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Changes In Hospital Utilization Three Years Into Maryland's Global Budget Program For Rural Hospitals

ABSTRACT In a substantial shift in payment policy, the State of Maryland implemented a global budget program for acute care hospitals in 2010. Goals of the program include controlling hospital use and spending. Eight rural hospitals entered the program in 2010, while urban and suburban hospitals joined in 2014. Prior analyses, which focused on urban and suburban hospitals, did not find consistent evidence that Maryland's program had contributed to changes in hospital use after two years. However, these studies were limited by short follow-up periods, may have failed to isolate impacts of Maryland's payment change from other state trends, and had limited generalizability to rural settings. To understand the effects of Maryland's global budget program on rural hospitals, we compared changes in hospital use among Medicare beneficiaries served by affected rural hospitals versus an in-state control population from before to after 2010. By 2013—three years after the rural program began—there were no differential changes in acute hospital use or price-standardized hospital spending among beneficiaries served by the affected hospitals, versus the within-state control group. Our results suggest that among Medicare beneficiaries, global budgets in rural Maryland hospitals did not reduce hospital use or price-standardized spending as policy makers had anticipated.

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Policy makers and health care payers are implementing alternative payment models to control the growth of health care spending and to encourage providers to deliver high-value care.[1–6] One payment model being tested by the Centers for Medicare and Medicaid Services (CMS) and implemented through a partnership with the State of Maryland establishes global budgets for hospitals.[7–9]

Unique among alternative payment models, Maryland's global budget program provides each of the state's acute care hospitals with an annual budget. This budget specifies the total amount of revenue that a hospital can receive each year from all payers—including Medicare, Medicaid, commercial insurers, and self-paying patients—for inpatient, emergency department (ED), and outpatient department (on the hospital campus) services. By setting a fixed budget for each hospital, instead of paying hospitals on a traditional fee-for-service basis, policy makers sought to slow hospital spending growth, limit unnecessary hospital use, and encourage hospitals to develop population health management programs that emphasize the provision of care outside of the hospital.[8–11]

Maryland implemented this program in phases: Eight rural hospitals received global budgets in 2010, followed by thirty-six larger,

predominantly urban and suburban hospitals in 2014. One study, which focused on rural Maryland hospitals, found no change in readmissions attributable to the program, but it examined trends over only an eighteen-month post-intervention period.[12] Other studies, including one by members of this author group, have investigated the impacts of Maryland's statewide expansion of global budgets on urban and suburban hospitals but have not found consistent evidence of changes in hospital or primary care use that could be attributed to the program after two years.[13,14]

However, these prior evaluations had important limitations.[15] First, because hospitals may need time to implement new care management programs and reconfigure capacity, the effects of global budgets might not be detectable after only one or two years. Second, because Maryland expanded its global budget model in 2014—just as major provisions of the Affordable Care Act were being implemented—it may be difficult to isolate effects of the program from contemporaneous policy changes. Third, in evaluations of the statewide expansion of global budgets, modest differences in pre-reform trends between affected populations in Maryland and out-of-state control populations made it difficult to link post-reform changes in utilization to global budgets.[13,14]

Fourth, while most prior studies have evaluated Maryland's program in urban and suburban hospitals, the economic incentives of global budgets may differ in rural versus urban settings. For example, rural hospitals in Maryland—as in many other parts of the United States—are often the main acute care providers in their communities, while urban areas often are served by multiple local hospitals. Under global budgets, rural hospitals may have stronger incentives to implement population health management programs because these hospitals are likely to capture the majority of any associated savings (for example, from fewer hospital stays). In urban settings, these incentives may be diluted if savings are split among competing hospitals that serve the same community. Multiple reports have highlighted how Maryland's rural hospitals developed new care management programs after the implementation of global budgets.[16,17]

There has been growing interest among policy makers in developing global budget programs for rural hospitals elsewhere in the US. For example, CMS and the State of Pennsylvania have announced plans to implement global budgets in thirty of the state's rural hospitals over the next four years.[18] To increase understanding of the effects of global budgets in rural hospitals, we used data on fee-for-service Medicare beneficiaries in Maryland and a difference-in-differences analysis to evaluate changes in price-standardized hospital spending and use associated with global budgets in rural Maryland hospitals after three years.

