service use and spending for the Medicare fee-for-service (FFS) population only.

Evaluating spending on and use of clinician services relative to all Part A and Part B services

Spending and service use are different measures. In this study, spending represents monetary outlays by the Medicare program. Service use reflects volume of services (how many) and the intensity of those services (long office visits have higher service use than short office visits). We derived service use by adjusting spending amounts for regional differences in the prices that Medicare sets for Part A and Part B services and for differences in demographics and health status among beneficiaries.

Data and methods

In our analysis of the relationship between Medicare spending on clinician services and on all Part A and Part B services, we used data from the Medicare Trustees' annual reports on the status of the Medicare program (Boards of Trustees 2014, Boards of Trustees 2013, Boards of Trustees 2004). We extracted data on the annual expenditures that Medicare made from 1993 through 2013 on clinician services and all services covered under Part A and Part B of Medicare for beneficiaries in FFS Medicare.

In our analysis of service use, we used beneficiary-level program spending in FFS Medicare from the Master

Beneficiary Summary Files (MBSFs) from 2008 and 2013 and claims data from the Medicare Provider and Review (MedPAR) files from 2008 and 2013. We analyzed these data at both the national level and at the level of geographic areas that are based on metropolitan statistical areas (MSAs). For beneficiaries residing in MSAs, the geographic areas we used in this study consisted of counties that are in the same state and same MSA. For beneficiaries not residing in MSAs, our geographic areas consisted of all of their state's counties not in MSAs. For example, the St. Louis, MO, MSA has 15 counties. Eight are in Illinois, and seven are in Missouri. The eight Illinois counties formed one of our geographic areas, and the seven Missouri counties formed another geographic area. The counties in Missouri that are not in an MSA formed a statewide, nonmetropolitan geographic area. In total, our study had 484 geographic areas.

We estimated service use at the national level and for each geographic area in both 2008 and 2013 by adjusting Medicare expenditures for geographic differences in wages and special payments to hospitals and clinicians. We also adjusted for differences in beneficiaries' demographics and health status.

We made these adjustments to the spending data to obtain estimated service use. Medicare pays different prices in different geographic locations to account for higher costs in one location compared with another. For example, wages for nurses are much higher in New York City than in Little Rock, AR. Also, Medicare makes special payments to hospitals and clinicians, such as payments for indirect graduate medical education, which are not evenly distributed across geographic areas. We made adjustments to remove the effects of these special payments across geographic areas. We also needed to adjust for differences in beneficiaries' demographics and health status so that service use reflected volume and intensity of services, not differences among beneficiaries themselves that can affect service use.

We transformed the Medicare expenditures into a measure of service use by removing the effects of:

- geographic differences in wages;
- additional payments to hospitals above the standard payment rates in the inpatient prospective payment system (IPPS), which include graduate medical education, indirect medical education, and disproportionate share payments;
- additional payments to clinicians above the standard rates in the physician fee schedule (PFS), which include primary care incentive payments, adjustments for having a system of electronic health records, and additional payments in health provider shortage areas; and
- additional payments to critical access hospitals that are above standard rates in the IPPS, the outpatient prospective payment system, and the skilled nursing facility payment system.

We also adjusted for demographics and health status. We conducted a beneficiary-level regression analysis using data for 100 percent of Medicare FFS beneficiaries to estimate service use for each geographic area in 2013. We used data from 2008 in the same regression-based approach to estimate service use for each geographic area in 2008. Our data from 2013 included about 37.7 million beneficiaries, and our data from 2008 included about 35.5 million beneficiaries. The regression-based method we used for this analysis is summarized in the text box about adjusting Part A and Part B spending data.

Relationship between spending on clinician services and spending on all Part A and Part B services

Data from the Medicare Trustees' annual reports indicate that the share of Medicare spending on all Part A and Part B services in FFS Medicare that was attributable to clinician services has fluctuated over the 1993 through 2013 period (Table 4-1, p. 146). Two important facts are that (1) the clinician share of total expenditures for Part A and Part B services was about 19.1 percent in both 1993 and 2013 and (2) there was only a small change in the clinicians' share of the total from 19.3 percent in 2008 to 19.1 percent 2013.

We caution against placing a great deal of meaning on the results that are based on raw, unadjusted expenditures. In particular, Medicare uses different methods for annually updating the payment rates in different health care sectors. For example, payment rates in the PFS had very small updates over the 2008 through 2013 period relative to the other sectors such as hospital outpatient services. The relatively small updates that have occurred in the PFS mitigate the share of total Medicare expenditures that is attributable to clinician services simply because prices rose more slowly for clinician services than for other services. For example, if payment rates in the PFS had been updated over the 2008 through 2013 period at the same rate as

Adjusting Part A and Part B spending data to measure Part A and Part B service use

We used the same method to estimate use of Part A and Part B services in both 2008 and 2013 for the geographic areas in our analysis. To obtain these estimates, we used data from the Master Beneficiary Summary Files (MBSFs) and, for hospital inpatient services, the Medicare Provider Analysis and Review (MedPAR) file. We developed geographic areas based on metropolitan statistical areas (MSAs) of the core-based statistical area definitions. For each state, we collected counties that are in the same MSA into a geographic area. For MSAs that cross state borders, we created geographic areas that included only the portion of the MSA in each state. For example, the Minneapolis–Saint Paul MSA consists of 16 counties in Minnesota and 4 counties in Wisconsin. We created one geographic area for the 16 Minnesota counties and a separate geographic area for the 4 Wisconsin counties. Finally, within each state, we collected all of the counties that were not in an MSA into a single statewide, non-MSA geographic area. The result was 484 geographic areas.

