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Evaluation of the Maryland All-Payer Model

Volume II: Final Report Appendices

Prepared for

Katherine Giuriceo, PhD
Centers for Medicare & Medicaid Services
Center for Medicare and Medicaid Innovation
Mail Stop WB-06-05
7500 Security Boulevard
Baltimore, MD 21244-1850

Prepared by

Susan Haber, ScD
Heather Beil, PhD
Marisa Morrison, PhD
Leslie Greenwald, PhD
Rebecca Perry, MSc
Linda Jiang, BA
Sam Masters, PhD
Regina Rutledge, PhD
Olivia Berzin, MPH
Maggie Cole-Beebe, PhD
Rose Feinberg, MPH
Lauren Zichittella, MS
Marianne Kluckman, MPH
William Parish, PhD
Vincent Keyes, MA
Douglas Kendrick, MStat
John Schneider, MS
Elise Hooper, BA
Lauren Mittman, BA*
Timothy O'Brien, MSc
Wendi Elkins, BA
Sandyha Joshi, MPH*
Rizwaan Lakhani, BS
Chloe McIntosh, AB
Alexander Rabre, MPH
Kara Suvada, BS*
Alton Wright, MPP*
Peter Amico, PhD**

* Formerly of RTI International
** Amico Consulting

RTI International
307 Waverley Oaks Road, Suite 101
Waltham, MA 02452

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VOLUME II: FINAL REPORT APPENDICES

by Susan Haber, Project Director
Heather Beil, Associate Project Director
Marisa Morrison, Leslie Greenwald, Rebecca Perry, Linda Jiang, Sam Masters, Regina Rutledge, Olivia Berzin, Maggie Cole-Beebe, Rose Feinberg, Lauren Zichittella, Marianne Kluckman, William Parish, Vincent Keyes, Douglas Kendrick, John Schneider, Elise Hooper, Lauren Mittman, Timothy O'Brien, Wendi Elkins, Sandyha Joshi, Rizwaan Lakhani, Chloe McIntosh, Alexander Rabre, Kara Suvada, Alton Wright, Peter Amico

Federal Project Officer: Katherine Giuriceo

RTI International

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ANALYTIC METHODS

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A.1 Primary Data Collection and Analysis

A.1.1 Key Informant Interviews and Hospital Site Visits

The RTI evaluation team conducted two types of qualitative data collection—telephonic interviews with key informants and in-person and telephonic hospital site visits comprising individual interviews and focus groups. Key informants selected for telephonic interviews included state officials; state regulators; professional advocacy organizations for health care providers; and representatives of consumer advocacy groups. We conducted 11 key informant interviews in 2018 and 2019, with each interview typically lasting 1 hour. Over the 5-year evaluation, RTI conducted a total of 38 key informant interviews.

In 2018 and 2019, we selected 18 hospitals for in-person site visits and 1 hospital for a telephonic site visit. For the telephonic site visit, we conducted joint interviews with hospital leaders and did not conduct focus groups. We conducted the site visits from March 2018 through March 2019. The hospital selection in 2018 sought a mix of independent and system-affiliated hospitals that had not been visited previously. In 2019, we selected the remaining hospitals that had not been visited in previous years. We also selected a specialty hospital focused on rehabilitation that did not operate under the All-Payer Model as a comparison to one Maryland acute care hospital that, despite its acute care designation, provides services similar to a specialty rehabilitation hospital. During the 5-year evaluation, the RTI site visit team conducted 49 site visits, of which all but 1 were in person.

During the in-person and telephonic site visits at 19 Maryland hospitals in 2018 and 2019, RTI staff interviewed 98 senior hospital leaders, including chief executive, financial, medical, and nursing officers, as well as upper-level managers responsible for case management, population health, and quality of care. Each of these interviews ranged from 45 minutes to 90 minutes depending on the individual's role and involvement in the Maryland All-Payer Model.

RTI worked with hospital staff to coordinate 2 focus groups at each of the 18 hospitals selected for an in-person site visit.[1] Each hospital was responsible for identifying and recruiting clinicians for the focus group discussions. At each hospital, one focus group consisted of physicians whose primary responsibility was providing direct patient care, rather than teaching or conducting research. The second focus group consisted of nursing and care management personnel who had direct patient interaction and included bedside nurses, nurse care managers, discharge planners, and other care management staff. We targeted these types of participants because we wanted to understand how clinicians' delivery of patient care changed in response to the All-Payer Model. We intended to exclude staff with management or supervisory roles, but it is possible they participated in some focus groups because hospitals were responsible for recruiting participants. It is common practice to exclude managers and supervisors from focus group discussions with their subordinates because including them can change subordinates' willingness to discuss topics candidly. All focus group participants signed an informed consent form. Focus group discussions covered the following topics: clinical care, care coordination, care

[1] We planned a total of 36 focus groups. However, we only completed 34 focus group discussions because 1 scheduled physician focus group was canceled due to lack of attendance, and 1 physician focus group consolidated physicians from 2 affiliated hospitals that shared staff.

transitions, quality of care, health care costs and utilization, and transformation of the Maryland health care workforce.

The RTI site visit team conducted 16 focus group discussions with a total of 103 physicians and 18 focus group discussions with a total of 135 hospital nursing and care management staff in 2018 and 2019. Physician focus group discussions included 2 to 16 participants and nursing focus group discussions included 3 to 13 participants. Although we attempted to recruit 10 to 12 participants for each focus group, the number of actual focus group participants varied by site, based largely on the availability and willingness of clinical staff to participate; the number of focus group participants did not vary by hospital size. By their nature, focus groups are not statistically representative of any individual hospital or its clinical staff and were intended to offer supplemental descriptive data. Our goal in these focus group discussions was to identify both common and unique perspectives based on the experience of a convenience sample of hospitals' clinical staff members. During the 5-year evaluation, the RTI team conducted a total of 92 focus group discussions with hospital clinicians, including 302 physicians and 421 hospital nursing and care management staff.

Notetakers cleaned the notes from the leadership interviews and transcripts of clinician focus group discussions and the interviewer or focus group moderator reviewed the cleaned documents. We developed a detailed codebook based on theoretical constructs from the Consolidated Framework for Implementation Research.[2] Before coding the qualitative material, our five-person coding team conducted interrater reliability (IRR) testing. Each team member participated in two rounds of IRR testing using a 1 percent sample of interviews and focus group discussion transcripts. Our team discussed situations where the IRR testing generated a Kappa coefficient of 95 percent or lower for a particular code and revised the code definition or the code to ensure a common understanding. We also conducted ongoing reliability reviews by having team members review their peers' coded materials and offer feedback and suggested changes to improve reliability of the codes. Coded data were stratified by site visit year.

A.1.2 Care Redesign Program Focus Groups

Our team conducted 18 focus groups with physicians participating in the Care Redesign Program (CRP). In addition, we held individual telephone interviews with three participating physicians. The focus group discussions took place from July to October 2018 and were conducted with assistance from the Henne Group. We conducted focus groups at 18 hospitals that (1) agreed to participate in the CRP on or before January 2018 and (2) had two or more physicians participating as Care Partners. Physicians who participated in focus groups received a $300 honorarium as compensation for their time and to cover participation expenses such as transportation to the group.

Although our goal was to include approximately 10 physicians in each focus group, some hospitals did not have enough Care Partners to meet this goal, so the number of focus group participants ranged from 2 to 11 physicians at each hospital. We conducted two focus group

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2 Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. *Implementation Science*, *4*(1), 50.

discussions each at two hospitals with a larger number of Care Partners. Most focus group discussions were conducted in person at a convenient location and time for physician participants, such as on the hospital campus in the early morning or evening. We used the focus group discussion guide to conduct telephonic interviews with physicians associated with two hospitals where there was no convenient location for an in-person focus group.

The Henne Group led focus group discussions with an RTI staff person present for follow-up questions and probes. All focus group participants signed an informed consent form. For physicians who participated by phone, we obtained informed consent electronically.

Focus group discussions covered the following topics: the hospital's impetus for participating in the CRP; changes in physicians' behaviors in response to the CRP; perceptions of the hospital's CRP implementation; and overall perspectives on the CRP and unintended consequences that resulted from the CRP. All physician focus groups were audio-recorded and transcribed.

We also conducted interviews at 18 hospitals with staff that had lead responsibility for the CRP. We conducted these interviews either in person during our annual site visit if we visited the hospital in 2017 or 2018; otherwise, we conducted interviews by telephone. Our team reviewed each hospital's CRP implementation protocol to identify key CRP staff. We interviewed more than one individual at hospitals where there were multiple staff with lead responsibility for CRP implementation. We conducted interviews in advance of the CRP focus group discussions to provide background on the hospital's decision to participate in the CRP, CRP implementation in general, physician engagement in the CRP, and CRP implementation progress.

RTI staff reviewed notes from the leadership interviews and transcripts of the physician focus group discussions and organized them using a thematic analysis approach.

A.1.3 Hospital Survey

Survey content and data collection methods—We conducted a survey to learn how hospitals responded to the All-Payer Model and to the CRP. The survey was designed to complement information gathered through hospital site visits and focus group discussions by providing more readily quantifiable responses at a consistent point in time. The survey consisted of 32 multiple choice questions and 4 opened-end questions (see ***Appendix B***). The survey was designed to take no more than 20 minutes to complete and covered the following topics: hospital strategies adopted in response to the All-Payer Model; hospital workforce, leadership and staff engagement; early strategies and perceptions related to the CRP; and overall perspectives on the All-Payer Model implementation process.

RTI worked with its subcontractor, the Henne Group, to develop and field the survey. The Henne Group used an electronic survey platform to create a user-friendly, mobile-compliant survey. The survey platform allowed users to save their responses and return to the survey before submitting it. Prior to fielding the survey, the Henne Group, RTI, and Centers for Medicare & Medicaid Services (CMS) staff user-tested the survey to ensure that the information was presented as intended and that the skip patterns worked as anticipated.

The survey was fielded to hospital chief financial officers (CFOs) from October through December 2018. The Henne Group sent the survey to all 47 general acute care hospitals in the state. ***Table A-1*** presents the steps followed in fielding the hospital survey. Each CFO received a unique survey link generated by the survey platform. CFOs received both e-mail and telephone reminders to complete the survey.

Table A-1
Steps for fielding the hospital survey

Step	Date
E-mail prenotification letter sent to all hospital CFOs	October 12, 2018
E-mail web-based survey link sent to hospital CFOs	October 29, 2018
First e-mail reminder with survey web link sent to hospitals that had not responded to the survey	November 5, 2018
Second e-mail reminder with survey web link sent to hospitals that had not responded to the survey	November 8, 2018
Telephone follow-up conducted with hospitals that had not responded to the survey	November 12–December 12, 2018
MHA contacted non-respondent hospitals	November 26–December 1, 2018
Survey closed	December 12, 2018

CFO = chief financial officer; MHA = Maryland Hospital Association.

We achieved a 100 percent response rate. To accomplish this, RTI collaborated with the Maryland Hospital Association, which conducted follow-up calls to hospitals that had not responded to the survey after 1 month. We also informed the Health Services Cost Review Commission (HSCRC) about the survey administration and timeline so that they could direct questions about the survey to the RTI team.

Survey analysis—Survey data were cleaned to identify missing responses and incomplete surveys. Hospitals with missing or incomplete responses to a particular question were excluded from analyses of that question. We did not use imputation for this survey because it focused on implementation and was not intended to provide generalizable population estimates.

Once cleaned, we calculated response category frequencies for multiple choice questions. We reviewed and categorized open-ended responses where there were common responses. We also incorporated survey data about activities and strategies implemented by hospitals in the comparative case study analyses to identify the relationship between hospital activities and strategies and All-Payer Model outcomes (see ***Section A.3***).

A.2 Secondary Data Analysis

To estimate the effect of the Maryland All-Payer Model on a broad variety of outcomes, we conducted quantitative analyses using several secondary data sources. We present results of both descriptive trends and difference-in-differences (D-in-D) analyses for outcomes across six of the evaluation domains: (1) hospital financial performance, (2) service utilization and expenditures, (3) quality of care, (4) service mix, (5) spillover effects, and (6) comparison of payment rates under all-payer rate setting with other payment systems. In addition, we conducted difference-in-difference-in-differences (DDD) analyses to assess whether the impacts of the All-Payer Model differed by hospital and population subgroups. This section of the appendix details the methods used for each of these domains. We describe methods used for all domains except hospital financial performance and payment rate comparisons under methods for claims analyses.

A.2.1 Hospital Financial Performance

The analyses of hospital financial performance in ***Section 3*** include information from 46 of the 47 Maryland acute care hospitals. We excluded Holy Cross Germantown, which opened in October 2014, because it did not operate under the global budget model until fiscal year (FY) 2016.

The analyses subdivided facilities into five major hospital characteristic categories (***Table A-2***). We defined hospital characteristics using the 2014 Inpatient Prospective Payment System (IPPS) Impact File and the Maryland Health Care Commission's (MHCC) *Annual Report on Selected Maryland Acute Care and Special Hospital Services* for FY 2015. To maintain consistent comparisons over time, we did not redefine hospital characteristics using updated information. The IPPS Impact File, which was used to define teaching status and disproportionate share hospital (DSH) percentage, combines data for the University of Maryland at Dorchester with those for the University of Maryland Shore Medical Center at Easton. Therefore, we based teaching status and DSH percentage for these hospitals on their combined information in the IPPS Impact File.

We determined adherence to global budgets using global budget and total revenue data obtained from HSCRC for FY 2014, FY 2015, FY 2016, FY 2017, and FY 2018. HSCRC provided a list of hospitals receiving penalties for failing to adhere to their budgets in FY 2015, FY 2016, and FY 2017 and the amounts of penalties.

We calculated hospital charged rates for the selected services used in the analyses from the HSCRC Revenue and Volumes Report, which contains inpatient and outpatient revenue and volume data by rate center for each Maryland hospital, including services provided to Maryland residents and nonresidents. We used final Revenue and Volumes Reports for FYs 2014–2018 (last two quarters only for FY 2014). We derived individual hospital rates by rate center set by HSCRC from hospital rate orders for each FY. We obtained information on approval to vary rates beyond the 5 percent corridor from quarterly reports submitted by HSCRC to CMS.

Hospital statements of revenues and expenditures for FYs 2012–2018, obtained from HSCRC, include information on regulated and unregulated revenues, operating expenses, and operating margins (percentage excess or deficit of operating revenues net of deductions and operating expenses relative to operating revenues net of deductions).

Table A-2
Number of Maryland hospitals by selected characteristics

Hospital characteristic	Number of hospitals[*] (percentage of all hospitals)
All Maryland hospitals	46 (100)
Participated in TPR	
No	36 (78)
Yes	10 (22)
Number of inpatient beds	
<150	14 (30)
150–349	23 (50)
350+	9 (20)
Teaching status†	
IBR ≤ 5%	33 (72)
IBR > 5%	13 (29)
DSH percentage †	
<20	18 (39)
20–30	16 (35)
>30	12 (26)
Hospital system affiliation	
Affiliated	29 (63)
Nonaffiliated	17 (37)

TPR = Total Patient Revenue.

[*] The analyses include information from 46 of the 47 Maryland acute care hospitals. Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because it did not operate under a global budget until FY 2016.

† Intern-to-bed ratio (IBR) and disproportionate share hospital (DSH) percentage were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for University of Maryland Medical Center at Dorchester are reported under University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File.

A.2.2 Claims Analyses

Descriptive analyses of utilization, expenditure, and quality-of-care outcomes—For the descriptive analyses of key utilization, expenditure, and quality-of-care trends, we present graphs of annual averages for Maryland and the comparison group for the baseline period (2011–2013) and the first 4.5 years of the All-Payer Model period (2014–June 2018) for Medicare beneficiaries and the first 4 years of the All-Payer Model period (2014–2017) for commercial plan members. We weighted the annual averages by the product of two factors: (1) the fraction of the year during which the beneficiary was eligible for the analyses (the eligibility fraction) and (2) the beneficiary's propensity score. In addition, we present graphs of annual averages for Medicaid beneficiaries in Maryland and a comparison group comprised of 3 comparison states

(Illinois, Kansas, and North Carolina) for a baseline period (2011–2012)[3] and the first 4 years of the All-Payer Model period (2014–2017). For Medicaid, we present graphs for the rate of inpatient admissions per 1,000 beneficiaries, the rate of emergency department (ED) visits per 1,000 beneficiaries, and total expenditures. We weighted the annual averages for Medicaid beneficiaries by the eligibility fraction only because we did not do propensity score weighting or regression modeling for the Medicaid population.