Study Data And Methods

MARYLAND'S HOSPITAL GLOBAL BUDGET PROGRAM Since the 1970s, Maryland has operated a unique all-payer rate-setting system that regulates hospital prices for all health care payers. Before the introduction of global budgets, Maryland's system constrained revenue per admission (for inpatient care) or per service (for outpatient care), without limiting total hospital revenue. Similar to Medicare's national hospital prospective payment system, which reimburses hospitals at fixed rates without constraining aggregate spending, Maryland's prior payment system enabled hospitals to increase their revenues by providing more care.[19,20]

Maryland's global budget program counteracts incentives to provide more hospital care by establishing a "global" revenue constraint (that is, a budget) for each of the state's nonfederal acute care hospitals. Each hospital's budget is calculated from its historical utilization; forecasted changes in use; and prices, which Maryland continues to regulate. Hospitals bill payers per admission (for inpatient care) or per service (for outpatient care) but are now expected to raise or lower their prices to remain on budget. For example, if a hospital reduced its rate of admissions, it would increase its prices to stay on budget, which would presumably improve its operating margin. Conversely, a hospital with greater-than-expected utilization must reduce its prices so as not to exceed its budget.[13,21] Budgeted revenues do not include payments to physicians for inpatient or outpatient care.

By constraining hospital revenue, policy makers sought to give hospitals a financial incentive to limit unnecessary hospital use, manage patients' care in settings not subject to a budget (for example, community-based primary care practices), and develop care management programs aimed at reducing potentially avoidable ED visits and hospital stays.[8,9,16] Additional details of Maryland's program are provided in the online appendix.[22]

Spending is the product of prices and utilization. It remains unclear whether hospitals met their budgets by reducing patients' use of hospital services or simply by changing their prices. In this study we examined changes in hospital use and price-standardized spending (a summary measure of utilization) from before to after the introduction of global budgets in rural Maryland hospitals. The Medicare population is ideal for

Maryland's introduction of global budgets in rural hospitals was not linked to reductions in hospital use.

our analysis, because the care of elderly and disabled people, who have high rates of hospital use,[23] is likely to be affected by the introduction of hospital global budgets.

STUDY POPULATION We analyzed 2007–13 enrollment and claims data for 100 percent of fee-for-service (that is, Part A and Part B) Medicare beneficiaries residing in Maryland. We limited our analyses to beneficiaries with continuous fee-for-service coverage in a given study year (or, for decedents, with continuous enrollment until death).

AFFECTED HOSPITALS Maryland placed eight rural hospitals under global budgets in July 2010 (appendix exhibit 1).[22] We excluded one of these hospitals (Western Maryland Regional Medical Center) from our analyses. This hospital opened in late 2009, replacing two smaller hospitals in its service area while offering an expanded scope of services that affected the combined hospitals' budgets. Because this change was concurrent with the implementation of the global budget program, we limited the intervention population to Medicare beneficiaries living in areas primarily served by the seven remaining hospitals. (Appendix exhibit 2 plots trends in hospital use for Medicare beneficiaries residing in the service area of Western Maryland Regional Medical Center.)[22]

INTERVENTION AND CONTROL POPULATIONS We determined patients' exposure to the global budget program based on the ZIP codes where Medicare beneficiaries lived and distances from these ZIP codes to the closest affected and unaffected hospitals (for details, see section 2 of the appendix).[22] We conducted within-Maryland comparisons to control for changes in the payment and regulatory environment that affected all Maryland hospitals during our study period.[19,24]

Our intervention population consisted of Medicare beneficiaries living in 117 Maryland ZIP codes located closer to one of the seven hospitals affected by the 2010 payment change than to any other hospital. In the pre-intervention period (2007–09), 74 percent of admissions from Medicare beneficiaries in these ZIP codes occurred at one of the intervention hospitals (appendix exhibit 3).[22]