We used the MBSF data to determine Medicare expenditures in six health care sectors: hospital outpatient, skilled-nursing facility, home health, durable medical equipment, hospice, and clinician services. Our computation of Medicare program spending did not include beneficiaries' payments for cost sharing. We tracked the data to each beneficiary's area of residence, not to where the services were provided.

For all services other than hospital inpatient care, we obtained beneficiary-level spending data from the MBSFs for both 2008 and 2013. We adjusted the spending data in the MBSFs for geographic differences in regional prices, including geographic practice cost indexes (GPCIs) for clinicians and hospital wage indexes (HWIs) for all other providers. We also adjusted spending for additional payments to clinicians in health professional service areas, clinicians who established electronic health record systems, and clinicians who received primary care incentive payments. Moreover, we adjusted for special outpatient and skilled nursing payments for critical access hospitals. We removed the effects that these special payments had on variation in

spending by calculating the national per beneficiary amount of these special payments and adding it to each beneficiary's service use.

For a given beneficiary, we used the GPCIs and HWIs from where the beneficiary resides to adjust that spending. However, beneficiaries sometimes receive health care in geographic areas other than their area of residence. In some cases, the GPCIs and HWIs of where a beneficiary receives health care are different from the GPCIs and HWIs of where he or she resides. We did not address this issue of border crossing for services in the six sectors included in the MBSFs. This approach could result in some overestimation of service use in rural areas if patients received their ambulatory care or post-acute care in higher priced urban areas. However, we believe this issue is small for these services, relative to inpatient services, especially with regard to clinician services. For example, it is plausible that patients are less likely to travel long distances for clinician services than for inpatient care. In addition, the payment areas represented by GPCIs (89 payment areas) in the physician payment system tend to be larger than the payment areas in the inpatient payment system (about 430).

We used the MedPAR file to compute service use for hospital inpatient care. For each inpatient claim in the MedPAR file, we multiplied the relative weight for the claim's diagnosis related group by the national standardized rate to create an estimated payment for the claim that excludes the effects of adjustments for regional prices. We summed these results from the claims to the beneficiary level to create an estimate of adjusted inpatient service use for each beneficiary. Some hospitals received additional payments in the form of payments for graduate medical education, indirect medical education, and treatment for disproportionate shares of low-income patients. We removed the effects that these special payments had on variation in spending by calculating the national per beneficiary amount of these special payments and adding it to each beneficiary's adjusted inpatient service use. Finally, we adjusted the inpatient service use to include outlier payments and adjustments for transfer

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Adjusting Part A and Part B spending data to measure Part A and Part B service use (cont.)

cases. For outlier adjustments, we removed the effects of regional differences in input prices.

We used claims data from the MedPAR file as the source for inpatient services because beneficiaries frequently obtained care in locations where the HWI used to adjust inpatient payments for geographic differences in wages was different from the HWI of their area of residence. Use of the claims data allowed us to adjust beneficiaries' inpatient spending using the HWIs where their services were provided. If we had used spending on inpatient services from the MBSF, we would have had to adjust that spending for the border crossing that occurs more often with inpatient care than other service types. Adjusting for border crossing would have been more difficult than using our method based on the inpatient claims from the MedPAR file.

To estimate total price-adjusted spending for each beneficiary, we added the price-adjusted inpatient spending derived from the claims to the price-adjusted spending for the six health care sectors from the MBSF. One of the sectors from the MBSF, clinician services, was actually a combination of services

provided by physicians and other health professionals, ambulatory surgical centers (ASCs), and ambulance providers, which are on claims from Medicare carriers (contractors that process Medicare claims). We used the services from the carrier claims (which we will call "carrier services") as a proxy for clinician services because we were not able to derive a specific category for expenditures on clinician services from the MBSFs in 2008.

We estimated that Medicare expenditures for clinician services (including Part B drugs) were about 90 percent of Medicare expenditures for physicians, other health professionals, ASCs, and ambulance providers. Most of the remaining share is heavily affected by clinicians' decisions, such as use of anesthesia and ASCs, so we viewed expenditures on carrier services as an acceptable proxy for expenditures on clinician services. We price adjusted the expenditures on physicians, other health professionals, ASCs, and ambulance services to create a price-adjusted proxy for clinician services. We created monthly price-adjusted total spending and monthly price-adjusted spending in each health care sector for each beneficiary by dividing the price-adjusted amounts

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payment rates in the outpatient prospective payment system had been, then clinician services as a share of all Part A and Part B services would have been more than 19.1 percent in 2013 (assuming no effect on the volume of clinician services provided).

Relationship between use of clinician services and use of all Part A and Part B services

We used several measures to evaluate the relationship between use of clinician services and use of all Part A and Part B services. These measures are described as follows:

- We determined the change from 2008 to 2013 in the share of all Part A and Part B service use that is attributable to use of clinician services.
- For each geographic area, we determined the per capita use of clinician services and per capita use of all Part A and Part B services in 2008 and 2013. We used these results to determine for each geographic area the percentage change from 2008 to 2013 in the use of clinician services and use of all Part A and Part B services.
- We determined the correlation between the percentage change in use of clinician services and use of all Part A and Part B services among our geographic areas. A positive correlation between the percentage change in use of clinician services and percentage change in use of all Part A and Part B services would suggest that higher use of

Adjusting Part A and Part B spending data to measure Part A and Part B service use (cont.)

by the number of months the beneficiary participated in fee-for-service (FFS) Medicare.