Because some individuals were not enrolled in health insurance throughout an entire year, we calculated eligibility fractions for each individual. The eligibility fraction is defined as the total number of months the person was enrolled in each year divided by the total number of months in a year. For example, an individual enrolled in Medicare for 6 months of a year has an eligibility fraction of 0.5 for that year.[4] In both the calculation of weighted average outcomes and the regression models for person-level outcomes, the eligibility fractions downweight observations for beneficiaries who are not eligible for the full year because there is greater uncertainty about the information, so the observations exert less influence on the analyses.

Baseline analyses for difference-in-differences models—D-in-D models assume that the outcomes for the intervention and comparison group followed a similar growth trend during the baseline period. We investigated whether the baseline period before the start of All-Payer Model satisfied the baseline trend assumptions of a D-in-D model—that is, whether the outcome trends in Maryland and in the comparison group were similar during this period. The following section describes the baseline analysis we conducted to inform the D-in-D model.

To test the assumption that Maryland and the comparison group had parallel baseline trends, we estimated the D-in-D model in ***Equation A.1*** for the baseline period only and expanded the model by including a set of interactions between I_j (the Maryland indicator) and the indicators for the baseline years on the right-hand side of the model, as shown in ***Equation A.2***. We conducted a joint significance test of the interactions between the Maryland indicator and the baseline years. Statistically significant interaction coefficients indicated that the outcome difference between Maryland and the comparison group increased or decreased in particular baseline years.

$$O = \alpha_0 + \alpha_1 I + \Sigma\beta_n Y_{n,b} + \Sigma\beta_t Y_{t,p} + \Sigma\varphi_t Y_{t,p} \bullet I + \lambda X + \varepsilon, \qquad (A.1)$$

[3] We excluded 2013 from the baseline period because data were incomplete.

[4] The maximum eligibility fraction for 2018 is 0.5 because we only have 6 months of data for the year. We chose to not prorate people who died in a period differently because we did not expect there to be a difference in the death rate between Maryland and comparison areas. The unweighted annual mortality rates for the Medicare population are similar in Maryland and the comparison group and there is little change over time for either group. Mortality rates are less than 4 percent in all years in both groups, and the rate in Maryland is consistently 0.1–0.2 percentage points lower than in the comparison group.

where

O	=	a performance measure (e.g., total per beneficiary per month [PBPM] cost per year) for the *i*-th beneficiary in the *j*-th group (Maryland or comparison), in period t (*i,j,t* subscripts suppressed).
I	=	a 0,1 indicator (0 = comparison group, 1 = Maryland).
X	=	a vector of patient, county, and hospital characteristics.
$Y_{n,b}$, $Y_{t,p}$	=	0,1 indicator of the *n*-th or *t*-th year; in the baseline (b) or post (p) period (*n* starts counting at first baseline period year, while *t* starts with first All-Payer Model period year).
ε	=	error term.

We estimated the parameters of ***Equation A.2*** using weighted least squares, count, or logit regression models for 12 key outcomes. The weights are a function of the eligibility fraction and propensity scores. For each outcome, we report estimates and standard errors of the difference between the baseline trend in Maryland and the comparison groups (λ).

$$O = \alpha_0 + \alpha_1 I + \Sigma\beta_n Y_{n,b} + \Sigma\varphi_t Y_{n,b} \bullet I + \lambda X + \varepsilon, \tag{A.2}$$

We estimated the baseline trend differences for both Medicare beneficiaries and commercial plan members for all outcomes, including the following core outcomes:

- Total expenditures
- Inpatient facility expenditures for acute care hospitalizations
- Expenditures for ED visits
- Expenditures for other hospital outpatient department services
- Payments per acute inpatient admission
- Payments per ED visit
- Count of acute inpatient admissions (probability for commercial plan members)
- Count of ED visits (probability for commercial plan members)
- Probability of any ACSC admission
- Probability of an unplanned readmission within 30 days after an inpatient discharge
- Probability of a follow-up visit within 14 days after an inpatient discharge

- Length of stay (LOS) for an acute admission

As detailed in ***Appendix J***, we found statistically significant differences at $p<0.05$ in baseline trends for 7 of the 12 core measures we assessed for Medicare beneficiaries and for 1 of the 12 core measures we assessed for commercial plan members. Additionally, four core outcomes for commercial plan members had a statistically significant difference at $p<0.10$. Although baseline trends generally appeared similar based on visual inspection, we concluded that we could not assume that the Medicare population in Maryland and the comparison group were on the same trajectory before the implementation of the All-Payer Model, but the commercial insurance populations were on the same trajectory. For Medicare, we opted to take a conservative approach that allowed us to generate effect estimates that net out the potential baseline differences between Maryland and the comparison group. To do this, we included an interaction term between the Maryland indicator and a linear time trend in the final model, described in detail below. The linear time trend controls for differences between Maryland and the comparison group that began in the baseline period and continued through the All-Payer Model period. As such, the D-in-D interaction term measures the deviation of the difference between Maryland and the comparison group in the All-Payer Model period from the trend line beginning in the baseline period. This model specification adjusts for underlying trend differences between Maryland and the comparison group, and allows for a straightforward interpretation of the D-in-D coefficient.

D-in-D regression model—Commercial insurance analyses used the D-in-D model shown in ***Equation A.1***. The D-in-D model used for Medicare analyses is shown in ***Equation A.3***. The Medicare model includes the annual interaction terms from ***Equation A.1*** along with a linear time trend. As in ***Equation A.1***, O is the outcome for individual i in state (Maryland or comparison group) j in year t (i,j,t subscripts suppressed); I (=0,1) is an indicator equal to 1 if the individual is in Maryland and 0 if the individual is in its comparison group; and t is a linear time trend ranging from 1 to N, where t=1 in the first calendar year (2011) and N in the last calendar year of available data for each payer (8 for Medicare, 7 for commercial). The term that interacts the Maryland indicator and time (I*t) measures differences in trends between Maryland and the comparison group over the entire period. $Y_{t,p}$ is a series of yearly dummies for the post-All-Payer Model years. The interaction of the Maryland indicator and $Y_{t,p}$ ($I * Y_{t,p}$) measures the difference in the pre-post change between Maryland and the comparison group and is the estimate of the All-Payer Model's impact on the outcome of interest. With this model specification, the post year*Maryland interactions measure any deviation from the trend line in the All-Payer Model period.

$$O = \alpha_0 + \alpha_1 I + \beta_1 t + \beta_2 I \bullet t + \Sigma\beta_n Y_{n,b} + \Sigma\beta_t Y_{t,p} + \Sigma\varphi_t Y_{t,p} \bullet I + \lambda X + \varepsilon, \qquad (A.3)$$

For both Medicare and commercial insurance analyses, we estimated all the population-based regression models with the beneficiary- or plan member-year as the unit of analysis. All admission- or visit-level outcomes used the admission or visit as the unit of analysis, with observations assigned to a year based on date of service.[5] We modeled ED visits, inpatient admissions, outpatient medical exam visits across all sites of care, and inpatient admission LOS as count models for the Medicare population.[6] We also used a count model for LOS and outpatient medical exam visits across all sites of care for commercial plan members. For commercial plan members, we converted annual inpatient admission and ED visit utilization counts into binary outcomes (1 = any use) and used weighted logistic regression models. Count models were not appropriate for commercial plan members because of the low occurrence of multiple hospitalizations and ED visits for individual members in any year; however, we multiplied the marginal effect from the logistic regression models by 1,000 to obtain approximate rates of utilization per 1,000 members. Multiplying the marginal effect by 1,000 does not produce an exact rate of utilization per 1,000 members because it assumes no person has more than one visit or admission per year. However, we concluded that this is a reasonable approximation because at least 95 percent of commercial plan members had zero or one ED visit or admission per year. For expenditure outcomes and DRG weight, we used weighted least square models. For all binary outcomes, we used weighted logistic regression models.

<u>Control variables</u>. Control variables depended on whether the outcome was a person-level, ED visit-level, or admission-level outcome and whether the model was for the Medicare or commercially insured population.

Control variables for person-level models for the Medicare population included person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category [HCC] risk score, number of chronic conditions in previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

Section 4 includes mostly person-level models. ***Section 4*** also includes an ED visit-level model for payment per ED visit and admission-level models for LOS and payment per inpatient admission. These ED visit-level and admission-level models included the same control variables as the person-level models.

Sections 5–7 present findings from several admission-level models. All Medicare admission-level models in these sections included not only the person-level and county-level variables in the person-level models but also three hospital-level variables: hospital's resident-to-bed ratio, number of short-term acute beds, and DSH percentage. Some Medicare admission-level outcome models included additional covariates. In ***Section 6*****,** the case-mix-adjusted

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5 For admission level outcomes, we used the discharge date in Medicare data and admission date in MarketScan data. We used admission date for MarketScan data because admissions are included in the MarketScan file for a given calendar year if the admission date falls in that year. For visit-level outcomes, we used the service date.

6 For the Medicare analyses, we used negative binomial models for ED visits, inpatient admissions, outpatient medical exam visits across all sites of care, and LOS. Because the negative binomial for LOS prior to PAC transfer did not converge, we used a Poisson model instead.

payment per discharge outcome model also controlled for area wage index. The model for the percentage of admissions that came through the ED, also in ***Section 6*****,** included variables for admission-level diagnosis-related group (DRG) weight and whether an admission came from a skilled nursing facility.

The Medicare models estimating hospitals' avoidance of costly admissions in ***Section 7*** also controlled for admission-level DRG weight, whether an admission came from a skilled nursing facility, and whether an admission came through the ED. The two Medicare models for inpatient episodes of care payments in ***Section 7*** controlled for area wage index and DRG weight.

There is one ED visit-level outcome, whether an ED visit resulted in an admission, in ***Section 6***. The Medicare model for this outcome controlled for person-level variables, county-level variables, hospital resident-to-bed ratio, number of short-term acute beds in the hospital, and the hospital's DSH percentage.

All models for commercial plan members included the same control variables. We included individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial insurance plan type) and the urban/rural status of the county. We did not include the HCC risk score in the model because commercial HCC risk scores are concurrent and therefore may be endogenous with outcomes, particularly spending and utilization. We did include the HCC score in the propensity score model to balance the populations on health risk, however, so the propensity score weights adjust for risk. We could not include other county-level variables because MarketScan does not identify geographic areas with fewer than 50,000 people and we could not include hospital-level control variables because MarketScan does not include hospital identifiers.

<u>Weighting and clustering</u>. We estimated all regression models using weighted least squares. We weighted person-level models by the propensity score times the eligibility fraction; we weighted admission- and ED visit-level analyses by the propensity score. In addition, all models used clustered standard errors. For models using Medicare data, beneficiary-level models were clustered at the hospital service area (HSA) level to account for correlation across observations within the same market area. Admission-level and ED visit-level analyses were clustered at the hospital level. For MarketScan, all analyses were clustered at the HSA level.

<u>Adjusted means</u>. We used parameters estimated from the D-in-D models to calculate regression-adjusted means for the baseline and All-Payer Model periods for Maryland and the comparison group to illustrate whether the outcome increased or decreased from the baseline period to the All-Payer Model period for each group. The regression-adjusted D-in-D estimate and the D-in-D calculated from regression-adjusted means will differ for one of two reasons.

First, in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. To address this bias, we use the nonlinear approach described in Puhani to calculate the regression-adjusted D-in-D estimate

(2012).[7] In some cases the bias may be extreme, leading to a substantial difference between the regression-adjusted D-in-D estimate and the D-in-D calculated from regression-adjusted means.

Second, in both linear and nonlinear specifications, the D-in-D calculated from the regression-adjusted means for the All-Payer Model period overall may differ substantially from the overall regression-adjusted D-in-D estimate because we use different weights to obtain these estimates. Specifically, the regression-adjusted D-in-D estimates are weighted using the number of Maryland beneficiaries observed in each year relative to the total number of Maryland beneficiaries ever observed during the All-Payer Model period. This is mathematically equivalent to weighting the All-Payer Model period adjusted means for both groups with the same weights that are applied to Maryland. However, the overall All-Payer Model period adjusted means presented for the comparison group are weighted using the number of comparison beneficiaries observed in each year relative to the total number of comparison beneficiaries ever observed during the All-Payer Model period. The implication of this is that in cases where there are large differences over time in the change in beneficiaries between Maryland and the comparison group, the D-in-D calculated from the overall regression-adjusted means may differ substantially from the overall regression-adjusted D-in-D estimate.

Calculation of overall D-in-D estimates. Overall D-in-D estimates are a weighted average of the annual D-in-D estimates. The weights used for calculating the weighted average were based on the number of observations in the treatment group in each model year. We calculated overall standard errors as a function of the weighted annual standard errors. We then used the overall standard errors to create confidence intervals and p-values for overall D-in-D estimates. We also created overall adjusted means for Maryland and the comparison group for the All-Payer Model period as a weighted average of annual adjusted means for the two groups.

Probability of savings estimates—In addition to the frequentist D-in-D approach described above, we used a "Bayesian lite" approach to make probabilistic statements about impacts on total expenditures and total hospital expenditures for the Medicare population to help policymakers understand the potential for any savings. The "Bayesian lite" approach uses the coefficient and standard error from the frequentist D-in-D regression analysis to produce a distribution of the likelihood of savings or loss at different threshold values (for example, the probability of saving more than $25 or $50). For this analysis, we chose a threshold value of $7.49 PBPM, which is the amount required for Maryland to save Medicare $330 million over the 5 years of the model. We calculated the PBPM savings necessary to reach $330 million over 5 years by dividing $330 million by 44,049,392 (12 months * 5 years * 734,157, where 734,157 is the average weighted number of Medicare beneficiaries per month over the first 4.5 years of the All-Payer Model). Given a large sample size and uniform priors, the "Bayesian lite" approach should produce probabilistic statements that are similar to results from a Bayesian analysis. For the Medicare analysis, our total sample size for expenditure outcomes exceeds 10 million person-years. Moreover, Maryland has operated an all-payer hospital rate-setting system since the mid-1970s, and it is the only state in the nation that is exempt from Medicare's IPPS and Outpatient Prospective Payment System (OPPS). Given the uniqueness of the Maryland All-Payer Model,

[7] Puhani, P. (2012). The treatment effect, the cross difference, and the interaction term in nonlinear ''difference-in-differences'' models. *Economics Letters, 115*, 85–87.

we do not have experience from similar models to support informative priors. We produced the annual estimates of savings using the D-in-D model for the main Medicare analysis. In addition, we produced cumulative estimates of savings by running a separate D-in-D model for each year of the model that estimated the cumulative effect by adding a year of data to each model. That is, we ran five models, the first used 2014 only as the implementation period, the second used 2014–2015 as the implementation period, and so forth until the fifth used 2014–2018 as the implementation period.

Methodological changes from the Third Annual Report. In this report, we changed from clustering at the beneficiary level to clustering at the HSA level for population-level outcomes because clustering at the higher level is generally recommended to obtain consistent standard errors, as long as there is a sufficient number of higher level clusters. We conducted sensitivity analyses and determined that clustering at the HSA level had only a minor effect on the results for core outcomes for the time period included in the Third Annual Report.

In addition, for this report we conducted sensitivity analyses for all outcomes for the Medicare population using the standard D-in-D approach that excludes the linear time trend to assess whether our findings were sensitive to the inclusion of the linear time trend. We also conducted sensitivity analyses for all outcomes for the commercial insurance population using the D-in-D model that includes a linear time trend. Results of the sensitivity analyses are reported in ***Appendix J***.