The control population consisted of Medicare beneficiaries residing in eighty-six Maryland ZIP codes located at least fifteen miles farther from one of the affected hospitals than from any other hospital. We excluded beneficiaries residing in the metropolitan areas of Baltimore and Washington, D.C., because of substantial differences in patients' demographic characteristics and the types of hospitals serving these areas compared to the hospitals serving the intervention population (for details, see section 2 of the appendix).[22] After we excluded these urban areas, our control population consisted of Medicare beneficiaries living in predominantly rural and suburban Maryland ZIP codes. We verified that beneficiaries in these control ZIP codes exhibited pre-intervention characteristics and utilization trends that were comparable to those of the rural intervention population. During the pre-intervention period, approximately 2 percent of admissions of Medicare beneficiaries residing in the control ZIP codes occurred at one of the intervention hospitals.

We excluded ZIP codes located 0–15 miles closer to a nonintervention hospital than to one of the affected hospitals. Excluding these ZIP codes avoided biasing our difference-in-differences estimates to the null, since patients in these areas were partly served by the intervention hospitals. We also excluded ZIP codes within 20 miles of Western Maryland Regional Medical Center because, as noted above, this hospital opened shortly before the implementation of the global budget program. Appendix exhibit 4 displays areas of Maryland that encompass the intervention and control populations along with the seven intervention hospitals, and appendix exhibit 5 lists the hospitals serving these populations.[22]

To assess the sensitivity of our estimates to the control population used, we conducted a supplementary analysis that limited the control population to Medicare beneficiaries residing in ZIP codes designated as rural and located at least fifteen miles farther from an intervention hospital than from any other hospital (for details of this analysis, see section 7 of the appendix).[22]

OUTCOME VARIABLES We assessed changes in acute care use and price-standardized hospital spending from before to after the introduction of global budgets in rural Maryland hospitals. All outcomes were measured at the beneficiary-year level.

We measured beneficiaries' use of acute hospi-

tal care as a count of inpatient admissions, observation stays, and ED visits that did not lead to admission. In subanalyses, we separately assessed these ED visits and a composite measure of admissions and observation stays, which we term *hospital stays*. We assessed a combined measure of hospital stays because hospitals have increasingly classified short hospital stays as observation stays.[25]

Policy makers also hoped that Maryland's program would encourage hospitals to develop initiatives aimed at deterring readmissions and returning ED visits.[9,11] To assess changes in these outcomes, we measured the proportion of beneficiaries' acute hospital visits (inpatient admissions, observation stays, and ED visits) that were followed by a second acute hospital visit within thirty days (we term these *thirty-day return acute hospital visits*).

In supplemental analyses, we assessed thirty-day return hospital stays (including admissions and observation stays, but excluding ED visits). We also assessed changes in the proportion of ED visits that led to an inpatient admission.

We assessed price-standardized hospital spending as a summary measure of utilization, as this allowed us to capture potential changes in the composition of hospital care. (For example, hospitals could have admitted fewer patients with high-cost conditions, while treating more patients with low-cost conditions.) Because prices differed across Maryland hospitals and were subject to change under the state's global budget model, we calculated standardized prices using Medicare claims from non-Maryland hospitals, and we applied these prices to claims for beneficiaries in our intervention and control populations. We measured standardized prices annually at the level of the diagnosis-related group for inpatient claims, at the level of the revenue code (identifying the type and place of service) for observation stays, and at the level of the procedure code for ED visits. If multiple revenue or procedure codes were billed per claim, we summed spending associated with all revenue or procedure codes for that claim. In subanalyses, we separately assessed changes in price-standardized hospital stays and ED spending.

Finally, because care in hospital outpatient departments is included in hospitals' budgets, we assessed price-standardized hospital outpatient department spending, which we measured by applying national average prices at the level of the procedure code to hospital outpatient department claims. We did not include a count of hospital outpatient department use as a study outcome, given the great heterogeneity in services provided in these settings. Additional information about these variables is available in section 3 of the appendix.[22]

Maryland has begun to address several limitations of its current payment model.