We then adjusted the price-adjusted spending amounts for regional differences in demographics and health status using a regression-based method. We performed a separate set of regressions for the 2008 data and the 2013 data. In both years, we performed a regression for price-adjusted total spending and regressions for price-adjusted spending in each of the health care sectors. In each regression, the dependent variable was a beneficiary's monthly FFS spending that had been adjusted for regional prices and additional payments. Explanatory variables included:

- demographic variables, such as age and sex;
- all 70 conditions in CMS's hierarchical condition category (CMS-HCC) model, which CMS used to risk adjust Medicare Advantage payments in 2008 and 2013;
- other beneficiary-level factors in the CMS-HCC model, such as disability, dual-eligible, and institutional status; and
- an indicator of the beneficiary's geographic area as defined for this study.

The regressions produced coefficients for the demographic variables, the 70 conditions, the other factors in the CMS-HCC model, and the 484 geographic areas.

We used results from the regressions to estimate both per capita total service use and per capita service use for each health care category in each geographic area as follows:

- We created national average spending amounts by multiplying each coefficient estimate—except for the indicators for the geographic areas—by the mean value of each variable and summing these products. These calculations had the effect of removing the variation in service use resulting from the population characteristics, such as demographics and health status.
- We added the coefficient for each geographic area from the regressions to the national average spending amounts. The result is our measure of service use for each geographic area.
- We used this process for total Part A and Part B services and for service use in each health care sector. ■

clinician services is associated with higher use of Part A and Part B services.

- There is a concern about “circularity” when evaluating the correlation between change in clinician services and change in all Part A and Part B services because clinician services are a large part of all Part A and Part B services. An increase in clinician services will raise the likelihood that all Part A and Part B services also increase. Therefore, we also examined the correlation between the percentage change in clinician services and the percentage change in all Part A and Part B services net of the clinician services.

- For 2013, we estimated the correlation between use of clinician services and use of all Part A and Part B services among our geographic areas. A positive correlation would suggest that greater use of all services is related to greater use of clinician services. We also estimated the correlation between use of clinician services and use of all Part A and Part B services, net of the clinician services.

A shortcoming in our data is that the 2008 MBSF does not have the data configured so that we can determine use of clinician services at the level of our geographic areas. However, we were able to approximate use of clinician services through carrier claims, which are claims for services provided by physicians, physician assistants, clinical social workers, nurse practitioners, independent

**TABLE
4-1**

Medicare spending on clinician services in FFS Medicare as a share of all Part A and Part B services fluctuated, 1993–2013

Year	Medicare spending (in billions of dollars)		Clinician services as a share of Part A and Part B services
	Clinician services	Part A and Part B services	
1993	\$26.3	\$138.0	19.1%
1994	28.8	150.3	19.2
1995	31.7	167.9	18.9
1996	31.6	175.7	18.0
1997	31.9	183.0	17.4
1998	32.4	181.6	17.8
1999	33.4	176.3	18.9
2000	37.0	182.0	20.3
2001	42.0	202.1	20.8
2002	44.8	223.8	20.0
2003	48.3	238.8	20.2
2004	54.1	262.7	20.6
2005	57.7	281.6	20.5
2006	58.1	289.8	20.0
2007	58.8	298.0	19.7
2008	60.6	313.3	19.3
2009	61.8	328.5	18.8
2010	63.9	337.6	18.9
2011	67.5	350.0	19.3
2012	69.5	362.2	19.2
2013	68.6	358.7	19.1

Note: FFS (fee-for-service). “Medicare spending” is the amount spent by the Medicare program excluding beneficiaries’ cost sharing. The spending amounts are for services provided to beneficiaries in FFS Medicare and exclude services to beneficiaries in Medicare Advantage.

Source: Annual reports of the Boards of Trustees of the Medicare trust funds, 2004, 2013, and 2014.

clinical laboratories, ambulance providers, and ambulatory surgical centers. We estimated that clinician services (including Part B drugs) account for about 90 percent of the expenditures on carrier claims, and most of the remaining share is heavily influenced by clinicians’ decisions such as use of anesthesia and ambulatory surgical centers. Therefore, the use of all services from carrier claims (which we will call “carrier services”) is our proxy for the use of clinician services.

Variation in use of all Part A and Part B services across regions is less than the variation in use of clinician services

A comparison of service use from 2013 across our geographic areas shows that use of all Part A and Part B services varied less than use of carrier services (Table

4-2). For example, use of Part A and Part B services was 24 percent higher at the 90th percentile than at the 10th percentile. In comparison, use of carrier services was 51 percent higher at the 90th percentile than at the 10th percentile. At the extremes, use of Part A and Part B services was 1.76 times higher in the highest use area than in the lowest use area, while use of carrier services was 2.48 times higher in the highest use area than in the lowest use area.

Use of clinician services as a share of all Part A and Part B services, 2008 compared with 2013

We found that, in 2013, per capita use of carrier services was 26.3 percent of the per capita use of all Part A and Part B services. In 2008, use of carrier services was

**TABLE
4-2****Use of Part A and Part B services had less regional variation than use of carrier services, 2013**

Measure of variation	Part A and Part B service use	Carrier service use
Ratio of 90th to 10th percentile	1.24	1.51
Ratio of maximum to minimum	1.76	2.48
Average distance from the mean, as a percent of the mean	0.065	0.138

Note: We used services from carrier claims as a proxy for clinician services. "Part A and Part B service use" is per capita use in each geographic area of all services covered under Part A and Part B of Medicare. "Carrier service use" is per capita use of carrier services in each geographic area. We defined geographic areas as the metropolitan statistical areas (MSAs) of the core-based statistical areas. If an MSA crosses state borders, we divided the MSA into multiple areas based on state borders. For areas that are not in MSAs, the geographic area is all of a state's counties that are not in MSAs.