We updated the specifications for four outcome measures: unplanned readmissions within 30 days of discharge, follow-up visit within 14 days of hospital discharge, ED visit within 30 days of hospital discharge, and unplanned admission. We made these changes because an updated version of the Yale all-cause hospital-wide unplanned readmissions measure was released in March 2018.[8] Like the Yale measure, our unplanned readmissions measure excluded index admissions and readmissions for rehabilitation. In prior years, we identified these admissions for rehabilitation using broad diagnosis categories from the Agency for Healthcare Research and Quality's Clinical Classification Software. However, for this report, the unplanned readmissions measure—following the 2018 version of the Yale measure—also identified and excluded admissions and readmissions for rehabilitation using revenue center codes 0024, 0118, 0128, and 0148. The follow-up visit within 14 days of hospital discharge, ED visit within 30 days of discharge, and unplanned admissions measures likewise excluded admissions for rehabilitation; these measures also used rehabilitation revenue center codes to identify admissions for rehabilitation.

We also changed the methodology for identifying admissions with major or extreme severity or risk of mortality. In previous reports, we used the updated version of the 3M All Patient Refined (APR) DRG Grouper for each fiscal year. In this report, we used version 32 of the 3M APR DRG Grouper for all claims that included ICD-9 codes and version 34 of the grouper for all claims that included ICD-10 codes. Version 32 was the most recent version of the grouper that processed claims with ICD-9 codes, and version 34 was the most recent grouper

8 Yale New Haven Health Services Corporation—Center for Outcomes Research & Evaluation. (2018). 22018 All-cause hospital wide measure updates and specifications report: Hospital-level 30-day risk-standardized readmission measure – version 7.0.

version available on the Chronic Conditions Data Warehouse at the time of our analysis. We used only two grouper versions—rather than using an updated grouper version for each fiscal year—because annual changes in the grouper's methodology created discontinuities in unadjusted trends for outcomes created using the grouper.

Finally, we annualized counts of Medicare inpatient admissions, ED visits, and medical exam visits by dividing the count for each beneficiary in each year by that beneficiary's eligibility fraction. We then rounded the annualized count to the nearest integer. In previous reports we did not adjust for partial year eligibility. This adjustment was important in the Final Report Medicare analyses because we only had 6 months of data for 2018. For consistency, we annualized counts for all years for the Medicare population, as well as for the commercially insured population analyses.

Subgroup analyses—We conducted claims-based analyses to assess whether the impacts of the All-Payer Model differed by hospital and population subgroups.

DDD regression model. To examine the differences by hospital and population subgroup for Medicare, we used a DDD model. By extending the D-in-D approach to a triple difference, we explored the differential effects of the Maryland All-Payer Model by hospital characteristics of interest, such as participation in the Total Patient Revenue (TPR) system, or by population characteristic, such as beneficiaries with multiple chronic conditions (MCCs). The DDD approach used a three-way interaction term between an indicator variable for being in Maryland, the All-Payer Model period indicator variable, and the hospital or population characteristic of interest. The DDD model is shown in ***Equation A.4***. We also conducted sensitivity analyses using a model that excluded the linear time trend.

The model included the same variables included in ***Equation A.3***, as well as interactions between the hospital/population subgroup of interest and year and group:

$$O = \alpha_0 + \alpha_1 I + \beta_1 t + \beta_2 I \bullet t + \Sigma\beta_n Y_{n,b} + \Sigma\beta_t Y_{t,p} + \Sigma\varphi_t Y_{t,p} \bullet I + \Sigma\varphi_2 I \bullet Y \bullet G + \lambda X + \varepsilon \qquad (A.4)$$

Y is a series of yearly dummies for the baseline and post years as noted in ***Equation A.3***. The interaction of the Maryland indicator and Y ($I*Y$) measures the difference in the pre-post change between Maryland and the comparison group. The interaction of the Maryland indicator and Y and the subgroup (G) of interest ($I*Y*G$) measures the difference in the pre-post change between Maryland and the comparison group for a specific subgroup of interest. The model also includes interaction terms between the subgroup and the Maryland indicator, the subgroup and time, the subgroup and time and the Maryland indicator, as well as the subgroup and the All-Payer Model period year indicators (excluded from ***Equation A.4*** for brevity). All control variables (X) in the subgroup models were the same as those included in the overall outcome models.

The DDD parameter, φ_2, shows whether the between-group difference *for a specific subgroup*, increased ($\varphi_2>0$) or decreased ($\varphi_2<0$) relative to its comparator subgroup after the All-Payer Model was implemented. For example, if the All-Payer Model was more successful in reducing expenditures or utilization in Maryland relative to the comparison group for people with MCCs than for people who do not have MCCs, then $\varphi_2<0$. In the model output, we display the p-value for the statistical test of $\varphi_2=0$.

Subgroups. We examined the following hospital-specific subgroups:

- Hospitals that participated in the TPR system vs. those that did not. Comparison group hospitals took the TPR participation status of their matched Maryland hospitals. We assigned TPR participant status to comparison group hospitals that matched with both Maryland hospitals that participated in TPR and hospitals that did not participate so that the TPR participation subgroups are mutually exclusive.

- Teaching vs. non-teaching hospitals. We categorized hospitals as teaching if they had a resident-to-bed ratio of greater than 0.05. We categorized all other hospitals as non-teaching.

- High DSH percentage vs. low/medium DSH percentage hospitals. We categorized hospitals as high DSH percentage if they had greater than or equal to 30 percent of total inpatient days for those on Supplemental Security Income or Medicaid. We categorized all other hospitals as low/medium DSH percentage.

- Accountable care organization (ACO)-aligned hospitals vs. non-aligned hospitals. We categorized hospitals as ACO aligned if they were affiliated with an ACO at any point in the 8-year study period. We categorized a hospital that was never affiliated with an ACO during the study period as non-aligned.

We examined the following beneficiary-specific subgroups:

- Urban vs. rural residence. We determined urban or rural residency status based on a beneficiary's county of residence and the 2013 Rural-Urban Continuum Code (RUCC) assigned to that county. We defined beneficiaries as urban residents if they lived in metropolitan areas with a RUCC of 1, 2, or 3. We defined beneficiaries as rural residents if they lived in non-metropolitan areas with a RUCC of 4, 5, 6, 7, 8, or 9. This included beneficiaries in urban areas adjacent to a metropolitan area and beneficiaries in rural areas.

- Presence of MCCs vs. absence of MCCs. We categorized beneficiaries as having MCCs if they had greater than one chronic condition in the prior year. We categorized beneficiaries as not having MCCs if they had one or zero chronic conditions in the prior year.

- Original reason for Medicare entitlement based on age vs. disability. We categorized beneficiaries as disabled if their Medicare original entitlement reason was disability insurance benefits, end-stage renal disease, or both. We categorized all other beneficiaries as being originally entitled to Medicare based on age.

- Dual Medicare/Medicaid eligibility vs. Medicare only. We categorized beneficiaries as dually eligible if they were simultaneously enrolled in both Medicare and Medicaid at any time in a given year. We categorized all beneficiaries who were never enrolled in Medicaid and Medicare simultaneously as non-dual in that year.

- White vs. non-white race. We categorized beneficiaries as white if their race was coded as white in the Medicare Beneficiary Summary File (MBSF). We categorized all beneficiaries whose race was not coded as white in the MBSF as non-white.

Outcomes. For the hospital subgroups, we analyzed the following outcomes:

- Case-mix-adjusted payment per discharge
- DRG weight per admission
- Unplanned readmissions within 30 days of hospital discharge
- Follow-up visit within 14 days of hospital discharge

For the beneficiary subgroups, we analyzed the following outcomes:

- Total expenditures PBPM
- Total hospital expenditures PBPM
- Inpatient facility expenditures PBPM
- ED visit expenditures PBPM
- Other hospital outpatient department expenditures PBPM
- Number of inpatient admissions
- Number of ED visits
- Unplanned readmissions within 30 days of hospital discharge
- Follow-up visit within 14 days of hospital discharge

A.2.3 Comparison of Payment Rates under All-Payer Rate Setting with Other Payment Systems

The analyses described below provide a counterfactual of what would have been paid in Maryland in the absence of all-payer rate setting. We made three types of comparisons: (1) comparison of Medicare payments to Maryland hospitals for inpatient services with what would have been paid under IPPS; (2) comparison of commercial insurance payments for inpatient services in Maryland with commercial insurance payments for inpatient services provided to comparison group residents; and (3) comparison of Medicare payments to Maryland hospitals for hospital outpatient services with what would have been paid under OPPS.

IPPS comparison—We used two comparisons for the Medicare payments in Maryland: (1) Medicare payments for admissions to a group of matched comparison hospitals that operated under the IPPS; and (2) Medicare claims for admissions to Maryland hospitals that were repriced to approximate what would have been paid by Medicare if Maryland had operated under the IPPS. Both comparisons are based on the weighted average payment per inpatient admission for the same mix of admissions.

Comparison group analyses. The first analyses compared payments for admissions to Maryland hospitals with payments for admissions to the comparison group hospitals. Medicare payments to the comparison hospitals served as a proxy for what Maryland hospitals would have been paid under the IPPS. We excluded any DRG that was not present in both Maryland and the comparison group in each year. Analyses included Medicare claims data for inpatient discharges from CY 2011 through CY 2018 (January through June only). To ensure a fair comparison, we added the per diem payments (bad debt, organ acquisition, capital pass through, and direct graduate medical education) to the comparison group's IPPS payment amounts because reimbursement for these costs are incorporated in Maryland's all-payer rates. We calculated Medicare inpatient payments for each inpatient stay for all admissions to eligible Maryland and comparison group hospitals. We limited analyses to those admissions for which the beneficiary was Medicare fee-for-service, the beneficiary was eligible for Parts A and B, Medicare was the primary payer, and the beneficiary was alive at admission. In addition, in each year we excluded any denied claims and any DRG that had a zero paid value for either Maryland or the comparison group. The process for creating the weights used for the weighted averages is described below.

Table A-3 is a simplified example of the approach to creating weighted average payments for Maryland and comparison group hospitals. As shown in this example, we weighted the comparison group to have the same proportion of admissions for each DRG as Maryland hospitals overall. ***Table A-3*** below shows a hypothetical distribution of a universe of two DRGs for Maryland and the comparison group. The Maryland distribution of 100 admissions was split evenly between the two DRGs. Using their own DRG shares, the comparison group distribution was split 37/63 between the two DRGs. To calculate the average comparison group payment for the same distribution of DRGs, we reweighted the comparison group to have the same distribution of DRGs as Maryland (Maryland DRG Shares). As shown in ***Table A-3***, the comparison group is reweighted from a 37/63 distribution of DRGs 1 and 2 (own DRG shares) to a 50/50 distribution (Maryland DRG shares). This reweighting is conducted separately for each year of data.

In this simplified example, Maryland has an average payment per admission of $1,375; the comparison group has an average payment of $791 using its own DRG shares of admissions, and $837 using the Maryland DRG shares of admissions. The payment differential in this example would be ($1,375−$837)/$837=64 percent higher payment in Maryland.

Table A-3
Simplified Maryland and comparison group weighted average payment per admission calculation

DRG	Maryland			Comparison group (own DRG shares)			Comparison group (Maryland DRG shares)		
	# of admits	Total $	$ per admit	# of admits	Total $	$ per admit	# of admits	Total $	$ per admit
1	50	75,000	1,500	97	97,625	1,006	132.5	133,354	1,006
2	50	62,500	1,250	168	112,061	667	132.5	88,381	667
Total	100	137,500	1,375	265	209,686	791	265	221,735	837

The actual weighting process used in the analyses also accounted for the fact that a comparison group hospital could be matched to more than one Maryland hospital and Maryland hospitals could be matched with up to three comparison group hospitals. (These are the same hospital matches that were used for all analyses with a comparison group in this report.) The weighting process also accounted for each comparison group hospitals' share of overall comparison group admissions. The full weighting process is described below.

In these analyses, each comparison group hospital received a weight based on the number of comparison group matches for each Maryland hospital (matched weight). The comparison group hospital weight also accounted for the number of Maryland hospitals with which it was matched. This was done so as not to overweight comparison group hospitals that were part of a dyad or triad of matches to a single hospital or underweight those that were matched to multiple Maryland hospitals. In ***Table A-4***, MD1 was matched with three comparison group hospitals so each comparison group hospital received a matched weight of 0.333; MD2 was matched with one comparison group hospital so the comparison group hospital received a matched weight of 1; and MD3 was matched with two comparison group hospitals so each comparison group hospital received a matched weight of 0.5.

We also calculated each Maryland hospital's share of the total admissions in the state (MD admission ratio); we made the same calculation for the comparison group using the total admissions in the comparison group market areas (CG admission ratio). We adjusted the comparison hospitals' shares to be proportionate to their matched Maryland hospital's share. This ensured that comparison group hospitals matched to a Maryland hospital that had a high percentage of total admissions had a correspondingly higher weight in the analyses. We calculated the final weight as: (matched weight x MD admission ratio)/CG admission ratio. ***Table A-4*** provides an example of the weights described in this section. CG Hospital 1 was matched to two MD hospitals; in the analyses, the weight for CG Hospital 1 (3.70) was the sum of its weights for MD1 and MD2 divided by its CG admission ratio [3.70=(0.133+0.200)/0.09].

Table A-4
Example of comparison group hospital weight calculation

CG hospital	Matched hospital	Matched weight	MD admission ratio	Matched weight x MD admission ratio	CG admission ratio	Final weight
CG Hospital 1	MD1	0.333	0.40	0.133	0.09	3.70
CG Hospital 2	MD1	0.333	0.40	0.133	0.18	0.73
CG Hospital 3	MD1	0.333	0.40	0.133	0.27	0.49
CG Hospital 1	MD2	1	0.20	0.200	0.09	3.70
CG Hospital 4	MD3	0.5	0.40	0.200	0.23	0.87
CG Hospital 5	MD3	0.5	0.40	0.200	0.14	1.43

NOTES: CG Hospital 1 has a matched weight of 0.133 for the match to MD1 and 0.200 for the match to MD2. The sum of these weights is 0.233. The CG admission ratio (0.09) is applied to the summed weights to yield the final weight of 3.70.

After creating the weights as described above, each comparison group hospital had a final weight that we applied to the comparison group's actual mix of admissions by DRG. ***Table A-5*** shows an example of the final weight for each comparison hospital at the DRG level, again using the hypothetical example of a universe of two DRGs. We multiplied the final weight by the unweighted count and the unweighted payment to get a weighted count and weighted payment for the DRG. We summed the weighted count and weighted payment for a given DRG across the comparison group hospitals. For example, three comparison group hospitals had admissions for DRG 1; the total weighted count was 103 admissions and the weighted payment sum for those 103 admissions was $102,639.

Table A-5
Simplified example of comparison group weighted average payment per admission calculation by DRG

Hospital	DRG	Final weight	Unweighted count	Weighted count	Unweighted payment	Weighted payment
CG Hospital 1	DRG 1	3.70	17	62.90	16,745	61,957
CG Hospital 2	DRG 1	0.73	5	3.65	4,380	3,197
CG Hospital 3	DRG 1	0.49	75	36.75	76,500	37,485
Total	**DRG 1**			**103**	**97,625**	**102,639**
CG Hospital 1	DRG 2	3.70	28	103.60	21,420	79,254
CG Hospital 2	DRG 2	0.73	43	31.39	37,582	27,435
CG Hospital 3	DRG 2	0.49	97	47.53	53,059	25,999
Total	**DRG 2**			**183**	**112,061**	**132,688**

After applying the final weights for each DRG and summing for comparison group hospitals, we applied the Maryland distribution of DRGs to the comparison group to yield a final weighted comparison group payment that was compared to hospital payments in Maryland. As shown in ***Table A-6***, the comparison group overall average payment per admission increased from $823 with comparison group weights applied to $861 after applying the Maryland distribution of DRGs. The averages compare to the comparison group average of $791 before weighting was applied, shown above in ***Table A-6***.