PATIENT CHARACTERISTICS We used Medicare enrollment data to determine beneficiaries' age, sex, race/ethnicity, disability status, receipt of Medicaid benefits, and presence of end-stage renal disease. We incorporated data from the Medicare Chronic Conditions Data Warehouse to assess the presence of twenty-seven chronic conditions reported before each study year. In regression analyses, we controlled for indicators of each of these chronic conditions and counts of those conditions (the indicators were in unit increments for 2–8 versus 9 or more conditions).

STATISTICAL ANALYSES We used difference-in-differences analysis to assess differential changes between the intervention and the control populations in acute hospital use and price-standardized hospital spending from before to after the introduction of global budgets. Our main analyses assessed average differential changes from the pre (2007–09) to the post (2011–13) period. Because effects of the global budget program might have changed with time, in supplementary analyses, we estimated differential changes from the full pre period to each year in the post period (2011, 2012, and 2013). We omitted 2010 from the regression analyses because the global budget program was implemented in the middle of that year.

For each outcome, we fit a linear regression model at the patient-year level to estimate differential changes, which we adjusted for patients' clinical and demographic characteristics in addition to year and ZIP code fixed effects. We used propensity score weighting to balance the observed characteristics of beneficiaries in the intervention and control areas in each study year.[26] Thus, our difference-in-differences estimates represent differential changes among comparable Medicare beneficiaries in the intervention versus control populations. Additional details of our statistical analyses are provided in sections 4 and 5 of the appendix.[22]

An assumption of difference-in-differences analysis is that changes in the intervention

Our results underscore the need for policy makers to consider incentives for behavior change among hospitals and physicians.

and control populations would have been identical had the intervention (in this case, the global budget policy) not been implemented.[27] To test this assumption, for each outcome variable, we assessed whether pre-2010 trends were parallel in the intervention and control populations (appendix exhibit 7).[22]

LIMITATIONS Our study had several limitations. First, although we used a within-state control population, our estimates could have been biased by unobserved time-varying factors that differentially affected the intervention and control populations.

Second, we lacked claims for physician services for our 100 percent sample of Medicare beneficiaries. Consequently, we did not assess how the policy affected utilization outside of hospitals.

Third, our study assessed changes in hospital use in the fee-for-service Medicare population, although Maryland's program included all health care payers. To the extent that changes in providers' financial incentives affected care for all patients served—an assumption supported by prior evidence[28,29]—we would expect to see any changes in the care of Medicare beneficiaries.

Fourth, our intervention population consisted of approximately 78,000 beneficiaries per year who were served primarily by seven hospitals. The relatively small number of patients and hospitals could have limited our statistical power to detect small differential changes in use or spending associated with hospital global budgets.

Fifth, we examined global budgets in rural Maryland hospitals, but differences in the design and implementation context of hospital global budgets outside of Maryland might have different effects on patient care.

Study Results

SAMPLE CHARACTERISTICS In 2010, the year Maryland's global budget program for rural hospitals was implemented, the intervention population consisted of 77,756 Medicare beneficiaries, and the control population consisted of 68,117 beneficiaries. Before weighting, beneficiaries in the intervention population were more likely than beneficiaries in the control population to be white, younger than age sixty-five, and disabled, but they had slightly fewer chronic conditions (exhibit 1). After weighting, there were no substantive differences between the two populations, on average, on observed clinical or demographic characteristics.

COMPARISON OF PRE-INTERVENTION TRENDS We saw similar pre-intervention trends in the intervention and control populations for counts of acute hospital use, but significant trend differences for price-standardized hospital spending (appendix exhibit 7).[22] Before the payment change, price-standardized acute hospital spending was initially lower in the intervention population than in the control population, but it rose to the level of spending in the control population in 2009 (exhibit 2). From 2008 to 2009, price-standardized hospital outpatient department spending increased markedly in the control population, relative to changes in the intervention group.