Source: MedPAC analysis of the 2013 Master Beneficiary Summary File and the 2013 Medicare Provider and Review file.

24.4 percent of the use of all Part A and Part B services. Therefore, carrier services increased as a share of all Part A and Part B services over the 2008 through 2013 period (Table 4-3).¹

For 2008 and 2013, we also divided the total service use into 10 sectors. We found that the outpatient facilities sector had the largest service use increase from 2008 through 2013, and carrier services had the second largest increase. At the same time, the acute inpatient sector had

the largest decrease in services over that period (Table 4-3). These results are consistent with the shift of services from hospital inpatient care to ambulatory settings.

Correlation between percentage change in use of clinician services and use of all Part A and Part B services

We performed a linear regression that had as the dependent variable the percentage change from 2008 to 2013 in per capita Part A and Part B service use for each geographic

**TABLE
4-3****Use of carrier services as a share of all Medicare Part A and Part B services increased from 2008 to 2013**

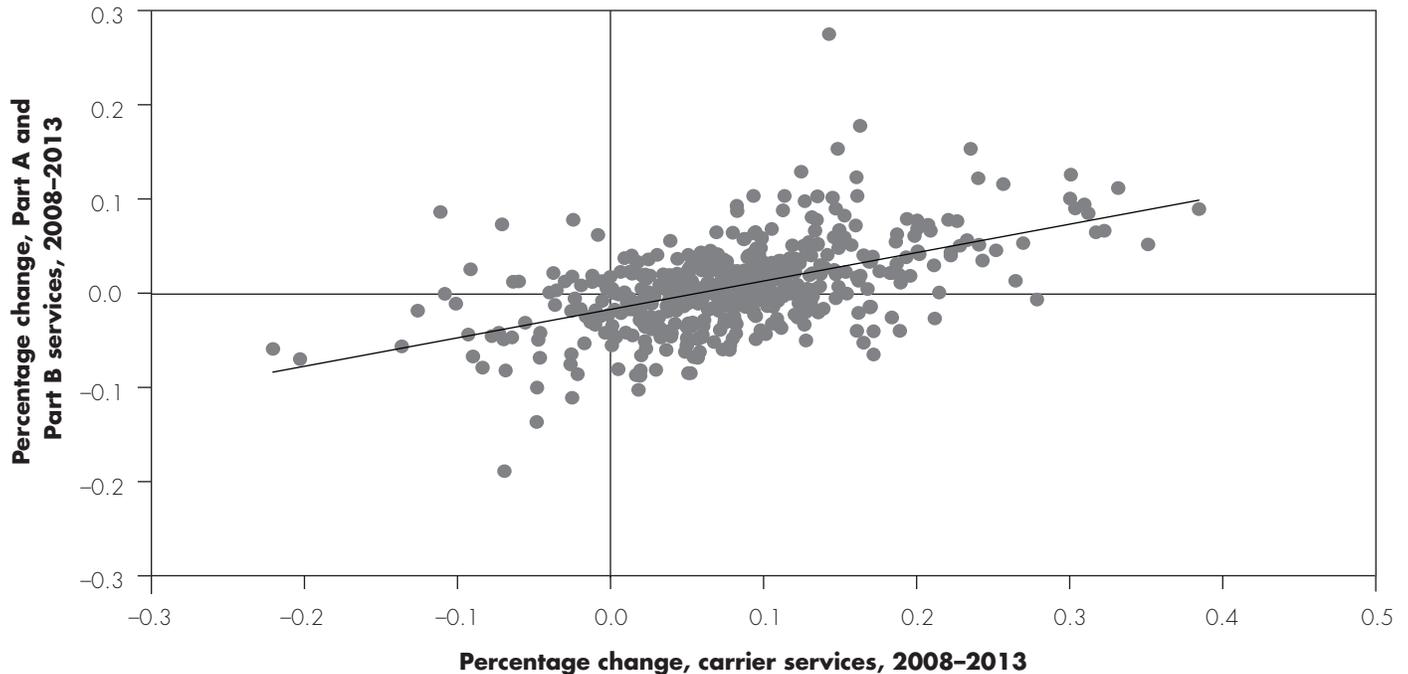
Sector	Share of all Part A and Part B services	
	2008	2013
Carrier	24.4%	26.3%
Acute inpatient	39.6	36.1
Outpatient facilities	10.4	12.5
Durable medical equipment	2.8	2.2
Hospice	4.1	4.3
Skilled nursing facility	8.4	8.1
Home health agency	5.4	5.8
Inpatient psychiatric facility	1.1	1.0
Inpatient rehabilitation facility	1.7	1.7
Long-term care hospital	2.1	2.1

Note: We used services from carrier claims as a proxy for clinician services. We deflated our 2013 service use estimates to 2008 levels to remove the effects of payment updates that occurred over the 2008 through 2013 period. Outpatient facilities consist primarily of hospital outpatient departments but also include freestanding dialysis facilities, outpatient rehabilitation facilities, and rural health clinics.

Source: MedPAC analysis of data from the 2008 and 2013 Master Beneficiary Summary Files and the 2008 and 2013 Medicare Provider and Review files.