Table A-6
Reweighting comparison group admissions to equal Maryland distribution

	Maryland			Comparison group (own DRG shares—weighted)			Comparison group (Maryland DRG shares—weighted)		
DRG	**# of admits**	**Total $**	**$ per admit**	**# of admits**	**Total $**	**$ per admit**	**# of admits**	**Total $**	**$ per admit**
1	50	75,000	1,500	103	102,639	996	143	142,499	996
2	50	62,500	1,250	183	132,688	725	143	103,685	725
Total	100	137,500	1,375	286	235,327	823	286	246,184	861

Repriced claims analyses. The second method for comparing inpatient Medicare rates in Maryland with the IPPS used repriced inpatient claims for Maryland[9] to approximate what would have been paid by Medicare if Maryland had operated under the IPPS. These analyses included Medicare claims data for Maryland inpatient discharges in federal FYs 2013, 2014, 2015, 2016, and 2017. This analysis provides an alternative comparison of the payment differential that controls for any differences between Maryland and comparison group hospitals in factors related to location and facility type that might influence the comparison described above. We calculated the average payment per admission using repriced claims and compared it to the actual average payment under Maryland's all-payer rate-setting system.[10] We did not use weights for repriced claims analyses because they were for the same set of admissions to the same hospitals. In addition, we excluded any denied claims and any DRG that had a zero paid value for either repriced Maryland claims or the actual paid amounts in each year.

Commercial insurance comparison—The commercial insurance payment analysis used commercial insurer claims from the MarketScan database. These analyses included hospital discharges in CYs 2011 through 2017. MarketScan data include approximately 7 percent of all commercial plan member admissions in Maryland,[11] and large employers are overrepresented. We excluded any denied claims and any admission that had a zero paid value for either Maryland or the comparison group in each year. These analyses followed the methodology used in the first type of Medicare analyses described above—that is, we compared the weighted average payments for inpatient admissions of commercial plan members in Maryland with those for commercial plan members in the comparison group, using weights defined based on the share of commercial insurance admissions by DRG in Maryland hospitals. Because of limitations in MarketScan data, we were not able to identify admissions to specific hospitals. Instead, we used all admissions for Maryland and comparison group residents.[12] We multiplied the difference in the weighted average payment per admission by the total number of commercial insurance discharges, obtained from HSCRC hospital discharge data, to calculate the total payment differential.

MarketScan data include both claims for admissions covered by commercial insurers and admissions covered by self-insured employers. Some commercial insurers in some of the comparison group market areas stopped contributing to the MarketScan database beginning in

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9 Repriced claims for Maryland hospitals were prepared by the Lewin Group under a contract with CMS. Methods for repricing claims are described in: The Lewin Group, Inc. State Innovations Model (SIM) All-Payer Operations: Development of Maryland Acute Hospital Medicare Prospective Payment System for Maryland Task 4d Option Year 2. Prepared for Centers for Medicare & Medicaid Services. September 22, 2017.

10 A simple average, rather than a weighted average, was used in the comparisons using repriced claims. The repriced claims data and the claims data with actual payment amounts included the same discharges, so the annual DRG weights are identical in the two datasets.

11 We do not have comparable information for the comparison group, but they presumably represent a similarly small share of all commercial admissions.

12 Because of the difference in the sample population, matching weights and volume weights were calculated at the hospital market area level, rather than the hospital level.

2013. These withdrawals could bias comparison group payment trends if these insurers' payment rates differed systemically from the remaining payers. Participation of self-insured employers, however, was generally stable over the study period.

OPPS comparison—This analysis compared actual Medicare hospital outpatient payments in Maryland with the OPPS using repriced claims for Maryland[13] to approximate what would have been paid by Medicare if Maryland had operated under the OPPS. These analyses included Medicare claims data for Maryland hospital outpatient visits in federal FYs 2013, 2014, 2015, 2016, and 2017. Like the IPPS comparison using repriced claims, this analysis controlled for any differences between Maryland and comparison group hospitals in factors related to location and facility type. We calculated the average payment per visit using repriced claims and compared it to the actual average payment under Maryland's all-payer rate-setting system.[14] We did not use weights for these analyses because they were for the same set of visits to the same hospitals. We excluded any ambulatory payment classification (APC) that had a zero paid value for either Maryland or the comparison group in each year. In addition, we excluded any denied claims.

We used the count of hospital outpatient claims to approximate the number of visits and divided total payments by the number of visits to calculate the average payment per visit under the two systems. We multiplied the payment difference per hospital outpatient visit by the total number of Medicare hospital outpatient visits to calculate the total payment differential. An alternative approach could have divided by the total number of APCs to calculate the average payment per APC. This would have yielded the same differential, but the magnitude of the per unit amounts would have differed. We elected to use outpatient visits because it is a more readily interpretable unit than APCs.

A.3 Comparative Case Study Analysis

Comparative case study is a data analysis methodology that systematically examines similarities and differences across cases.[15] Our comparative case study examined whether there were relationships between hospital responses to the All-Payer Model and hospital-level outcomes. In our analyses, hospitals served as cases, or the lens through which we made our comparisons.

A.3.1 Hospital Responses to the All-Payer Model

Our analysis focused on five domains of hospital responses that we hypothesized might influence hospitals' outcomes under the All-Payer Model. These domains included (1) designating an implementation leader; (2) using data to inform decision-making and

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[13] Repriced claims for Maryland hospitals were prepared by the Lewin Group under a contract with CMS.

[14] A simple average, rather than a weighted average, was used in the comparisons using repriced claims. The repriced claims data and the claims data with actual payment amounts included the same discharges, so the annual APC weights are identical in the two datasets.

[15] Goodrick, D. (2014). Comparative case studies: Methodological briefs – Impact Evaluation No. 9. *Methodological Briefs, 9*.

operations under the All-Payer Model; (3) implementing staffing and clinical care delivery-related strategies; (4) having a systematic process to identify opportunities for improvement; and (5) having processes to align physicians and clinical staff to the hospital's efforts to meet their global budget targets.

The five domains aimed to answer the following research questions:

1. **Designated implementation leader.** Did hospitals with a designated leader have successful outcomes under the All-Payer Model? Was the designated leader's role within the hospital associated with the hospital's performance under the All-Payer Model? What types of roles and characteristics were common among designated leaders at hospitals with successful outcomes under the All-Payer Model?

2. **Using data analytics.** Did hospitals that used data analytics to operate under the All-Payer Model have successful outcomes? Specifically, did hospitals that used customized data analytics have successful outcomes? What types or qualities of data analytics were common among hospitals with successful outcomes? What characteristics of the hospital's health information technology (health IT) system were present in hospitals with successful outcomes?

3. **Implementing staffing and clinical care delivery-related strategies.** Did hospitals that implemented staffing or clinical care delivery-related strategies under the All-Payer Model have successful outcomes? What were the common strategies (e.g., staff implementing these strategies or types of strategies) in place at hospitals with successful outcomes under the All-Payer Model?

4. **Having a systematic process to identify opportunities for improvement.** Did hospitals that had a systematic process for identifying areas of opportunity for improvement have successful outcomes under the All-Payer Model? What types or characteristics of systematic processes were common among hospitals with successful outcomes under the All-Payer Model?

5. **Alignment of physicians and clinical staff in hospital's efforts to meet global budget targets.** Did hospitals with more aligned and engaged physicians and clinical staff have successful outcomes under the All-Payer Model? What common characteristics or relationships between the hospital and the clinical staff were in place in hospitals with successful All-Payer Model outcomes?

We selected and examined a total of 28 implementation strategies across the 5 domains. Hospitals already had some strategies in place prior to the All-Payer Model, while they implemented other strategies in conjunction with the All-Payer Model. ***Table A-7*** shows the strategies examined under each of the five domains. Information about hospitals' use of these strategies was derived from the hospital survey responses. We used qualitative data from hospital site visits to complement the survey data and to provide context and details about the hospital responses. For example, we used the survey to identify hospitals with a designated implementation leader for their All-Payer Model efforts and then used the qualitative data to identify the characteristics of these designated implementation leaders. ***Table A-8*** outlines the survey questions and qualitative data themes used to examine each domain and the associated hospital responses to the All-Payer Model.

Table A-7
Strategies examined in the comparative case study analysis by domain

Domain	Strategies
1. Designated implementation leader	• Presence of designated implementation leader • CEO or CFO is the designated implementation leader
2. Using data analytics	• Current use of CRISP tools • Current use of data analytics • CRISP tools are one of the three most important tools used to operate under the All-Payer Model • Data analytics are one of the three most important tools used to operate under the All-Payer Model • Relies on customized data analytics to operate under the All-Payer Model • In-house/hospital system dedicated analytic staff used to support the All-Payer Model • In-house/hospital system financial operations staff performed data analytics to support the All-Payer Model • Outside consultants performed data analytics to support the All-Payer Model • Maryland Hospital Association or other industry group performed data analytics to support the All-Payer Model
3. Implementing staffing and clinical care delivery strategies	• Currently uses care coordinators and care managers • Currently uses social work staff • Currently uses discharge planning staff • Currently uses community health workers • Currently uses employed physician staff • Currently refers patients to hospital funded/supported alternative care settings • Currently provides patients with hospital funded/supported supply of prescription drugs at discharge • Currently provides patients with clinically specific patient education/coaching/self-management program • Currently uses regular multidisciplinary care team rounding • Currently invests in interventions that address social determinants of health • Currently uses patient care transition programs • Currently regularly uses patient care plans
4. Having a systematic process to identify opportunities for improvement	• Regular use of any specific quality or change management strategies
5. Alignment of physicians and clinical staff	• Self-reported average level of physician engagement in the implementation of All-Payer Model-related strategies • Participating in CRP to improve financial alignment with physicians • Participating in CRP to improve relationships with physician partners in anticipation of Total Cost of Care Model • Participating in CRP to gain access to Medicare data and other data sources

CEO = chief executive officer; CFO = chief financial officer; CRISP = Chesapeake Regional Information System for our Patients; CRP = Care Redesign Program.

Table A-8
Data points and data sources by comparative case study analysis domain

Domain	Data point	Data source
1. Designated implementation leader	• Does your hospital have a designated leader and who is the leader? • What are the characteristics and role of the designated leader?	Survey data Qualitative data
2. Using data analytics	• Does your hospital rely on customized data analytics to operate under the All-Payer Model?	Survey data
	• What sources of data does your hospital use in operating under the All-Payer Model?	Survey data
	• Which health data and analytic-related strategies is your hospital using currently to operate under the All-Payer Model?	Survey data
	• How are hospitals collecting clinical data?	Qualitative data
	• What types of health IT systems, including electronic health record capabilities, are available in the hospitals?	Qualitative data
	• What types of hospital billing, medical coding, and quality data collection functionality are available?	Qualitative data
	• How are hospitals collecting cost data (if at all)?	Qualitative data
	• What types of systems or data are hospitals using to monitor hospital finances and spending?	Qualitative data
3. Implementing staffing and clinical care delivery strategies	• What staffing, and clinical care delivery strategies are the hospital currently using to operate under the All-Payer Model?	Survey data
	• What staffing and clinical care delivery strategies were in place prior to the All-Payer Model?	Survey data
	• What strategies did hospitals implement to operate under the All-Payer Model?	Qualitative data
	• What strategies did hospitals have in place before the All-Payer Model was implemented?	Qualitative data
4. Having a systematic process to identify opportunities for improvement	• Does the leadership team regularly use any specific quality or change management strategies?	Survey data
	• What processes did hospitals use to implement changes under the All-Payer Model?	Qualitative data
5. Alignment of physicians and clinical staff	• How are hospitals informing and educating physicians and clinical staff about the All-Payer Model?	Qualitative data
	• What strategies or initiatives have hospitals implemented to align physicians or clinical staff with hospital’s efforts to meet global budget targets?	Qualitative data
	• How would you describe the level of engagement among physician staff in your hospital in the implementation of global budget-related strategies?	Survey data
	• What factors are behind the decision for your hospital to participate in the CRP?	Survey data

A.3.2 Outcome Performance Measures

The comparative case study analyses focused on two hospital-level measures of outcome performance—operating margin and Medicare 30-day unplanned readmission rate. The selected outcomes represent two dimensions of hospital-level performance related to the All-Payer Model that we anticipated could be associated with implementation strategies: operating margin represents financial performance, and 30-day unplanned readmission rate represents patient care performance. Additionally, Maryland hospitals showed considerable variation in these two outcomes; we needed variation in outcomes to be able examine the association between implementation strategies and outcomes.[16]

For both measures, we defined hospital-level outcomes as the percentage change from the baseline period mean to the All-Payer Model implementation period mean. The baseline period mean for the Medicare 30-day unplanned readmission rate was the simple average of the outcome in each of the three baseline period years (2011, 2012, and 2013); the implementation period mean was the simple average of the outcome in each of the 4.5 years of the implementation period (2014–2018). The baseline period mean for operating margin was the simple average of the outcome for FY 2012 and FY 2013, whereas the implementation period mean was the simple average of the outcome for FYs 2014–2018.

For both financial and patient care performance, we categorized hospitals into four groups as described in ***Table A-9***. For both measures, we created a category that included hospitals whose performance declined from the baseline period to the All-Payer Model implementation period. We chose cut points of low, medium and high improvement based on the distribution of data for operating margin and readmission rate, excluding hospitals whose performance declined from the baseline to the All-Payer Model implementation period. The financial performance analysis included 46 cases and the patient care performance analysis included 45 cases, reflecting the number of hospitals for which we had complete data.[17]

[16] We had initially identified hospital deviation from the global budget target as a potential outcome for the comparative case study, but by Year 5 of the All-Payer Model, most Maryland hospitals were operating successfully within their target. Thus, examining hospitals' deviation from their global budget targets was not useful for understanding the relationship between features of hospital responses to the All-Payer Model and variation in their outcomes. Likewise, we considered inpatient length of stay as a potential outcome but there was insufficient variation across hospitals.

[17] Our comparisons did not include financial and patient care performance data for Holy Cross Hospital Germantown and patient care performance data for University of Maryland Medical Center at Dorchester. Holy Cross Hospital Germantown opened in 2014 and, therefore, did not have baseline data to calculate operating margin and readmission rate during the baseline timeframe. University of Maryland Medical Center at Dorchester bills and collects revenue under the University of Maryland Medical Center at Easton's Medicare billing number. University of Maryland Medical Center at Dorchester's readmissions are included under University of Maryland Medical Center at Easton.

Table A-9
Performance measure categories and number of hospitals in each category

Financial performance		Patient care performance	
Category	**Definition**	**Category**	**Definition**
Decline	The average operating margin decreased from the baseline period to the All-Payer Model period (N=8)	Decline	The average readmission rate increased from the baseline period to the All-Payer Model period (N=4)
Low improvement	The average operating margin increased up to 28.4% from the baseline period to the All-Payer Model period (N=15)	Low improvement	The average readmission rate decreased up to and equal to 10.0% from the baseline period to the All-Payer Model period (N=13)
Medium improvement	The average operating margin increased greater than 28.4% and up to and equal to 56.8% from the baseline period to the All-Payer Model period (N=11)	Medium improvement	The average readmission rate decreased greater than 10.0% and up to or equal to 20.0% from the baseline period to the All-Payer Model period (N=19)
High improvement	The average operating margin increased greater than 56.8% from the baseline period to the All-Payer Model period (N=12)	High improvement	The average readmission rate decreased greater than 20.0% from the baseline period to the All-Payer Model period (N=9)

A.3.3 Analysis

We integrated the qualitative data, hospital survey data, and performance data into a comparative case study database. We used this database to compare hospitals within and across performance categories to identify common and dissimilar responses to the All-Payer Model derived from survey data. We then used the qualitative data to examine the context in which these responses were prominent and the context in which they were not.

We identified strategies that were associated with successful outcomes by looking for patterns in their adoption that indicated a strategy was more likely to be used by hospitals in categories with higher levels of improvement. We classified the likelihood of hospitals in a performance category adopting a strategy in the following way:

- All hospitals in a performance category used a strategy.
- The percentage of hospitals in a performance category that used a strategy was more than the average across all hospitals.
- The percentage of hospitals in a performance category that used a strategy was less than the average across all hospitals.

We identified three scenarios for strategies strongly associated with successful performance:

- All hospitals with high improvement used a strategy, and fewer than the average number of hospitals in the remaining categories used this strategy.

- All hospitals in the high improvement category and more than the average number of hospitals in the medium improvement category used a strategy, and fewer than the average number of hospitals in the remaining categories used this strategy.

- All or more than the average number of hospitals in all three improvement categories used a strategy, and fewer than the average number of hospitals in the decline category used this strategy.

We also identified a scenario for strategies that showed a more modest association with successful performance:

- More than the average number of hospitals in either the high performance category or both the medium and high performance categories used a strategy, and fewer than the average number of hospitals in the remaining categories used this strategy.