DIFFERENTIAL CHANGES IN ACUTE HOSPITAL USE We observed comparable changes in acute hospital use in the intervention and control populations from the pre-reform period (2007–09) to the post-reform period (2011–13) (exhibit 3). The corresponding differential change of 0.014 annual acute hospital visit per beneficiary in the intervention population (exhibit 4) was equivalent to 1.9 percent of baseline acute hospital utilization in the intervention population (0.737 annual visits per beneficiary). Underlying these changes, we found a nonsignificant differential reduction in hospital stays in the intervention population (−0.006 annual stays per beneficiary) (exhibit 4 and appendix exhibit 8),[22] equivalent to a reduction of 1.5 percent in the intervention population's baseline mean, and a differential increase in ED visits that did not lead to admission (0.020 annual visits per beneficiary), or 5.8 percent of baseline ED use in the intervention group. The rate of thirty-day return acute hospital visits did not change differentially between the intervention and control populations over the study period (exhibit 4).

In supplementary analyses we found no differential change in the annual rate of thirty-day return hospital stays (excluding ED visits) (appendix exhibit 10)[22] or evidence of differential declines in acute hospital use emerging by the

EXHIBIT 1

Characteristics of the intervention and control populations in 2010, before and after propensity score weighting

Characteristic	Before weighting		After weighting[a]	
	Intervention population ($n = 77,756$)	Control population ($n = 68,117$)	Intervention population	Control population
Male	43.8%	43.3%	43.5%	43.5%
Age range (years)				
Less than 65	13.6%	13.0%	13.2%	13.2%
65–69	25.6	25.5	25.6	25.6
70–74	19.8	20.5	20.2	20.2
75–79	16.2	16.6	16.4	16.4
80–84	12.7	12.8	12.8	12.8
85 or more	12.1	11.6	11.8	11.8
Race/ethnicity				
White	89.8%	86.0%	88.1%	88.1%
Black	8.4	11.7	9.9	9.9
Hispanic	0.8	0.9	0.8	0.8
Other	1.0	1.4	1.2	1.2
Disabled[b]	18.2%	17.6%	17.8%	17.8%
Enrolled in Medicaid[c]	8.6%	8.4%	8.4%	8.4%
End-stage renal disease	0.8%	1.1%	0.9%	0.9%
Mean number of chronic conditions[d]	5.24	5.30	5.26	5.26

SOURCE Authors' analysis of fee-for-service Medicare claims for 2010. [a]Propensity score weights were used to balance the observed characteristics of patients in the intervention and control populations in each study year. Therefore, the effective sample sizes of the intervention and control populations in 2010 were 36,010 patients in each. After weighting, there were no differential changes on observed characteristics between the intervention and control populations from the pre- to the post-intervention periods, as shown in appendix exhibit 6 (see note 22 in text). [b]Patients originally eligible for Medicare because of disability. [c]Patients dually enrolled in Medicare and Medicaid (excluding recipients of partial Medicaid coverage through the Qualified Medicare Beneficiary, Specified Low-Income Medicare Beneficiary, or Qualified Individual programs). [d]Assessed from information in the Medicare Chronic Conditions Data Warehouse, which includes indicators for twenty-seven chronic conditions (for a list of these, see Chronic Conditions Data Warehouse. Condition categories [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; c 2018 [cited 2018 Feb 15]. Available from: https://www.ccwdata.org/web/guest/condition-categories). We assessed the presence of chronic conditions reported for each patient before the study year. Regression analyses were adjusted for indicators for each of these chronic conditions reported before each study year as well as for the patient's count of chronic conditions (in unit increments from 2 to 8 conditions versus 9 or more conditions).

program's third year (appendix exhibit 11).[22]

DIFFERENTIAL CHANGES IN PRICE-STANDARDIZED HOSPITAL SPENDING From before 2010 to after 2010, we found a nonsignificant $98 differential increase (exhibit 4) in annual price-standardized acute hospital spending per beneficiary in the intervention population, which was equivalent to 2.3 percent of the intervention group's baseline mean. However, given pre-2010 trend differences between the intervention and control populations (exhibit 2 and appendix exhibit 7),[22] it is unclear whether this differential change can be attributed to the global budget program. We did not find significant differential changes in price-standardized acute hospital spending in any specific post-implementation year (appendix exhibit 11).[22]

From before to after the 2010 payment change, we found a differential reduction of $57 in annual price-standardized outpatient department spending per beneficiary in the intervention population (exhibit 4). However, these changes reflected a continuation of trend differences that emerged before the implementation of the global budget program (exhibit 2 and appendix exhibit 7).[22] Given this pre-reform difference in trends, we cannot reliably attribute subsequent differential changes in outpatient department spending to the introduction of global budgets.