**FIGURE
4-1**

Moderately positive relationship between percentage change in use of carrier services and percentage change in use of all services, 2008–2013



Note: We used services from carrier claims as a proxy for clinician services. We deflated our 2013 service use estimates to 2008 levels to remove the effects of payment updates that occurred over the 2008 through 2013 period. We defined the units of analysis as the metropolitan statistical areas (MSAs) of the core-based statistical areas. If an MSA crosses state borders, we divided the MSA into multiple areas based on state borders. For counties that are not in MSAs, the unit of analysis is all of a state's non-MSA counties.

Source: MedPAC analysis of data from the 2008 and 2013 Master Beneficiary Summary Files and the 2008 and 2013 Medicare Provider and Review files.

area. This regression had one explanatory variable: The percentage change from 2008 to 2013 in per capita use of carrier services for each geographic area (using all services from carrier claims as a proxy for clinician services).

Results from this regression indicate that the percentage change in carrier services explains 27 percent of the variation in the percentage change in all Part A and Part B services among geographic areas ($R^2 = 0.27$). Also, the coefficient on percentage change over time in carrier services was 0.30, which indicates a 1 percentage point increase in carrier services resulted in a 0.30 percentage point increase in the use of all Part A and Part B services, on average.

However, we are concerned about the “circularity” of this regression because carrier services are a substantial share of total Part A and Part B services. An area that has a relatively large increase in use of carrier services will tend to have a larger increase in total Part A and Part B services

than an area that has a lower increase in carrier services. Therefore, we created a new variable for each geographic area—Part A and Part B service use minus carrier service use—that we will call “net Part A and Part B services.”

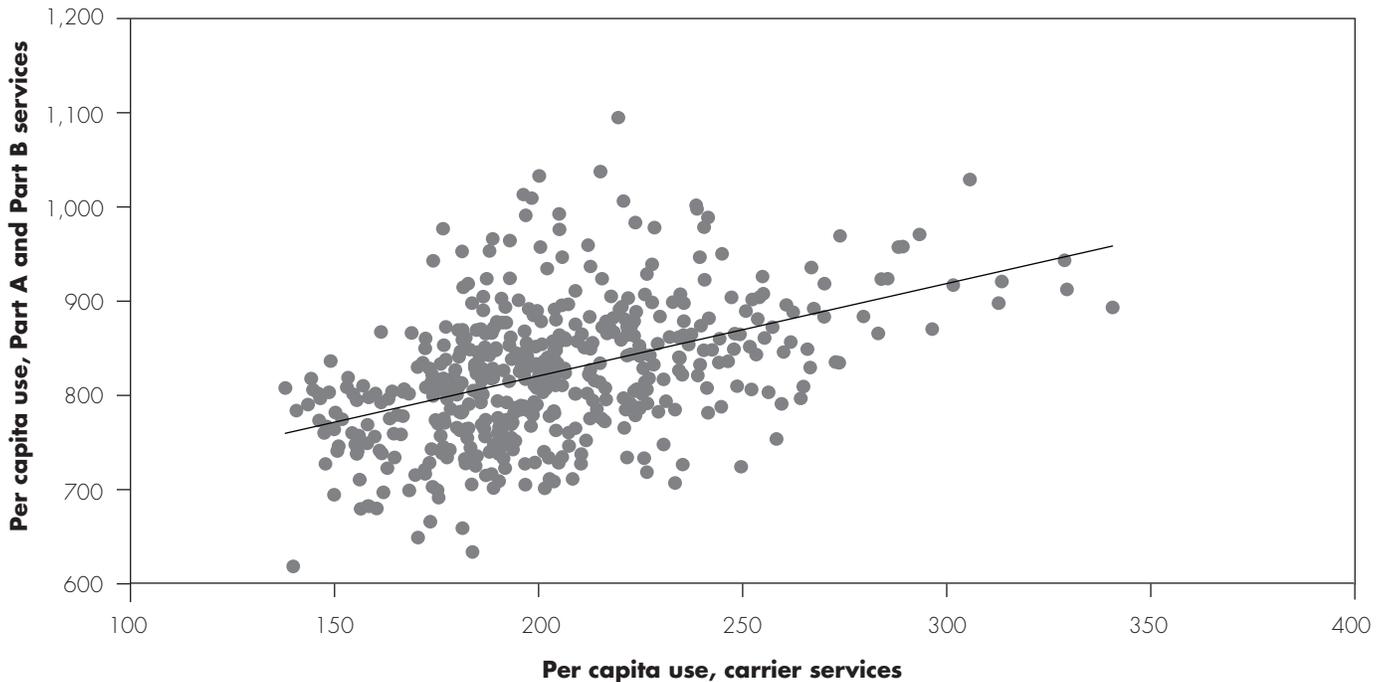
We performed a second regression that had as the dependent variable the percentage change in per capita net Part A and Part B service use over the 2008 through 2013 period. The explanatory variable was the same as in the first regression: percentage change over 2008 through 2013 in per capita use of carrier services.

Results from this second regression indicate a weak positive relationship that is nearly neutral (neither positive nor negative) between the percentage change in use of carrier services and percentage change in net Part A and Part B services. The R^2 is 0.03, and the coefficient on percentage change in use of carrier services is 0.14.

In summary, the first regression indicates that an increase in use of carrier services is associated with an increase in

**FIGURE
4-2**

Moderately positive relationship between use of carrier services and use of Part A and Part B services, 2013



Note: We used services from carrier claims as a proxy for clinician services. We define our units of analysis as the metropolitan statistical areas (MSAs) of the core-based statistical areas. If an MSA crosses state borders, the MSA is divided into multiple areas based on state borders. For counties that are not in MSAs, the unit of analysis is all of a state's non-MSA counties.