Finally, we identified a scenario for strategies associated with unsuccessful performance:

- All hospitals with declining performance used a strategy and fewer than the average number of hospitals in the remaining categories used this strategy.

We interpreted all other patterns as showing no relationship between adoption of the strategy and hospital performance.

We characterized a strategy as universal when more than 90 percent of Maryland hospitals (more than 43 hospitals) reported using the strategy. We could not examine the association between these strategies and hospital performance because there was insufficient variation among hospitals in their use.

APPENDIX B:
HOSPITAL SURVEY INSTRUMENT AND RESULTS TABLES

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B.1 Hospital Survey Instrument

Evaluation of the Maryland All-Payer Model

Sponsored by:

U.S. Department of Health and Human Services,
Centers for Medicare & Medicaid Services

Begin Survey

Your Participation in this Survey

This survey is being fielded to all Maryland hospital Chief Financial Officers (CFOs) as part of an independent evaluation of Maryland All-Payer Model with a focus on the Global Budget Revenue (GBR) component. RTI International is conducting this independent evaluation, under contract to the Centers for Medicare and Medicaid Services (CMS). RTI International is a non-profit research organization. This is the same organization that you may have spoken with during the evaluation's site visit interviews. RTI is being assisted in fielding this survey by another organization: The Henne Group.

We are collecting this information as part of our evaluation to help document how hospitals changed in response to the GBR model. Feedback collected in this survey will help CMS understand the kinds of operational strategies, leadership models, and other factors that hospitals perceive were important to operations under a fixed revenue environment. We also want to help CMS understand hospitals' perceptions of GBR and the Care Redesign Program now that the model been in effect for almost 5 years. Specifically, this survey is designed to collect comparable information at a consistent point in time on four broad topics: (1) Hospital strategies implemented under the GBR environment, (2) hospital leadership and staffing engagement, (3) early strategies and perceptions related to the Care Redesign Program, and (4) your overall perspectives on the GBR implementation process.

Participation in this survey is voluntary. Your responses will have no consequences for payments under the GBR model. We are interested in your candid observations on the way your hospital operates under GBR today.

Responses from your individual hospital will not be shared with anyone besides these researchers and will not be used for any purposes other than the evaluation of this initiative. The RTI evaluation team will report the results of this survey to CMS in a non-identifiable, aggregated form that will assure your full confidentiality.

We estimate that this survey will take about 15 minutes to complete.

If you are willing to participate in this research, please complete this survey by November 9, 2018.

If you have difficulty or questions when completing this survey, please contact Leslie Greenwald at lgreenwald@rti.org or 410-448-2611.

BACK NEXT HELP

The Questions in this Survey

This survey has questions on the following topics:

- Hospital strategies implemented under the GBR model
- Hospital workforce, leadership and staff engagement
- Early strategies and perceptions related to the Care Redesign Program
- Overall perspectives on the GBR implementation process

Please complete all questions in the survey to the best of your knowledge. Input can be requested from other staff in your hospital as needed. You may skip questions that you do not wish to answer. Please use the “Next” and “Back” buttons at the bottom of each screen to move from question to question in the survey. **The survey will automatically save, and you can return to it at a later time using the survey link.** Once you have completed as much of the survey as possible, please use the submit button to finalize your survey responses.

BACK NEXT HELP

Your Hospital

Q1_ENTRY. Please indicate which hospital your responses to this survey reflect. If you work for more than one Maryland hospital, please complete one survey for each hospital where you work.

[PROGRAMMER: PRESENT LIST IN ALPHABETICAL ORDER BY HOSPITAL NAME]

a. University of Maryland Medical System (skip pattern, go to Q1_A)
b. Johns Hopkins Health System Corporation (skip pattern, go to Q1_B)
c. MedStar Health (skip pattern, go to Q1_C)
d. LifeBridge Health (skip pattern, go to Q1_D)
e. Holy Cross Germantown Hospital (skip pattern, go to Q1)
f. Holy Cross Hospital of Silver Spring (skip pattern, go to Q1)
g. Adventist HealthCare Shady Grove Medical Center (skip pattern, go to Q1)
h. Adventist HealthCare Washington Adventist Hospital (skip pattern, go to Q1)
i. St. Agnes Hospital (skip pattern, go to Q1)
j. Bon Secours Hospital (skip pattern, go to Q1)
k. Doctors Community Hospital and Affiliates (skip pattern, go to Q1)
l. GBMC HealthCare System (skip pattern, go to Q1)
m. Atlantic General Hospital (skip pattern, go to Q1)
n. Meritus Medical Center (skip pattern, go to Q1)
o. Frederick Memorial Hospital (skip pattern, go to Q1)
p. Peninsula Regional Medical Center (skip pattern, go to Q1)
q. Anne Arundel Medical Center (skip pattern, go to Q1)
r. Garrett Regional Medical Center (skip pattern, go to Q1)
s. Union Hospital (skip pattern, go to Q1)
t. Calvert Memorial Hospital (skip pattern, go to Q1)
u. Western Maryland Regional Medical Center (skip pattern, go to Q1)
v. Mercy Medical Center (skip pattern, go to Q1)
w. Fort Washington Medical Center (skip pattern, go to Q1)
x. McCready Health (skip pattern, go to Q1)

Q1_A. Which specific hospital within **University of Maryland Medical System** will your responses reflect? Again, if you work for more than one Maryland hospital, please complete one survey for each hospital where you work.

1. University of Maryland Medical Center
2. UM Baltimore Washington Medical Center
3. UM Medical Center Midtown Campus
4. UM Rehabilitation & Orthopedic Institute
5. UM St. Joseph Medical Center
6. UM Charles Regional Medical Center
7. UM Shore Medical Center at Easton
8. UM Shore Medical Center at Dorchester
9. UM Shore Medical Center at Chestertown

10. UM Upper Chesapeake Medical Center
11. UM Harford Medical Hospital
12. UM Laurel Regional Hospital
13. UM Prince George's Hospital Center

[PROGRAMMER: SKIP TO Q1 AFTER SELECTION]

Q1_B. Which specific hospital within **Johns Hopkins Health System Corporation** will your responses reflect? Again, if you work for more than one Maryland hospital, please complete one survey for each hospital where you work.

1. The Johns Hopkins Hospital
2. Johns Hopkins Bayview Medical Center
3. Howard County General Hospital
4. Suburban Hospital

[PROGRAMMER: SKIP TO Q1 AFTER SELECTION]

Q1_C. Which specific hospital within **MedStar Health** will your responses reflect? Again, if you work for more than one Maryland hospital, please complete one survey for each hospital where you work.

1. MedStar Franklin Square Medical Center
2. MedStar Good Samaritan Hospital
3. MedStar Harbor Hospital
4. MedStar Montgomery Medical Center
5. MedStar Southern Maryland Hospital Center
6. MedStar St. Mary's Hospital
7. MedStar Union Memorial Hospital

[PROGRAMMER: SKIP TO Q1 AFTER SELECTION]

Q1_D. Which specific hospital within **LifeBridge Health** will your responses reflect? Again, if you work for more than one Maryland hospital, please complete one survey for each hospital where you work.

1. Carroll Hospital Center
2. Sinai Hospital of Baltimore
3. Northwest Hospital Center

Q1. [PROGRAMMER: AUTO-CODE RESPONSE BASED ON Q1_ENTRY AND Q1_A – Q1_D THEN SKIP TO Q2]

1. University of Maryland Medical Center
2. UM Baltimore Washington Medical Center
3. UM Medical Center Midtown Campus
4. UM Rehabilitation & Orthopedic Institute
5. UM St. Joseph Medical Center

6. UM Charles Regional Medical Center
7. UM Shore Medical Center at Easton
8. UM Shore Medical Center at Dorchester
9. UM Shore Medical Center at Chestertown
10. UM Upper Chesapeake Medical Center
11. UM Harford Medical Hospital
12. UM Laurel Regional Hospital
13. UM Prince George’s Hospital Center
14. The Johns Hopkins Hospital
15. Johns Hopkins Bayview Medical Center
16. Howard County General Hospital
17. Suburban Hospital
18. MedStar Franklin Square Medical Center
19. MedStar Good Samaritan Hospital
20. MedStar Harbor Hospital
21. MedStar Montgomery Medical Center
22. MedStar Southern Maryland Hospital Center
23. MedStar St. Mary’s Hospital
24. MedStar Union Memorial Hospital
25. Carroll Hospital Center
26. Sinai Hospital of Baltimore
27. Northwest Hospital Center
28. Holy Cross Germantown Hospital
29. Holy Cross Hospital of Silver Spring
30. Adventist HealthCare Shady Grove Medical Center
31. Adventist HealthCare Washington Adventist Hospital
32. St. Agnes Hospital
33. Bon Secours Hospital
34. Doctors Community Hospital and Affiliates
35. GBMC HealthCare System
36. Atlantic General Hospital
37. Meritus Medical Center
38. Frederick Memorial Hospital
39. Peninsula Regional Medical Center
40. Anne Arundel Medical Center
41. Garrett Regional Medical Center
42. Union Hospital
43. Calvert Memorial Hospital
44. Western Maryland Regional Medical Center
45. Mercy Medical Center
46. Fort Washington Medical Center
47. McCready Health

Hospital strategies implemented under the GBR model

Q2. Thinking about staffing-related strategies your hospital may be using today, which of the following are part of your hospital's CURRENT strategy to operate under the GBR model?

Please check all that apply.

a. Use of care coordination/care management staff
b. Use of discharge planning staff
c. Use of social work staff
d. Use of community health workers
e. Use of employed physician staff
f. Other (please specify):
g. Don't know

Q3. Some staffing-related strategies you noted above may have been in place before the start of GBR. Which of the following strategies was your hospital supporting PRIOR TO IMPLEMENTATION OF GBR (i.e., prior to January 2014)?

Please check all that apply.

a. Use of care coordination/care management staff
b. Use of discharge planning staff
c. Use of social work staff
d. Use of community health workers
e. Use of employed physician staff
f. Other (please specify)
g. Don't know

Q4. Thinking about clinical care delivery-related strategies your hospital may be using today, which of the following are part of your hospital's CURRENT strategy to operate under the GBR model?

Please check all that apply.

a. Referring patients to hospital funded/supported alternative care settings (for example, discharge clinics, chronic care clinics, primary care clinics)
b. Referring patients to hospital funded/supported palliative care programs
c. Providing patients with hospital funded/supported supply of prescription drugs at discharge
d. Providing patients with hospital funded/supported supply of disease monitoring equipment (for example, scales to monitor weight)
e. Providing patients with clinically specific patient education/coaching/self-management program
f. Use of patient care transitions program
g. Use of programs to improve patient experience

h. Regular use of multidisciplinary care team rounding
i. Regular use of patient care plans
j. Hospital investment in interventions that address social determinants of health
k. Development of protocols/agreements with clinical partners
l. Other (please specify)
m. Don't know

Q5. Some clinical care delivery-related strategies you noted above may have been in place before the start of GBR. Which of the following strategies was your hospital supporting PRIOR TO IMPLEMENTATION OF GBR (i.e. prior to January 2014)?

Please check all that apply.

a. Referring patients to hospital funded/supported alternative care settings (for example, discharge clinics, chronic care clinics, primary care clinics)
b. Referring patients to hospital funded/supported palliative care programs
c. Providing patients with hospital funded/supported supply of prescription drugs at discharge
d. Providing patients with hospital funded/supported supply of disease monitoring equipment (for example, scales to monitor weight)
e. Providing patients with clinically specific patient education/coaching/self-management program
f. Use of patient care transitions program
g. Use of programs to improve patient experience
h. Regular use of multidisciplinary care team rounding
i. Regular use of patient care plans
j. Hospital investment in interventions that address social determinants of health
k. Development of protocols/agreements with clinical partners
l. Other (please specify)
m. Don't know

Q6. Thinking about health data and analytic-related strategies your hospital may be using today, which of the following are part of your hospital's CURRENT strategy to operate under the GBR model?

Please check all that apply.

a. Use of telehealth/connected patient technologies
b. Use of CRISP tools (e.g., Encounter Notification Service)
c. Use of data analytics
d. Other (please specify):
e. Don't know

Q7. Some health data and analytic-related strategies you noted above may have been in place before the start of GBR. Which of the following strategies was your hospital supporting PRIOR TO IMPLEMENTATION OF GBR (i.e. prior to January 2014)?

Please check all that apply.

a. Use of Telehealth/connected patient technologies
b. Use of CRISP tools (for example, Encounter Notification Service)
c. Use of data analytics
d. Other (please specify):
e. Don’t know

Q8. From your perspective, which of the following strategies were the most important tools for operating under the GBR model.

Please check up to a total of <u>three</u>.

[PROGRAMMER: Randomize response groups]

Staffing-Related Changes

a. Use of care coordination/care management staff
b. Use of discharge planning staff
c. Use of social work staff
d. Use of community health workers
e. Use of employed physician staff

Clinical care delivery-related strategies

f. Referring patients to hospital funded/supported alternative care settings (for example, discharge clinics, chronic care clinics, primary care clinics)
g. Referring patients to hospital funded/supported palliative care programs
h. Providing patients with hospital funded/supported supply of prescription drugs at discharge
i. Providing patients with hospital funded/supported supply of disease monitoring equipment (for example, scales to monitor weight)
j. Providing patients with clinically specific patient education/coaching/self-management program
k. Use of patient care transitions program
l. Providing patients with clinically specific patient education/coaching/self-management
m. Use of programs to improve patient experience
n. Regular use of multidisciplinary care team rounding
o. Regular use of patient care plans
p. Hospital investment in interventions that address social determinants of health
q. Development of protocols/agreements with clinical partners

Health Data and Analytic-related strategies

r. Use of telehealth/connected patient technologies
s. Use of CRISP tools (for example, Encounter Notification Service)
t. Use of data analytics
u. Other (please specify):
v. Don't know

Q9. Does your hospital rely on customized data analytics to operate under the GBR model?

1. Yes
2. No (skip pattern, go to Q11)
9. Don't know (skip pattern, go to Q11)

IF YES:

Q10. Who conducts data analytics related to GBR performed at your hospital?

Please check all that apply.

a. In-house/hospital system dedicated analytics staff
b. In-house/hospital system financial operations staff
c. Outside consultants
d. Maryland Hospital Association or other industry group
e. Other (please specify):
f. Don't know

[PROGRAMMER: SKIP TO Q12 AFTER SELECTION]

IF NO or DON'T KNOW:

Q11. What sources of data does your hospital use in operating under the GBR model?

Please check all that apply.

a. CRISP
b. Hospital's electronic medical record (EMR) data
c. Data supplied by HSCRC
d. Maryland All-Payer Claims Database
e. Consultant supplied customized data
f. National benchmark data (for example, Premier)
g. Other:
h. Don't know

Q12. Which hospital staff routinely review and use data to assess/monitor GBR-related performance?

Please check all that apply.

a. Hospital CEO
b. Hospital CFO
c. Other senior hospital leaders (for example, hospital CMO, CNO or other senior executives)
d. Nursing directors
e. Direct patient care nursing staff
f. Physician leaders
g. Direct patient care physician and/or hospitalist staff
h. Care coordination/discharge planning/social work staff
i. Environmental services staff
j. Others (please specify):
k. Don't know

Q13. Which of the following factors represent the <u>most significant challenge to your hospital's operations</u> under the GBR model?

Please check **up to a total of <u>three</u>** of the most important challenges.

a. Patient non-compliance/non-engagement
b. Lack of resources to implement GBR strategies
c. Lack of hospital organizational capacity
d. Lack of financial alignment with physicians
e. Lack of financial alignment with other health care providers (for example, post-acute care facilities)
f. Insufficiency of hospital rate updates
g. Complexity of GBR-related policies
h. Data interoperability
i. Aggressive timelines for GBR policy changes
j. Rising costs of pharmaceuticals
k. Lack of access to needed data and data analytics
l. Other: (please specify)
m. Don't know

Hospital workforce, leadership and staff engagement

Q14. Has your hospital <u>increased</u> staffing for specific departments or types of staff in response to GBR?

1. Yes
2. No (skip pattern, go to Q16)
9. Don't know (skip pattern, go to Q16)

IF YES:

Q15: Which staff departments or types have increased? ___________________

Q16. Has your hospital <u>decreased</u> staffing for specific departments or types of staff in response to GBR?