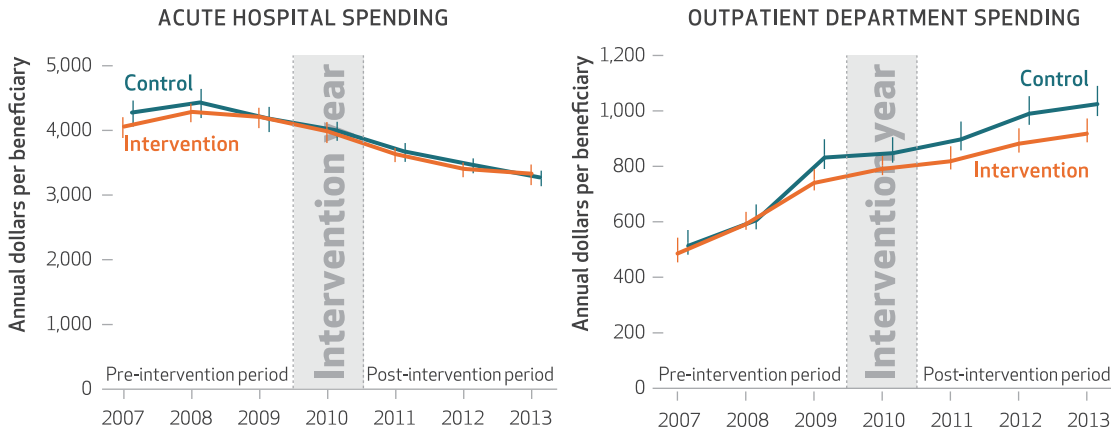
SENSITIVITY OF ESTIMATES TO THE CONTROL GROUP USED Our results were generally similar when we compared the intervention group to an alternative control population limited to Medicare beneficiaries in rural ZIP codes (appendix exhibit 12).[22]

Discussion

Over a three-year period following the introduction of global budgets in rural Maryland hospitals, we found no changes in acute hospital use (admissions, observation stays, and ED visits) or price-standardized hospital spending that could be attributed to the program. Although it may

EXHIBIT 2

Unadjusted annual price-standardized spending for acute and outpatient hospital services for Medicare beneficiaries in the intervention and control populations, 2007–13