Source: MedPAC analysis of data from the 2013 Master Beneficiary Summary File and the 2013 Medicare Provider and Review file.

use of all Part A and Part B services over the 2008 through 2013 period. Figure 4-1 depicts the relationship between the percentage change in use of carrier services and the percentage change in all Part A and Part B services. Although the relationship is not strong, Figure 4-1 clearly demonstrates a positive relationship. However, the second regression shows that, after removing the carrier services from total Part A and Part B services, there is a weak (nearly neutral) relationship between change in carrier services and change in all other Part A and Part B services. A scatter plot (not shown) confirms the low correlation.

Correlation between use of clinician services and use of all Part A and Part B services

We performed two more regressions in this part of our analysis. In the first of these regressions, the dependent variable was our estimate of the per capita use of all Part A and Part B services in 2013 for each of our 484 geographic areas. The single explanatory variable was our estimate

of per capita use of carrier services in 2013 for each geographic area, using services from carrier claims as a proxy for clinician services.

Results from this regression indicate that use of carrier services explains about 21 percent of the variation in use of all Part A and Part B services ($R^2 = 0.21$), and that a 1-unit increase in carrier services increases use of all Part A and Part B services by 0.88 units. These results indicate a moderately positive correlation between use of carrier services and use of all Part A and Part B services.

Figure 4-2 depicts the relationship between use of carrier services and use of all Part A and Part B services. Among our geographic areas, there was a moderately positive relationship between carrier services and all Part A and Part B services. However, much of the variation in the use of Part A and Part B services is not explained by the use of carrier services. If the relationship were stronger, the data points in Figure 4-2 would be more tightly clustered

**TABLE
4-4**

Part D enrollment and characteristics of beneficiaries enrolled in stand-alone PDPs, 2008 and 2013

	2008	2013
Medicare beneficiaries enrolled in Part D	27.5	37.8
Number of beneficiaries (in millions)	58%	69%
As a share of all Medicare beneficiaries		
Part D enrollees in PDPs		
Number of beneficiaries (in millions)	18.6	24.2
As a share of all Part D enrollees (remainder in MA-PDs)	68%	64%
As a share of FFS beneficiaries	50%	61%
Selected demographic characteristics of PDP enrollees		
Share:		
Female	61%	58%
Under age 65 (disabled)	27	22
Non-White	24	23
Receiving Part D's low-income subsidy	48	38
Residing in metropolitan areas	74	78

Note: PDP (prescription drug plan), MA-PD (Medicare Advantage-Prescription Drug [plan]), FFS (fee-for-service).

Source: MedPAC analysis of Medicare Part D denominator file from CMS.

around a straight line going through the center of the data points.

Once again, we were concerned about the circularity in the relationship between use of carrier services and use of all Part A and Part B services. Therefore, we performed another regression that had per capita use of Part A and Part B services net of carrier services in 2013 for each geographic area as the dependent variable. The single explanatory variable was per capita use of carrier services in 2013 for each geographic area.

Results from this regression indicated an almost neutral relationship between use of carrier services and use of net Part A and Part B services. Carrier services explain almost none of the variation in net Part A and Part B services ($R^2 = 0.005$), and the coefficient on per capita use of carrier services was not significantly different from zero at the 10 percent level. A scatter plot of the relationship between use of carrier services and use of net Part A and Part B services confirmed a very low level of correlation (not shown). This finding suggests that use of carrier services has little effect on the use of other Part A and Part B services.

Relationship between use and spending for clinician services and Part D drugs

As requested in MACRA, we examined the relationship between use and spending for clinician services relative to use and spending for prescription drugs covered under Medicare Part D.

The majority of Medicare beneficiaries receive their prescription drug coverage through Part D (Medicare Payment Advisory Commission 2016). Most other beneficiaries have prescription drug coverage from other sources, such as their former employers, that is at least as generous as the Part D benefit, but we have no drug spending data for those beneficiaries.

For this analysis, we limit our study sample to beneficiaries for whom we have both medical claims and prescription drug spending data. That is, our analysis examined a subset of beneficiaries who were enrolled in Part D's stand-alone prescription drug plans (PDPs) and received their medical services under Part A and Part B of

**TABLE
4-5****Similar growth in unadjusted per capita spending on services paid under the physician fee schedule and Part D drugs from 2008 to 2013**

	2008	2013	Percent change 2008–2013
Physician fee schedule payment per FFS enrollee	\$1,836	\$2,042	11%
Gross Part D spending per PDP enrollee	2,805	3,096	10

Note: FFS (fee-for-service), PDP (prescription drug plan). "Gross drug spending" includes payments for ingredient costs, dispensing fees, and sales taxes.

Source: MedPAC analysis based on Table IV.B2 of the annual report of the Boards of Trustees of the Medicare trust funds for 2016 and Part D prescription drug event data and denominator files from CMS.

Medicare.² Beneficiaries enrolled in Medicare Advantage–Prescription Drug plans (MA–PDs) were excluded from our analysis because we do not have medical claims data for them. PDP enrollees accounted for about 68 percent (18.6 million) and 64 percent (24.2 million) of Part D enrollees in 2008 and 2013, respectively (Table 4-4).