1. Yes
2. No (skip pattern, go to Q18)
9. Don't know (skip pattern, go to Q18)

IF YES:

Q17: Which staff departments or types have decreased? ___________________

Q18. Has your hospital created new hospital staff roles in response to GBR?

1. Yes
2. No (skip pattern, go to Q20)
9. Don't know (skip pattern, go to Q20)

IF YES:

Q19: What are these new staff roles? ______________________

Q20. Within your hospital, does the implementation of strategies in response to the GBR model have a clearly designated leader?

1. Yes
2. No (skip pattern, go to Q22)
9. Don't know (skip pattern, go to Q22)

IF YES:

Q21. Who is that leader?

1. Hospital CEO
2. Hospital CFO
3. Hospital COO
4. Other hospital senior executive (please specify their title):

Q22. In implementing strategies in response to GBR, does the leadership team in your hospital regularly use any specific quality or change management strategies (e.g., Lean, Six Sigma)?

1. Yes (please specify quality/strategy) ___________________
2. No
9. Don't know

Q23. How would you describe the level of engagement among **the following staff** in your hospital in the implementation of GBR-related strategies?

Rank from 1 to 10, with 1 indicating no engagement (for example, staff have no specific GBR-related role or responsibility) and 10 indicating very engaged in implementation (for example, staff have specific GBR-related roles and responsibilities)

Staff Roles	Not at All Engaged 1	2	3	4	5	6	7	8	9	Very Engaged 10
Q23. Senior Executives	□	□	□	□	□	□	□	□	□	□
Q24. Physician Staff	□	□	□	□	□	□	□	□	□	□
Q25. Bedside Nursing Staff	□	□	□	□	□	□	□	□	□	□

Early strategies and perceptions related to the Care Redesign Program

Q26. Is your hospital participating in a program operating under HSCRC's Care Redesign Program?

Check all that apply.

a. Yes, Hospital Care Improvement Program (HCIP)
b. Yes, Complex & Chronic Care Improvement Program (CCIP)
c. No (skip pattern, go to Q30)
d. Don't know (skip pattern, go to Q31)

IF YES to Q26:

Q27. What were the factors behind the decision for your hospital to participate in HCIP and/or CCIP?

Check all that apply.

a. Achieve better financial alignment with physicians
b. Achieve better financial alignment with other clinicians/health care provides
c. Develop relationships with physician partners in anticipation of Total Cost of Care Model / Waiver 2.0?
d. Fully participate in CMS and HSCRC initiatives
e. Satisfy other regulatory requirements or programs (for example, MACRA)
f. Get access to Medicare data or other data sources
g. Other:
h. Don't know

Q28. Does your HCIP and/or CCIP initiative build from an existing program or hospital initiative?

1. Yes
2. No (skip pattern, go to Q31)
9. Don't know (skip pattern, go to Q31)

IF YES to Q28:

Q29. How long was the existing program in place before the Care Redesign Program was adopted by your hospital?

1. Less than 6 months
2. Between 6 months and 2 years
3. More than 2 years, but less than 5 years
4. More than 5 years

[PROGRAMMER: SKIP TO Q31 AFTER SELECTION]

IF NO OR DON'T KNOW to Q26:

Q30. What were the factors behind the decision for your hospital NOT to participate in HCIP and/or CCIP?

Check all that apply.

a. The CMS requirements for participation in the HCIP and/or CCIP programs were not feasible for our hospital
b. The HCIP and CCIP programs wouldn't be advantageous for our hospital
c. Our hospital would not be able to achieve the necessary physician engagement
d. No need to achieve better financial alignment with physicians or other clinical staff; relationships are already established

e. The timelines for implementation were not feasible for our hospital
f. Other (please specify):
g. Don’t know

Q31. Does your hospital implement initiatives other than the Care Redesign Program that better align physician and hospital financial incentives (for example, participation in a different value-based purchasing, shared savings or gainsharing initiative)?

1. Yes
2. No (Skip pattern, go to Q35)
9. Don’t know (Skip pattern, go to Q35)

IF YES:

Q32. How long has this program been in place at your hospital?

1. Less than 6 months
2. Between 6 months and 2 years
3. More than 2 years, but less than 5 years
4. More than 5 years

Q33. Please use this text box to report the name of this alternative program.

[Open Text Box]

Q34. Is this program associated with a private insurance payer?

1. Yes (please specify the name of the Payer) _____________________
2. No

Overall Perspectives on GBR

Q35: From your perspective in this hospital, what have been the most positive aspects of GBR implementation?

[Open Text Box]

Q36: From your perspective in this hospital, what have been the most challenging aspects of GBR implementation?

[Open Text Box]

EXIT: Thank you, those are all the questions we have. If you experienced any difficulty or had any questions while completing the survey, please contact Leslie Greenwald at lgreenwald@rti.org or 410-448-2611.

Click "Submit" to complete the survey exit.

B.2 Hospital Survey Results

Table B-1
Hospital staffing-related strategies implemented under the All-Payer Model

Strategy (N=47)[a, b]	Current strategy (% of hospitals)	Strategy implemented prior to the All-Payer Model (% of hospitals)
Use of care coordination/care management staff	100.0	53.2
Use of discharge planning staff	97.9	72.3
Use of social work staff	91.5	74.5
Use of community health workers	80.9	17.0
Use of employed physician staff	87.2	57.4
Other	17.0	4.3
Don't know	0.0	10.6

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.
[b] Respondents could select more than one option. Percentages sum to more than 100.

Table B-2
New hospital staff roles created in response to the All-Payer Model

Percentage of hospitals that created new staff roles in response to All-Payer Model (N=47)[a]	91.5
Staff role (N=43)[b, c]	**% of hospitals**
Population health personnel	41.9
Community health workers	25.6
Data analyst/performance improvement analyst	23.3
Care managers/care coordinators/case managers	18.6
Care transitions staff/discharge planners	16.3
Patient navigators	11.6
Social workers	9.3

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.
[b] Respondents could select more than one option. Percentages sum to more than 100.
[c] Responses reported by fewer than four hospitals were not included in this table.

Table B-3
Hospital clinical care delivery strategies implemented under the All-Payer Model

Strategy (N=47)[a, b]	Current strategy (% of hospitals)	Strategy implemented prior to the All-Payer Model (% of hospitals)
Referring patients to hospital funded/supported alternative care settings (e.g., discharge clinics, chronic care clinics, primary care clinics)	85.1	38.3
Referring patients to hospital funded/supported palliative care programs	83.0	38.3
Providing patients with hospital funded/supported supply of prescription drugs at discharge	78.7	40.4
Providing patients with hospital funded/supported supply of disease monitoring equipment (e.g., scales to monitor weight)	63.8	25.5
Providing patients with clinically specific patient education/coaching/self-management program	87.2	61.7
Use of patient care transitions program	91.5	25.5
Use of programs to improve patient experience	87.2	57.4
Regular use of multidisciplinary care team rounding	89.4	40.4
Regular use of patient care plans	93.6	61.7
Hospital investment in interventions that address social determinants of health	74.5	10.6
Development of protocols/agreements with clinical partners	76.6	23.4
Use of telehealth/connected patient technologies	74.5	14.9
Other	8.5	0.0
Don’t know	0.0	14.9

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

Table B-4
Hospital data and analytic strategies implemented under the All-Payer Model

Strategy (N=47)[a, b]	Current strategy (% of hospitals)	Strategy implemented prior to the All-Payer Model (% of hospitals)
Use of CRISP[c] tools (e.g., Encounter Notification Service)	97.9	23.4
Use of data analytics	93.6	76.6
Other	6.4	0.0
Don't know	0.0	21.3

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

[c] CRISP is the Chesapeake Regional Information System for our Patients, Maryland's health information exchange.

Table B-5
Hospital staffing increases in response to All-Payer Model

Percentage of hospitals that increased staffing for specific departments or types of staff (N=47)[a]	83.0
Type of staffing increase (N=39)[b, c]	**% of hospitals**
Care coordinators & managers (care transition, care management, case management, patient case management)	79.5
Analysts (data/quality/performance improvement/process improvement/patient safety)	41.0
Population health personnel	30.8
Community health workers	28.2
Social workers	28.2
Care navigators (patient navigators, care navigators, nurse navigators)	15.4
Nursing	12.8
Palliative care providers	12.8
Physicians/advanced practice providers	10.3
Pharmacists	10.3

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

[c] Responses reported by fewer than four hospitals were not included in this table.

Table B-6
Hospital staffing decreases in response to All-Payer Model

Percentage of hospitals that decreased staffing for specific departments or types of staff (N=47)[a]	27.7
Type of staffing decrease (N=13)[b, c]	**% of hospitals**
Finance/accounting	38.5
Management	30.8
Non-clinical/support staff	23.1
Nursing	23.1
Administrative	15.4
Reimbursement	15.4
Medical	15.4
Information technology	15.4
Human resources	15.4

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

[c] Responses reported by fewer than two hospitals were not included in this table.

Table B-7
Strategies perceived as most important for operating under the All-Payer Model

Strategy (N=47)[a, b]	% of hospitals
Staffing strategy	
Use of care coordination/care management staff	66.0
Use of discharge planning staff	8.5
Use of social work staff	4.3
Use of community health workers	10.6
Use of employed physician staff	14.9
Clinical care delivery strategy	
Referring patients to hospital funded/supported alternative care settings (e.g., discharge clinics, chronic care clinics, primary care clinics)	29.8
Referring patients to hospital funded/supported palliative care programs	8.5
Providing patients with hospital funded/supported supply of prescription drugs at discharge	6.4
Providing patients with hospital funded/supported supply of disease monitoring equipment (e.g., scales to monitor weight)	0.0
Providing patients with clinically specific patient education/coaching/self-management program	6.4
Use of patient care transitions program	36.2
Providing patients with clinically specific patient education/coaching/self-management	8.5
Use of programs to improve patient experience	0.0
Regular use of multidisciplinary care team rounding	19.1
Regular use of patient care plans	10.6
Hospital investment in interventions that address social determinants of health	8.5
Development of protocols/agreements with clinical partners	17.0
Use of telehealth/connected patient technologies	2.1
Health data and analytic strategy	
Use of CRISP[c] tools (e.g., Encounter Notification Service)	21.3
Use of data analytics	19.1
Other	2.1
Don't know	0.0

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.
[b] Respondents could select up to three options. Percentages sum to more than 100.
[c] CRISP is the Chesapeake Regional Information System for our Patients, Maryland's health information exchange.

Table B-8
Hospital use of data analytics to operate under the All-Payer Model

Percentage of hospitals that used customized data analytics (N=47)[a]	**76.6**
Data source and staff type	**% of hospitals**
Sources of customized data analytics (N=36)[b]	
In-house/hospital system dedicated analytics staff	97.2
In-house/hospital system financial operations staff	86.1
Outside consultants	83.3
Maryland Hospital Association or other industry group	52.8
Other	2.8
Don't know	0.0
Sources of data for hospitals that do not use customized data analytics (N=11)[b]	
CRISP[c]	100.0
Hospital's electronic medical record	90.9
Data supplied by Health Services Cost Review Commission	54.5
Maryland all-payer claims database	36.4
Consultant supplied customized data	45.5
National benchmark data	45.5
Other	9.1
Don't know	0.0
Type of hospital staff who routinely review and use data to monitor budget performance (N=47)[a, b]	
Hospital CEO	76.6
Hospital CFO	100.0
Other senior hospital leaders	97.9
Nursing directors	53.2
Direct patient care nursing staff	36.2
Physician leaders	78.7
Direct patient care physician and/or hospitalist staff	53.2
Care coordination/discharge planning/social work staff	72.3
Environmental services staff	14.9
Other	4.3
Don't know	0.0

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

[c] CRISP is the Chesapeake Regional Information System for our Patients, Maryland's health information exchange.

Table B-9
Most significant challenges for hospitals operating under the All-Payer Model

Challenge (N=47)[a, b]	% of hospitals
Patient non-compliance/non-engagement	46.8
Lack of resources to implement All-Payer Model strategies	46.8
Lack of hospital organizational capacity	10.6
Lack of financial alignment with physicians	38.3
Lack of financial alignment with other health care providers (e.g., post-acute care facilities)	34.0
Insufficiency of hospital rate updates	42.6
Complexity of All-Payer Model policies	34.0
Lack of data interoperability	4.3
Aggressive timelines for All-Payer Model policy changes	8.5
Rising costs of pharmaceuticals	21.3
Lack of access to needed data and data analytics	8.5
Other	2.1
Don’t know	0.0

[a] Survey included all general acute care Maryland hospitals including, Holy Cross Germantown.

[b] Respondents could select up to three options. Percentages sum to more than 100.

Table B-10
Leadership and staff engagement in the All-Payer Model

Hospital staff engagement (N=47)[a] 1: Not at all Engaged; 10: Very Engaged [Mean (Min, Max)]	
Senior executives	9.2 (4, 10)
Physician staff	6.7 (2, 10)
Bedside nursing staff	5.4 (1, 10)
Percentage of hospitals that had a clearly designated leader for implementing strategies under the All-Payer Model (N=47)[a]	**72.3**
Leadership and staff type	**% of hospitals**
Type of leader (N=34)	
Hospital CEO	26.5
Hospital CFO	20.6
Hospital COO	0.0
Other hospital senior executive	52.9

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

Table B-11
Hospital use of quality or change management strategies

Percentage of hospitals that used quality or change management strategies (N=47)[a]	**66.0**
Type of strategy (N=31)	**% of hospitals**
Lean/Six Sigma	71.0
Define, Measure, Analyze, Improve, and Control (DMAIC)	16.1
High Reliability Organization (HRO) Methodology	6.5
Centers of Excellence	6.5
Plan Do Check Act (PDCA)	6.5
Other	29.0

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

Table B-12
Hospital participation in the Care Redesign Program and other programs

Percentage of hospitals that participated in the Care Redesign Program (N=47)[a]	**83.0**
Participation details	**% of hospitals**
Factors impacting hospital decision to participate (N=39)[b]	
Achieve better financial alignment with physicians	66.7
Achieve better financial alignment with other clinicians/health care providers	48.7
Develop relationships with physician partners in anticipation of Total Cost of Care Model	71.8
Fully participate in CMS and HSCRC initiatives	69.2
Satisfy other regulatory requirements or programs (e.g., MACRA)	43.6
Get access to Medicare data or other data sources	82.1
Other	5.1
Don't know	0.0
Factors impacting hospital decision to not participate (N=5)[b]	
CMS requirements for participation in the HCIP and/or CCIP programs were not feasible for our hospital	80.0
HCIP and CCIP programs wouldn't be advantageous for our hospital	40.0
Our hospital would not be able to achieve the necessary physician engagement	60.0
No need to achieve better financial alignment with physicians or other clinical staff; relationships are already established	0.0
Timelines for implementation were not feasible for our hospital	40.0
Other	0.0
Don't know	0.0
Care Redesign Program initiative built from an existing program or hospital initiative (N=39)	64.1

(continued)

Table B-12 (continued)
Hospital participation in the Care Redesign Program and other programs

Percentage of hospitals that participated in the Care Redesign Program (N=47)[a]	**83.0**
Participation details	**% of hospitals**
Length of time existing program was in place before Care Redesign Program adopted (N=25)	
Less than 6 months	8.0
Between 6 months and 2 years	52.0
More than 2 years, but less than 5 years	36.0
More than 5 years	4.0
Hospital implemented initiatives other than the Care Redesign Program (N=47)[a]	40.4
Length of time program other than Care Redesign Program had been in place (N=19)	
Less than 6 months	5.3
Between 6 months and 2 years	36.8
More than 2 years, but less than 5 years	68.4
More than 5 years	5.3
Other program is associated with a private insurance payer (N=19)	5.3

[a] Survey included all general acute care Maryland hospitals, including Holy Cross Germantown.

[b] Respondents could select more than one option. Percentages sum to more than 100.

APPENDIX C:
DATA SOURCES USED FOR SECONDARY ANALYSIS

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Table C-1 summarizes information about the data sources used in the quantitative analyses. For each type of data, we identify the organization providing the data, the units of analysis for which the data were used, the period for the data included in this report, and the content or variables of interest in the data source. More detail on each data source follows the table.