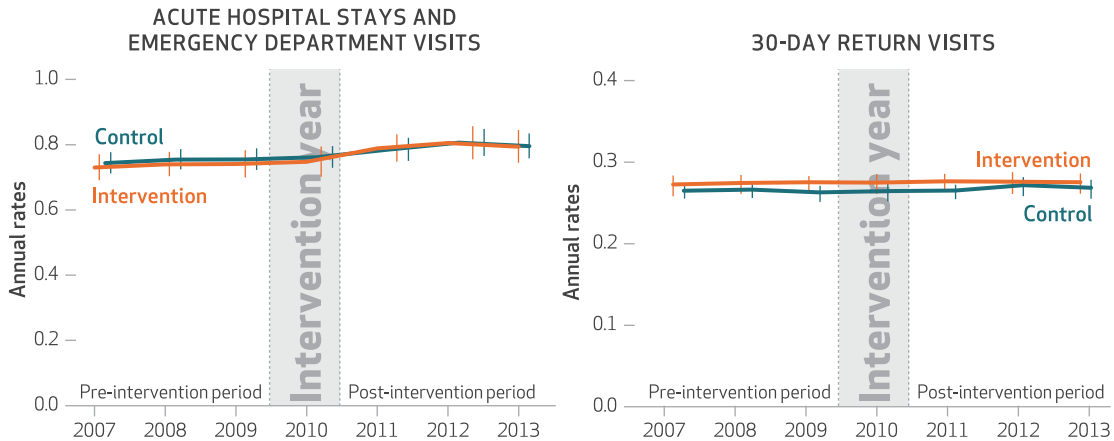


SOURCE Authors' analysis of fee-for-service Medicare claims for the period 2007–13. **NOTES** The error bars denote 95% confidence intervals and were calculated using standard errors clustered at the ZIP code level. Because Maryland's global budget program for rural hospitals was implemented in July 2010, we omitted 2010 from our regression analyses. "Acute hospital spending" is the sum of price-standardized spending associated with hospital stays (inpatient admissions and observation-unit stays) and spending associated with emergency department (ED) visits that did not result in an inpatient admission. "Hospital outpatient department spending" applies to services received at hospitals' outpatient facilities, excluding ED visits and observation stays. For details of how we standardized prices, see the text. Separate trends for price-standardized spending associated with hospital stays and ED visits that did not lead to an admission are plotted in appendix exhibit 8 (see note 22 in text).

take time for hospitals to gain experience operating under global budgets, we found no evidence of reductions in acute care use or price-standardized spending emerging by the program's third full year (2013). These results suggest that among Medicare beneficiaries, Maryland's introduction of global budgets in rural hospitals was not linked to reductions in hospital use that policy makers had hoped to achieve.

EXHIBIT 3

Unadjusted annual rates of acute hospital use per Medicare beneficiary, intervention and control populations, 2007–13



SOURCE Authors' analysis of fee-for-service Medicare claims for the period 2007–13. **NOTES** The error bars denote 95% confidence intervals and were calculated using standard errors clustered at the ZIP code level. Because Maryland's global budget program for rural hospitals was implemented in July 2010, we omitted 2010 from our regression analyses. Hospital stays include inpatient admissions and observation stays. ED visits are those that did not result in an inpatient admission. Thirty-day return acute hospital visits are patients' inpatient admissions, observation stays, and ED visits within thirty days of a first admission, observation stay, or ED visit (assessed annually among patients with at least one admission, observation stay, or ED visit during a given year). Separate trends for hospital stays and ED visits that did not lead to an admission are plotted in appendix exhibit 8 (see note 22 in text). Additional information about the measures' construction appears in section 3 of the appendix (see note 22 in text) and the notes to exhibit 4.

EXHIBIT 4

Changes in acute hospital use and spending from the pre- to the post-intervention periods in the intervention and control populations

Outcome	Unadjusted intervention population pre-period mean	Adjusted changes from the pre to the post period		Adjusted differential change[a]	
		Intervention population	Control population	Estimate	95% CI
ACUTE HOSPITAL USE					
All acute hospital use[b]	0.737	−0.007	−0.021	0.014	(−0.007, 0.036)
Hospital stays[b]	0.391	−0.078	−0.072	−0.006	(−0.020, 0.007)
ED visits[b]	0.346	0.071	0.051	0.020	(0.004, 0.036)
30-day return acute hospital visits[c]	0.271	−0.014	−0.014	0.000	(−0.007, 0.007)
PRICE-STANDARDIZED HOSPITAL SPENDING[d]					
All acute hospital spending	$4,185	−1,115	−1,213	98	(−69, 265)
Hospital stay spending	4,123	−1,152	−1,246	94	(−72, 260)
ED spending	62	37	33	4	(−2, 10)
Hospital outpatient department spending	618	393	450	−57	(−99, −15)

SOURCE Authors' analysis of fee-for-service Medicare claims for the periods 2007–09 (pre-intervention) and 2011–13 (post-intervention). **NOTES** Because Maryland's global budget program for rural hospitals was implemented in July 2010, we omitted 2010 from our regression analyses. Hospital stays, emergency department (ED) visits, and thirty-day return visits are defined in the notes to exhibit 3. Spending categories are defined in the notes to exhibit 2. CI is confidence interval. [a]Estimated using a weighted patient- and year-level linear regression model, adjusted for patient characteristics as well as year and ZIP code fixed effects. Propensity score weights balanced the observed characteristics of patients in the intervention and control populations in each study year. Section 5 of the appendix presents details of our statistical methods (see note 22 in text). [b]Annual number per beneficiary. [c]Annual proportion. [d]Annual price-standardized spending per beneficiary.