Data and methods

The method we used to estimate drug use in each geographic area parallels the method used to estimate medical service use from the MBSF. We obtained estimates of prescription drug use from Part D prescription drug event (PDE) data.³ For our analysis, we used gross drug spending from the PDE data that reflects ingredient costs—that is, payments to pharmacies for covered drugs, excluding dispensing fees, sales tax, and any retrospective rebates and discounts from manufacturers and pharmacies. (This measure of Part D drug spending and use differs from those used to measure spending and service use covered under Part A and Part B in that it includes beneficiary cost sharing.) Because there are no special payment adjustments (such as indirect medical education) as in Part A and Part B of Medicare, we calculated drug use as the gross drug spending adjusted for regional difference in prices and in beneficiary demographic characteristics and health status; after adjustment, it reflects volume (number of prescriptions) and intensity (choice of medications such as brand name versus generic drugs).⁴

We obtained the average monthly drug use (adjusted spending) for each beneficiary by dividing total annual drug use for each beneficiary by the number of months enrolled in a Part D plan. To measure the change in drug use from 2008 to 2013, we adjusted the 2013 drug spending to account for the average increase in drug prices observed between 2008 and 2013.⁵

We used a regression-based method to obtain estimated service use by adjusting for area-specific effects, differences in demographic characteristics (e.g., age, gender, institutionalized status, low-income subsidy status), and health status as measured by the prescription drug hierarchical condition categories (see text box on regression-based method used to obtain estimated use of Part A and Part B services, pp. 143–145).

Findings on the relationship between clinician services and Part D drugs

The share of Medicare FFS beneficiaries covered under Part D has grown over time, as has the share of enrollees in MA–PDs (Table 4-4). Changes in the pattern of Part D enrollment have resulted in PDP enrollees who have somewhat different demographic characteristics in 2013 compared with 2008. For example, in 2013, a smaller share of PDP enrollees were disabled beneficiaries under age 65 (22 percent, compared with 27 percent in 2008), and a smaller share received the low-income subsidy in 2013 (38 percent, compared with 48 percent in 2008).

Similar growth in unadjusted per capita spending for both clinician services and Part D drugs from 2008 to 2013

From 2008 through 2013, unadjusted per capita spending on services covered under the physician fee schedule (clinician services) and spending for drugs covered under the Part D benefit grew at similar rates. During this period, Medicare’s total annual spending per FFS enrollee for clinician services increased by 11 percent, from \$1,836 to \$2,042 (Table 4-5). During the same period, annual gross Part D spending per PDP enrollee increased by 10 percent, from \$2,805 to \$3,096.

**TABLE
4-6****Drug use had less regional variation than carrier service use, 2013**

Measure of variation	Drug use	Carrier service use
Ratio of 90th to 10th percentile	1.23	1.49
Ratio of maximum to minimum	1.89	2.30
Average distance from the mean (per member per month)	\$20	\$35

Note: "Drug use" is per capita drug use among stand-alone prescription drug plan enrollees in each geographic area. "Carrier service use" is per capita use of carrier services among fee-for-service (FFS) beneficiaries in each geographic area. We define geographic areas as the metropolitan statistical areas (MSAs) of the core-based statistical areas. If an MSA crosses state borders, we divided the MSA into multiple areas based on state borders. The measures of variation reported for carrier service use differ slightly from those reported in Table 4-2 (p. 147) because the measures are based on carrier service use by a subset of FFS beneficiaries who were enrolled in Part D (about 61 percent of all FFS beneficiaries).

Source: MedPAC analysis of the 2013 Master Beneficiary Summary File and 2013 prescription drug event data from CMS.

However, because the two sectors use different payment methods, similar growth in spending does not necessarily reflect comparable growth in service use. In particular, various adjustments applied to payments for clinician services could distort the relationship that may exist between the use of carrier services and the use of drugs under Part D.

Drug use varied less than clinician service use across regions

In our analysis of use of clinician services and use of drugs, we adjusted spending data to remove the effects of regional differences in prices and population characteristics and of special payments to providers (in the case of clinician services) to examine the relationship between carrier service use and drug use among beneficiaries enrolled in PDPs. As we did in our analysis of the relationship between use of clinician services and use of all Part A and Part B services, we used carrier services as a proxy for clinician services.

A comparison of service use across our 484 geographic areas shows that drug use (drug spending adjusted for variations in prices, demographic characteristics, and health status) varied less than use of carrier services in 2013 (Table 4-6).⁶ For example, drug use in high-use areas (areas at the 90th percentile) was 23 percent higher than in low-use areas (areas at the 10th percentile). In comparison, carrier service use in high-use areas was 49 percent higher than in low-use areas. At the extremes, drug use in the highest use area was about 1.89 times that in the lowest use area compared with 2.30 times for carrier service use. Results were similar for 2008 (Medicare Payment Advisory Commission 2011).

Clinician service use is positively correlated with drug use

A cross-sectional analysis of carrier service use (with all carrier-paid services as a proxy for clinician services) and prescription drug use data, using a linear regression model, shows that the areas with high carrier service use tend to have high drug use (and likewise, those with low carrier service use tend to have low drug use). Results from this regression indicate that use of carrier services explains about 7 percent of the variation in drug use ($R^2 = 0.067$) based on the 2008 data and about 24 percent of the variation in drug use ($R^2 = 0.24$) based on the 2013 data. We found a somewhat positive correlation between carrier service use and drug use in both years (estimated coefficient of 0.11 for 2008 and 0.3 for 2013). Our results suggest that the use of carrier services and the use of prescription drugs may be weak complements rather than substitutes for one another.

The positive correlation we found between carrier service use and drug use was somewhat stronger in 2013 than in 2008. It is not clear whether this finding reflects a change in the relationship between the service use in these two sectors. Although our model adjusts for population characteristics, it is possible that those adjustments do not fully capture the change in service use patterns that may have occurred as a result of the change in plan enrollment patterns among FFS beneficiaries from 2008 to 2013.