Table C-1
Data sources and years used for analysis

Data source	Data provider	Unit of analysis: Facility	Unit of analysis: Patient	Unit of analysis: State	Data period used	Contents/variables of interest
Medicare Part A and Part B fee-for-service (FFS) claims and enrollment in the Chronic Conditions Warehouse (CCW) data enclave	CMS	X	X	X	January 2011–June 2018	Patient-level inpatient and outpatient claims and enrollment data
MarketScan data	Truven Health Analytics		X	X	January 2011–December 2017	Patient-level inpatient and outpatient claims/ encounter and enrollment data
Maryland Medical Care Data Base	Maryland Health Care Commission (MHCC)		X		January 2011–December 2017	Patient-level inpatient and outpatient claims/ encounter and enrollment data
Medicaid Analytic eXtract (MAX) data	CMS		X	X	January 2011–December 2012	Patient-level inpatient and outpatient claims/ encounter and enrollment data
Transformed Medicaid Statistical Information System (T-MSIS) Analytic File (TAF)	CMS		X	X	January 2014–December 2017	Patient-level inpatient and outpatient claims/ encounter and enrollment data
Maryland hospital discharge data	Maryland Health Services Cost Review Commission (HSCRC)[18]	X	X		January 2011–December 2017	Discharges, including clinical data (e.g., diagnoses and procedures)

(continued)

[18] HSCRC is responsible for monitoring hospital financial affairs in Maryland. MHCC is responsible for establishing strategies to limit health care costs and expand access to Marylanders. Both departments fall under the Regulatory Programs Division, which is one of five large subgroups under the Secretary of the Department of Health and Mental Hygiene.

Table C-1 (continued)
Data sources and years used for analysis

Data source	Data provider	Unit of analysis: Facility	Unit of analysis: Patient	Unit of analysis: State	Data period used	Contents/variables of interest
Repriced Medicare Part A and B FFS claims for Maryland	Lewin Group		X		October 1, 2013–September 30, 2017	Patient-level inpatient and outpatient claims
Maryland Revenue and Volumes Report	Maryland Health Services Cost Review Commission	X			January 1, 2014–June 30 2018	Hospital revenue and volume data
Audited hospital statements	Maryland Health Services Cost Review Commission	X			January 1, 2014–June 30 2018	Hospital revenues, operating expenses, and operating margins
Inpatient Prospective Payment System Impact File	CMS	X			2011–2017	Hospital characteristics
American Hospital Association (AHA) annual survey	AHA	X			2013	Organizational structure, facility and service lines, physician arrangements, staffing, corporate and purchasing affiliations, teaching status, and a geographic indicator
Annual Report on Selected Maryland Acute Care and Special Hospital Services	MHCC	X			Fiscal Year 2015	Hospital system affiliation
Area Health Resources File (AHRF)	Health Resources and Services Administration			X	AHRF is produced annually, but the availability for individual data elements varies. We used the latest data available from the baseline period (2012–2013).	County-level demographic and health care supply variables
Geographic Variation Public Use File	CMS			X	2013	Aggregated demographic, spending, utilization, and quality indicators at the state and county levels

(continued)

Table C-1 (continued)
Data sources and years used for analysis

Data source	Data provider	Unit of analysis			Data period used	Contents/variables of interest
		Facility	Patient	State		
Hospital Compare	CMS	X		X	2011–2016	Patient perspectives on hospital care, including communication and care transitions
Behavioral Risk Factor Surveillance System	CDC		X	X	2011–2016	Smoking status and obesity

CMS = Centers for Medicare & Medicaid Services; CDC = Centers for Disease Control and Prevention.

Medicare data—We used Medicare claims data provided by the Centers for Medicare & Medicaid Services (CMS) in the Chronic Condition Data Warehouse (CCW) to derive expenditure, utilization, quality of care, service mix, and spillover outcomes for Medicare beneficiaries in Maryland and the comparison group. We also used Medicare data to compare inpatient and outpatient payment rates under the All-Payer Model with IPPS and OPPS payment rates. The Medicare data in the CCW include (1) denominator information, which indicates the number of beneficiaries alive and residing in Maryland or the comparison hospital market areas during the period; (2) enrollment information, which indicates the number of days that beneficiaries were enrolled in Medicare during the period; (3) the claims experience for each beneficiary, including inpatient, hospital outpatient, physician, skilled nursing facility, home health agency, hospice, and durable medical equipment claims; and (4) a health care characteristics file, which contains the hierarchical condition category (HCC) risk score[19] for beneficiaries. We used both Part A and Part B claims to create claims-based outcome measures and the health care characteristics file to obtain the beneficiaries' risk scores for risk adjustment in outcome regression models. For this report, we used Medicare data from January 2011 through June 30, 2018. Because Medicare Advantage (i.e., managed care) enrollees may not have complete utilization and expenditure data, we excluded beneficiaries with any months of enrollment in Medicare managed care. We further restricted the Medicare sample in each year to beneficiaries who were alive at the beginning of the year, had at least 1 month of both Part A and Part B enrollment, and had no months of only Part A or only Part B enrollment.

We also used repriced Medicare Part A and Part B fee-for-service claims prepared by the Lewin Group for the comparison with IPPS and OPPS payment rates. The Lewin Group applied pricing algorithms to Medicare final action claims to reprice all Medicare FFS claims submitted by a Maryland hospital as though such bills were paid in accordance with Medicare prospective payment systems. For this report, we used repriced Medicare data from 2011 through 2017.

[19] The HCC grouping is based on the average of all beneficiaries' health risk scores, which was calculated using CMS's HCC risk adjustment model. The HCC risk adjustment model uses beneficiary demographic information (e.g., gender, age, Medicaid status, disability status) and diagnosis codes reported in Medicare claims data from the previous year to predict payments for the current year. This risk score often is used as a proxy for a beneficiary's health status (severity of illness).

Commercial data—We used the 2011 through 2017 MarketScan data to derive outcomes for commercial insurance plan members in Maryland and the comparison group. To ensure comparability between groups, we used MarketScan for both Maryland and the comparison group. MarketScan is the largest available database of commercial insurance claims and contains payment and utilization data for all claim types. The MarketScan commercial insurance claims are constructed from data contributed by around 350 payers, although the exact number of contributors varies by year. Enrollees are covered under plan types that include FFS, fully and partially capitated plans, and various other plan models, including preferred provider organizations. The MarketScan data include enrollees from all 50 states and the District of Columbia. MarketScan includes data on all persons enrolled in the insurance plans contributing to the dataset, regardless of whether they used services, which allowed us to calculate the probability of using any services. We could not calculate hospital-specific outcomes for comparison hospitals because hospital identifier information is not included in MarketScan hospital discharge data.

MarketScan is a convenience sample that is not representative of the entire commercially insured population. Because the data over-represent large employers, employer-sponsored insurance is not completely represented for each state. As such, the results from the MarketScan analyses may not be generalizable to all commercially insured populations in Maryland. Nevertheless, the database has a significant sample of privately insured individuals in each state. Furthermore, it is important that we used MarketScan data for both Maryland and the comparison group in our difference-in-differences analyses to ensure comparable populations to reduce bias in the estimates.

We also calculated outcomes for the Maryland commercially insured population included in the Maryland Medical Care Data Base (MCDB) and compared them to outcomes from MarketScan data. The MCDB is the private insurer portion of Maryland's all-payer claims database. The MCDB excludes self-insured Employee Retirement Income Security Act health plans beginning in 2015 because of the Supreme Court ruling in Gobeille v. Liberty Mutual Insurance Company.[20] Because MarketScan data overrepresent large employer self-insured plans, there may not be much overlap in the commercially insured populations included in the MCDB and MarketScan datasets after 2014. The comparison with the MCDB can help inform our interpretation of the MarketScan analysis. The MCDB contains multiple files, including eligibility, professional services, pharmacy services, institutional services, dental services, and a provider directory for commercial payers. In this report, we included data from calendar years 2011 through 2017. The files contain patient-level eligibility information, inpatient and outpatient claims data, and facility-level financial data, which we used to create cost and utilization outcomes for the commercially insured population. Because we do not have a comparable commercial database for comparison states, we used the MCDB for pre-post analysis of Maryland residents only to compare the outcomes with those generated from the MarketScan data for Maryland. To have a comparable population to MarketScan, we excluded any members over the age of 64 from the MCDB analysis.

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[20] Department of Health, Maryland Health Care Commission. (2018, September 19). Health data and quality: MCDB. Retrieved from https://mhcc.maryland.gov/mhcc/pages/apcd/apcd_mcdb/apcd_mcdb.aspx

Medicaid data—We used Medicaid data from the CMS Medicaid Analytic eXtract (MAX) research files for the baseline period (2011 through 2012) and Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAFs) for the post-All Payer Model period (2014 through 2017). The data were made available through the CCW enclave for Maryland. We excluded 2013 from the analysis because of incomplete data. Each state's Medicaid Statistical Information System data are the source of the MAX files, and each state's T-MSIS data are the source for the TAFs. The MAX file and TAF processing add enhancements such as claims adjustments, creation of a national type of service field, and state-specific quality issues corrections. T-MSIS data contain over 1,000 elements, including many data elements not previously available in MAX files. However, the TAF processing was in early stages when we were analyzing the data, so many data elements were missing or incomplete. The MAX files include a person summary (PS) file with all enrollment information and summary claims information, and the TAFs include a beneficiary summary file (BSF) with all enrollment information. Both the MAX files and the TAFs include four claims files: inpatient (IP), long-term care (LT), pharmacy (RX), and other services (OT) claims. Because Maryland's Medicaid expansion coincided with the start of the All-Payer Model in 2014 and newly insured beneficiaries may have different utilization patterns, we excluded Medicaid expansion beneficiaries from this analysis. We also excluded beneficiaries who were dually enrolled in Medicare because their utilization data may be incomplete in the Medicaid claims data.

Health Services Cost Review Commission (HSCRC) discharge data—The Maryland hospital discharge database contains multi-payer data that have patient demographics (i.e., date of birth, gender, race, marital status, and geographic information), clinical data (i.e., diagnoses and procedures), hospital service use, expected payer, and charges incurred for inpatient hospital stays. The inpatient dataset contains discharge medical record abstract and billing data for all inpatient admissions in the state annually. For this report, we used Maryland discharge data from 2011 through 2016 to validate diagnosis information in the Medicare claims data.

HSCRC financial data—We used HSCRC's Revenue and Volumes Report to assess changes in rates charged. The Revenue and Volumes Report includes monthly revenue and volume data by rate center for each acute care hospital in Maryland.[21] Hospitals submit these data monthly within 30 days of the end of a month. Among other purposes, the data are used to monitor whether hospitals are charging rates in compliance with their rate corridors. Revenue and Volumes Report data are available monthly. We used these data in the analyses of hospital rate adherence. We also used information on hospital rate orders and permissions for hospitals to vary from their rate orders by more than 5 percent, obtained from quarterly reports submitted by HSCRC to CMS, in the rate adherence analyses. HSCRC provided information on hospital global budgets and penalties. Finally, we used annual audited hospital statements of revenues and expenditures, obtained from HSCRC, for analyses of hospital revenues, operating expenses, and operating margins.

American Hospital Association (AHA) annual survey data—We used the 2013 AHA annual survey data to select hospitals included in the comparison group. The AHA survey data

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[21] Additional information on hospital financial databases maintained by HSCRC is available at https://www.hscrc.maryland.gov/Pages/hsp_Data2.aspx.

include information on U.S. hospitals from the AHA's Annual Survey of Hospitals, AHA membership data, and U.S. Census Bureau identifiers. We used data on hospital ownership status from the AHA in selecting the comparison hospitals.

IPPS Impact File—We used the IPPS Impact File as an additional source of information for selecting the comparison group and for categorizing hospitals in financial performance analyses. The IPPS Impact File contains data elements by provider that CMS uses in calculating the final IPPS rates and estimating payment effects of policy changes to the IPPS. The data elements in this file are abstracted from the Medicare Provider Analysis and Review, Provider of Services, and Medicare cost report files. We used the IPPS Impact File to obtain data on hospital characteristics, including disproportionate share hospital percentages, number of beds, number of residents, transfer-adjusted case mix, and Medicare days as a percentage of total inpatient days.

Area Health Resources File (AHRF)—The AHRF comprises data collected by the Health Resources and Services Administration from more than 50 sources containing more than 6,000 variables related to health care access at the county level. We used information on health professions supply, hospital bed supply, and population characteristics and economic data to select the comparison group and to use as covariates in the analysis.

Geographic Variation Public Use File—The Geographic Variation Public Use File created by CMS contains aggregated demographic, spending, utilization, and quality indicators at the state and county levels. The file was developed to enable researchers and policymakers to evaluate geographic variation in the utilization and quality of health care services for the Medicare FFS population. We used these data in selecting the comparison group.

Annual report on selected Maryland acute care and special hospital services—This report, produced each fiscal year by the Maryland Health Care Commission (MHCC), provides information on hospital system affiliation; licensed bed capacity for selected services by hospital; and hospital capacity to provide surgical, emergency, obstetrics and delivery, and psychiatric care. We used these data to categorize hospitals in the hospital financial performance analyses.

Hospital Compare data—Hospital Compare is maintained by CMS as a part of their Hospital Quality Initiative. It includes data on quality of care from multiple sources for over 4,000 Medicare-certified hospitals across the country. For this report, we used data elements from the Hospital Consumer Assessment of Healthcare Providers and Systems survey to measure patient experience of care in Maryland and comparison group hospitals from 2011 through 2016.

Behavioral Risk Factor Surveillance System (BRFSS)—BRFSS is a nationally representative survey from the Centers for Disease Control and Prevention conducted annually by state health departments via landline and cellular telephone to collect information on behavioral risk factors of the noninstitutionalized adult population (18 years of age and older). The goal of BRFSS is to collect uniform, state-specific data on preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases affecting the adult population. BRFSS includes overall health status, mental health status, and health care access. For this report, we used data elements from the BRFSS to measure smoking status and obesity in Maryland and comparison group residents from 2011 through 2016.

APPENDIX D:
COMPARISON HOSPITAL COVARIATE BALANCE AND PROPENSITY SCORE METHODOLOGY

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D.1 Comparison Group Selection

Overview—National trends in payment methodologies and provision of health care affect the environment in which the Maryland model operates. For example, the Maryland health care delivery system is not immune to the national trends toward higher deductibles, the increased presence of value-based contracts, changes in the distribution of health care payer (commercial, Medicare, or Medicaid) enrollment, and reductions in the number of uninsured persons. Given the co-occurring changes in the health care environment, isolating the effects of any one health reform is difficult. As such, wherever possible the evaluation uses comparison groups to isolate the effects of the Maryland All-Payer Model from those of other changes in the health care environment. Given that so much change is occurring across the nation, this comparison does not measure what would have happened in the absence of the implementation of the Maryland All-Payer Model. Rather, it answers the question, "Are hospital global budgets more effective at changing cost and utilization than other potential models that are being implemented nationwide?"

The comparison group was used as a counterfactual to the Maryland All-Payer Model. Therefore, hospitals and hospital market areas from which the comparison population was drawn should closely resemble Maryland hospitals and the populations residing in their market areas. We used a two-stage method for selecting the comparison group, beginning with selection of individual hospitals. From these individual hospitals, we then constructed hospital market areas and selected the populations residing in these areas. This two-stage selection process allowed us to create comparison groups for both hospital admission-level and population-level outcomes.

There were multiple challenges to selecting a comparison group for the Maryland All-Payer Model evaluation. First, Maryland has had a unique approach to paying hospitals, including Medicare reimbursement, since the 1970s. Even before the adoption of the Maryland All-Payer Model, Maryland hospitals operated in a different environment from and faced different financial and regulatory pressures than hospitals elsewhere in the country. Given Maryland's unique history, it was not possible to construct a comparison group that represents what would have happened in Maryland in the absence of the Maryland All-Payer Model, and it was difficult even to identify a comparison group that reflects what would have happened if other potential models that are being implemented nationwide were implemented in Maryland instead of the Maryland All-Payer Model.