Our analyses addressed limitations of prior research on Maryland's program.[13–15] Prior studies compared affected populations in Maryland to out-of-state control groups, making it difficult to isolate any impacts of global budgets from other state trends. By using a within-state control group that exhibited more comparable pre-reform trends for acute hospital use, our study could more clearly isolate any changes in acute care use associated with global budgets. In addition, we examined outcomes over a longer post-implementation period than previous studies did, which allowed us to assess changes in use and spending as hospitals acquired greater experience operating under global budgets.

Finally, we examined Maryland's program in rural hospitals, which may be better positioned to implement population health management programs and capture any savings from improvements in care, compared with hospitals in urban markets. Even in this context, however, we saw no changes in hospital use that could be attributed to Maryland's global budget program after three years. Thus, we believe that this study provides the strongest evidence to date that Maryland's global budget program had no substantive impact on the use of hospital-based care among Medicare beneficiaries.

Two factors may account for these null findings. First, while Maryland's program sets global budgets for hospital care, it does not include services provided outside of hospitals and does not affect payments to physicians. This stands in contrast to other alternative payment models, including Medicare's accountable care organization (ACO) programs, whose budgets cover total spending and in which physician groups (not just hospitals) can bear risk.[4] Moreover, Medicare ACOs that have demonstrated success in reducing spending growth have been led by physicians rather than hospitals.[30,31] This may reflect the fact that outpatient physicians have stronger incentives than hospitals to reduce costly hospital use, as any savings accruing to physician groups would reflect total avoided payments to the hospital, whereas the savings accruing to a hospital would reflect only the marginal cost to the hospital of an admission. Thus, savings would be greater for physician groups because the hospital would still incur the fixed cost of an empty bed. By focusing incentives on hospitals while excluding physicians, Maryland's global budget program might not have provided sufficiently strong incentives for providers to reduce hospital use.

Second, although Maryland's program established annual budgets for hospitals, it did not actually pay hospitals prospectively each year. Hospitals continued to bill payers per visit and were expected to adjust their prices to meet their

budgets. This payment structure might have limited hospitals' incentives to lower utilization, since price increases were generally limited to no more than 5 percent.[13] (Larger price adjustments were subject to the review and approval of state regulators.)

Policy Implications

There is widespread interest in shifting from traditional fee-for-service payment to alternative payment models that give providers an economic incentive to manage their patients' care efficiently.[2–6] Maryland has used a unique alternative payment approach, setting an annual budget across all payers for each hospital, and there has been interest in expanding this payment model to rural hospitals in other states. Despite theoretical reasons why rural hospitals may be well positioned to respond to global budget incentives, we saw no evidence that Maryland's rural hospitals were successful in reducing hospital-based utilization beyond changes that would have been expected in the absence of global budgets.

Maryland has begun to address several limitations of its current payment model. In 2017 the state implemented a "care redesign program" aimed at further engaging hospitals in care coordination and the management of chronically ill patients.[32] In subsequent years, the state plans to establish spending benchmarks for the total cost of care (instead of just hospital-based care) and to align the financial incentives of hospitals and physicians.[33] It remains to be seen whether these adjustments will lead to substantial changes in the state's health care delivery system and, ultimately, patients' use of care. Ongoing evaluation of Maryland's program and other payment reforms is needed to identify which alternative payment models are most successful in changing how care is delivered.

Conclusion

We found no changes in hospital use among Medicare beneficiaries over a three-year period following the implementation of global budgets in rural Maryland hospitals. Our results underscore the need for policy makers to consider incentives for behavior change among hospitals and physicians when designing alternative payment models for hospital care. ■

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