Change in drug use is negatively correlated with change in clinician service use

To examine the relationship in our geographic areas between growth in the use of carrier services and the use of drugs, we compared the level of service use in 2008

with the level of service use in 2013 to determine each area's growth rate from 2008 to 2013.

Overall, from 2008 to 2013, per capita drug use grew cumulatively by about 11.5 percent compared with nearly 13 percent for per capita carrier service use. For both carrier service use and drug use, there was a slight inverse relationship between an area's level of service use in 2008 and growth from 2008 to 2013.

We conducted a linear regression that had the change in drug use as a dependent variable. Results of the regression analysis suggest that, for the 2008 through 2013 period, change in drug use was negatively correlated with changes in an area's carrier service use (coefficient on the change in carrier service use of -0.27 ($p < 0.0001$)). The rate of growth in carrier service use explained 6 percent of the variation in the rate of growth in drug use across the 484 geographic areas.⁷

Summary

The results of our analyses indicate the following:

- Medicare spending on clinician services as a share of Medicare spending on all Part A and Part B services has been stable in recent years at about 19 percent.
- There is a moderately positive correlation between use of carrier services (which we use as a proxy for clinician services) and use of all Part A and Part B services. From 2008 to 2013:
 - use of carrier services as a share of all Part A and Part B services increased from 24.4 percent to 26.3 percent.
 - across geographic areas, there was a moderately positive relationship between the percentage change in use of carrier services and the percentage change in use of Part A and Part B services.
 - across geographic areas, there was a moderately positive relationship between use of carrier services and use of all Part A and Part B services.

We were concerned about circularity between use of carrier services and use of all Part A and Part B services because carrier services constitute a significant portion of

Part A and Part B services. In response, we evaluated the relationship between use of carrier services and use of all Part A and Part B services, less the carrier services. We found the following:

- Across geographic areas, the relationship between the percentage change from 2008 to 2013 in use of carrier services and the percentage change in use of Part A and Part B services net of carrier services was positive but weak.
- Across geographic areas, there was nearly no correlation (neither positive nor negative) between use of carrier services and use of Part A and Part B services net of carrier services.
- These two correlations suggest that carrier services and all other Part A and Part B services were neither complements nor substitutes.

For a subset of FFS beneficiaries who receive their drug coverage through the Part D program, our analysis found the following:

- Carrier service use was positively correlated with drug use; that is, areas with high (or low) carrier service use tended to also have high (or low) drug use.
- The change in carrier service use was negatively correlated with the change in an area's drug use.

The positive correlation between carrier service use and drug use was weak to modest. While the regression results showed a negative relationship between the changes in carrier service use and drug use, only 6 percent of the variation in service use changes was explained by our regression model, suggesting a weak relationship between the rates of growth in carrier service use and drug use.

There are a few caveats in interpreting these findings. First, correlation in service use among different sectors does not prove causality. Second, our results are based on aggregate trends and do not represent individual circumstances or geographic areas.

While we found a moderately positive relationship between use of carrier services and use of all Part A and Part B services, that relationship was weaker and nearly neutral once carrier services were removed from the measure of Part A and Part B service use. This finding suggests that carrier services and other Part A and Part B services are neither complements nor substitutes.

Our findings on the relationship between use of carrier services and use of Part D drugs suggest a weak complementary relationship based on the level of service use, but not based on growth rates in these two sectors. While the negative relationship between the growth in use of carrier services and use of Part D drugs could be taken

to mean that they are weak substitutes, the more likely interpretation may be that there is very little relationship between the service use in these two sectors measured at the MSA level, given contradictory findings (based on level of service use vs. based on growth rates), small regression coefficients, and low R^2 values. ■

Endnotes

- 1 Over the 2008 through 2013 period, the Medicare program increased the payment rates for clinician services by a lower percentage than for most other services. Therefore, the 2013 per capita use amounts that we used in Table 4-3 (p. 147) have been deflated to 2008 levels by removing the effects of payment updates that occurred over the 2008 through 2013 period.
- 2 We re-estimated the clinician service use measures for 2008 and 2013 using only FFS beneficiaries who were enrolled in stand-alone PDPs in each of these years.
- 3 PDE data include all payments to pharmacies for drugs covered under Part D, including payments by plans, beneficiaries, and Medicare through the low-income cost-sharing subsidy that provides cost-sharing assistance for beneficiaries with low income and assets.
- 4 Factors used to adjust for variation in prices across regions are based on an analysis by Acumen LLC for the Commission. Regional variation in drug prices ranged from 1 percentage point below the national average to 4 percentage points above the national average in 2008, and 2 percentage points below the national average to 6 percentage points above the national average in 2013. These prices are arrived at through negotiations between Medicare Part D plans and pharmacies and do not reflect manufacturer rebates.
- 5 We used the volume-weighted price index constructed by Acumen LLC for Part D–covered prescription drugs filled by PDP enrollees to adjust the 2013 drug spending to account for the increase in drug prices between 2008 and 2013. Based on price levels measured in July of 2008 and July of 2013, our adjustment reduced 2013 drug spending by 3.3 percent.
- 6 The geographic areas developed for our study are defined as the metropolitan statistical areas (MSAs) of the core-based statistical areas. If an MSA crosses state borders, the MSA is divided into multiple areas based on state borders.
- 7 The R^2 for the regression using 2008 enrollment as the weight was 0.058. Results of a regression using 2013 enrollment as the weight were similar: A coefficient on the change in carrier service use was -0.26 ($p < 0.0001$), with an R^2 of 0.057.

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