Second, the comparison group for the evaluation had to be drawn from outside Maryland because the Maryland All-Payer Model was implemented statewide. Selection of a comparison group, particularly one from out of state, is always challenging because it must account for many factors that can influence the outcomes of interest, including population and health care market characteristics, as well as Medicaid program and other state health policies. It was unlikely that a single state could provide the ideal comparison. Selecting the comparison population from multiple states and hospital market areas reduced the potential for biasing results in a particular way because of a poor choice of comparison area.

Third, the evaluation of the Maryland All-Payer Model focused on a wide variety of research questions and specific areas of interest. Multiple comparison groups were necessary to adequately address these questions. The evaluation included analyses at several different levels.

Some analyses were conducted at the population level (e.g., per capita health care expenditures, hospital admission rates in a population) and included all residents within a hospital market area. Other analyses were conducted at the admission level (e.g., follow-up visits after hospital discharge, hospital readmission rate).

As described in the following sections, we matched Maryland hospitals with comparison hospitals using hospital and market characteristics during the baseline period and balanced individual and market-area characteristics at the person level, admission level, or emergency department (ED) visit level (depending on the outcome) using propensity score weighting. Nonetheless, the health care environment is dynamic, and comparison hospitals and their market areas may be affected by health system reform initiatives and other changes during the Maryland All-Payer Model implementation period. Although these changes can be viewed as the counterfactual against which Maryland was compared, some might affect the comparability of these groups. For example, Illinois, where a large number of comparison hospitals are located, participated in a demonstration in which dually eligible beneficiaries in selected counties were enrolled in capitated managed care for both Medicare and Medicaid services, although they could elect to opt out and remain in FFS Medicare. As a result, the proportion of dually eligible enrollees in the comparison group drawn from Illinois declined in the first quarter of 2015. Dual eligible status is one of the characteristics used in propensity score weighting, which allowed us to adjust for changes in the proportion of dually eligible beneficiaries over time. However, the dually eligible beneficiaries in Illinois who opted out of the demonstration and remained in FFS Medicare might be systematically different from the overall dually eligible population in unobservable ways, and this difference could potentially bias the comparison. The effect of the decline in the comparison group dually eligible population on the results in this report was expected to be minimal because Illinois is only one state from which the comparison group was drawn, although it does compose a disproportionately large share.

In the following sections, we describe the procedures for selecting the comparison hospitals and constructing market areas. The comparison group balance diagnostics at both stages of comparison group selection are presented in the First Annual Report.[22]

Hospital selection—Hospitals in all states except Maryland in the Inpatient Prospective Payment System (IPPS) Impact File were considered as potential comparison hospitals. We used variables from the IPPS Impact File, the Area Health Resources File (AHRF) from the Health Resources and Services Administration (HRSA), the American Hospital Association (AHA) survey, and the Geographic Variation Public Use File to select comparison group hospitals. ***Appendix C*** provides more detail about each of these data sources.

We considered variables in four broad domains: (1) hospital characteristics, (2) population characteristics, (3) Medicare costs and managed care penetration, and (4) Medicare utilization. The set of potential covariates was refined by examining pairwise correlations among all potential variables to identify and remove highly correlated (i.e., redundant) variables. With only 47 Maryland hospitals, the number of covariates that could be included in a conventional propensity score model using logistic regression was somewhat

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22 https://downloads.cms.gov/files/cmmi/marylandallpayer-firstannualrpt.pdf

limited. The covariates and domains, which include hospital and market area characteristics, were as follows:

- Hospital characteristics (hospital-level variables):
  - Bed size
  - Resident physicians per bed
  - Proportion of hospital discharges that are Medicare beneficiaries
  - Disproportionate share hospital (DSH) percentage
  - Percent capacity (average daily census/total beds)
  - Transfer-adjusted case mix
  - Hospital bed to total county bed ratio
- Demographic characteristics (county-level variables):
  - Median household income (2013)
  - Average Hierarchical Condition Category (HCC) score (2013)
- Medicare costs and managed care penetration (county-level variables):
  - Standardized risk-adjusted Medicare total costs per beneficiary (2013)
  - Medicare Advantage penetration (2013)
- Medicare utilization (county-level variables):
  - Percent change in inpatient stays per 1,000 beneficiaries (2008–2013)

Genetic matching—We used a genetic matching approach (GenMatch) to optimize balance between Maryland and comparison hospitals on observed characteristics while maximizing the diversity of comparison group hospitals selected.[23] We used the GenMatch package because of the large number of available user-specified options, the ability to perform exact matching on specified variables, and the prior experience of RTI's consultant with this package.

We selected up to two comparison hospitals for each Maryland hospital. Each comparison hospital could match with up to three Maryland hospitals. A standardized difference

[23] Diamond, A., & Sekhon, J. S. (2013). Genetic matching for estimating causal effects: A general multivariate matching method for achieving balance in observational studies. *Review of Economics and Statistics, 95*(3),932–945.

of less than 0.1 is the conventional threshold for covariate balance with large sample sizes; however, larger standardized differences (e.g., 0.25) are considered acceptable for covariate balance with smaller samples, such as those in our hospital selection.

Within GenMatch, we explored many of the user-specified functions, including population size, match ratio, alternative specifications of the balance matrix, addition of a propensity score as an additional x-covariate (both included in the balance matrix and not included in the balance matrix), wait generations, exact match, matching with and without replacement, caliper size, and omitting less important variables from the balance matrix.

A 1:1 match ratio performed better than 2:1 or 3:1 match ratios. Matching with replacement was superior to matching without replacement in all match ratios examined. Addition of a propensity score to both the x-covariates and the balance matrix improved covariate balance as well. We found a balance matrix with all first-order interaction terms and squared terms for continuous variables to be superior to any theory-based model specifications. Exact matching on the type of hospital (sole community, non-teaching, and teaching) improved balance on resident-to-bed ratio and hospital bed-to-county bed covariates. It also provided a means to match on a crucial theory-based distinction. Although post-matching balance was generally substantially improved from pre-matching balance, we were concerned about the extent of comparison group hospital replacement occurring with the optimal user specifications.

Using a 1:1 match ratio with replacement, we identified only 28 comparison group hospitals for the group of Maryland hospitals. One comparison group hospital was used five separate times as a match, and several additional comparison group hospitals matched to three or four different intervention hospitals. We were concerned about the degree of replacement occurring to achieve balance and about the potential implications of substantially upweighting these comparison group hospitals in outcome analysis.

We were not able to manipulate the degree of replacement within the GenMatch program other than to specify with or without replacement. This limitation led to two divergent extremes: suboptimal covariate balance in 1:1 matching without replacement and optimal covariate balance with excessive duplication of comparison group hospitals in 1:1 matching with replacement. We manually created two hybrid scenarios. In the first scenario we opted for a 3:1 match ratio with replacement and then manually eliminated matches involving duplicate comparison group hospitals until no comparison group hospital was used more than three times. In the second scenario, we followed a similar procedure but used a 2:1 match ratio with replacement. The strengths and weaknesses of each scenario are shown in ***Table D-1***.

After reviewing the results for these four scenarios, we proceeded with the final scenario, 2:1 matching with replacement followed by a manual deduplication to ensure that no comparison hospital was used more than three times in the comparison group. The covariate balance for the matched hospitals and Maryland hospitals is shown in the First Annual Report.

Table D-1
Summary of positive and negative aspects of alternative hospital matching scenarios

Scenario	Mean standardized difference	Strengths	Weaknesses
1:1 match with replacement	12.3	Best balance	Resulted in duplicates (up to 5); only 1 match per Maryland hospital
1:1 match without replacement	17.5	No duplicate hospitals	Worse balance than Option 1; still only 1 match per Maryland hospital
3:1 match with replacement/limit duplicates	18.7	Fewer duplicates than Option 1; more than 1 match for some hospitals	Worse balance than Option 1
2:1 match with replacement/limit duplicates	13.1	Fewer duplicates than Option 1; better balance than Option 2; more than 1 match for some hospitals	Worse balance than Option 1

D.2 Hospital Market Area Construction

Market area selection—The Maryland All-Payer Model included a commitment to focus on population health, and Maryland hospitals, to some extent, were expected to have a positive effect on population health. For the purposes of this evaluation, the hospital market area was defined to be an area where the population could reasonably be expected to be affected by the hospital. We expected that hospitals would have the greatest influence on population health in the geographic areas nearest them because they are likely to provide a larger proportion of hospital services to those populations.

To create the hospital market areas for our selected comparison hospitals, we examined several alternative methodologies. One set of alternatives took into account geographic distance to construct hospital market areas. A criterion for geographic distance can be defined in terms of ZIP codes within a specified distance from the ZIP code in which the hospital is located. A second alternative was based on hospital volume. Under this method, ZIP codes were rank ordered based on the number of admissions to the hospital. ZIP codes were selected if they exceeded a specified minimum share of a hospital's admissions or in combination accounted for a specified share of admissions. Geographic distance and volume could also be used in combination (e.g., ZIP codes within a specified distance that met a minimum volume threshold). A third alternative methodology was to use an existing hospital market area definition, such as the *Dartmouth Atlas of Health Care* HSAs. The HSAs are locally defined markets for receipt of hospital care. Each HSA is a collection of ZIP codes from which the plurality of residents receive most of their hospital care from hospitals in that area. The ZIP codes within an HSA are also required to be geographically contiguous. The HSAs were created based on Medicare data from the early 1990s. The HSAs have been kept static since that time to preserve historical continuity; they have not been updated to reflect hospital closures and openings or changes in where populations seek hospital care.[24] We also considered replicating the methodology used to define hospital primary service area in the All-Payer Model participation agreements with Maryland hospitals. However, the Health Services Cost Review Commission allowed hospitals to use their own criteria to define primary service area, so this definition could not be replicated for comparison hospitals.

We examined five different methods for defining hospital market areas. The first three methods relied solely on geographic distance, assigning all ZIP codes that fall within 5, 10, or 15 miles of the hospital ZIP code. The fourth variant used both geographic distance (15 miles) and a minimum threshold (2%) of the hospital admissions coming from the assigned ZIP code. Finally, we considered using the HSAs as defined by the *Dartmouth Atlas of Health Care*. We examined the performance of the alternative definitions for the comparison group hospitals. In addition, we examined performance for Maryland hospitals to assess whether the definitions performed similarly for Maryland and comparison group hospitals.

As described earlier, geographic distance and market share are important factors to consider in assigning market areas to hospitals. We created several ZIP code-level definitions of hospital market areas based on geographic proximity to the hospital ZIP code (measured using SAS: ZIPCITYDISTANCE) and the proportion of the hospital's total admissions received from the ZIP code. We considered several distance cutoffs—15, 10, and 5 miles—for constructing hospital market areas. We refer to the 15-mile cutoff as Option 1 and use the other definitions as references. We created a fourth distance-based option that considered only ZIP codes that both were within 15 miles of the hospital and accounted for at least 2 percent of the hospital's total Medicare admissions. We refer to the Dartmouth HSAs as Option 2.

We assessed the alternative market area definitions on two dimensions: (1) the percentage of the hospital's total Medicare admissions that originate from the assigned market area, and (2) the percentage of market area admissions that are to the hospital. These measures are inversely related. Expanding the first measure will reduce the second measure because it includes a larger market area (defined by ZIP codes). The larger market will capture more of the hospital's admissions, but a smaller share of the overall market will use the hospital. Therefore, a decision about market area definition had to weigh trade-offs between these criteria. It should also be noted that the share of market area admissions going to the selected hospital is lower in markets with multiple competing hospitals. ***Table D-2*** provides a brief summary and comparison of the results of analyses of the alternative market definitions for all included Maryland hospitals and the 48 comparison hospitals. We present a weighted average of percentages using the number of in-state Medicare admissions as the weight to appropriately account for larger hospitals.

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[24] https://www.dartmouthatlas.org/faq/#research-methods-faq

Table D-2
Comparison of alternative definitions of hospital market areas

Option	Percent of hospital admissions coming from assigned market area	Percent of assigned market area admissions going to hospital
15-mile rule (Option 1)		
MD	85	25
CG	85	24
Dartmouth (Option 2)		
MD	71	43
CG	67	49
10-mile rule		
MD	74	32
CG	65	31
5-mile rule		
MD	48	43
CG	48	43
15/2 rule		
MD	68	40
CG	65	42

NOTE: MD = Maryland hospitals; CG = comparison group hospitals.

Overall, Option 1 captured a greater percentage of the hospital's total admissions than Option 2. Option 1 covered 85 percent of the total hospital admissions for both Maryland hospitals and comparison hospitals. We found that for academic medical centers, Option 1 captured a larger percentage of admissions than Option 2, both in Maryland and particularly for the comparison hospitals. Option 2 captured 71 percent and 67 percent of hospital admissions in Maryland and the comparison hospitals, respectively. Under Option 1, however, the selected hospital covered a smaller proportion of the admissions in the market area: 25 percent (MD) and 24 percent (comparison group). The selected hospital covered a larger proportion of the market area admissions under Option 2—43 percent (MD) and 49 percent (comparison group). Overall, Option 2 assigned a more tightly defined market area (fewer ZIP codes) and therefore, the hospital captured more of the overall market area admissions. However, the more restricted market area resulted in including fewer of the overall hospital admissions. The Dartmouth definition performed similarly to or better than the other three market area definitions (10-mile, 5-mile, and 15/2 rule) on both dimensions, so we did not consider these further.

Table D-3 provides a count of the number of Maryland and comparison hospitals that had more than 50 percent of their total hospital admissions in the assigned market area by Option 1 and Option 2. A count of the number of hospitals in which the hospital admissions accounted for more than 50 percent of the assigned market area by Option 1 and Option 2 is also shown.

Table D-3
Count of hospitals based on performance on market area measures

Option	Count of hospitals where more than 50% of hospital admissions came from assigned market area	Count of hospitals where more than 50% of assigned market area admissions went to hospital
Option 1		
MD (45 hospitals)	44	8
CG (48 hospitals)	47	10
Option 2 (Dartmouth)		
MD (45 hospitals)	38	20
CG (48 hospitals)	38	27

NOTE: MD = Maryland hospitals; CG = comparison group hospitals.

Maryland and comparison group hospitals performed similarly under both Option 1 and Option 2. We also compared Option 1 and Option 2 with respect to the coverage of the ZIP codes within Maryland to ensure that the entire state would be included with the assigned methodology. We found that both methods leave less than 1 percent of the population unassigned. Therefore, we did not find an advantage to using Option 1 or Option 2 on this basis.

Option 1 was attractive because market areas could be defined based on current (2013) admission patterns of the selected comparison hospitals. In addition, a large number of the hospital admissions in the state were assigned to an HSA (85%). Finally, this method covered a higher percentage of hospital admissions for the academic medical centers in both Maryland and the comparison group. The downside of Option 1 was that the wider market area definition led to a market area that was less affected by the given hospital, as measured by the percentage of market area admissions to the hospital.

Option 2 was an existing, recognized methodology that was likely to be acceptable among involved stakeholders. In addition, market area definitions in Option 2 were better aligned with the geographic areas where patients were more likely to use the selected hospital. There were two downsides to this option. First, the market areas were created in 1993 and have not been updated since that time except to include new ZIP codes. However, the analyses used to compare Option 1 and Option 2 were based on 2013 admission data, and the Dartmouth market areas still performed well. Second, Option 2 assigned fewer of the hospital's total admissions to the hospital from the assigned market area than Option 1.

Both Option 1 and Option 2 have advantages and disadvantages. The critical question to answer was whether we wanted the measure to maximize (1) the share of the selected hospital's admissions captured or (2) the share of market area admissions captured by the selected hospital. When calculating differences in total spending between the Maryland and comparison group hospitals, we would capture more of the hospitalized patients who actually use the hospital with Option 1. However, the hospital would have less overall control of the market area, because it includes ZIP codes where the hospital may account for a small proportion of admissions. With Option 2, we would capture fewer of the hospital's actual patients, but we would have a better focus on the geographic areas where patients are more likely to use the hospital and where the hospital conceivably has more control.

It was also important to consider the primary purpose of the market areas for analysis. Our aggregated hospital-level analysis captures all hospital admissions regardless of how the market areas are defined. We use market areas for population-level outcomes such as inpatient admission rates and spending per capita. The population-level analysis was focused on outcomes among beneficiaries residing in a defined area. These outcomes are not entirely dependent on hospital utilization but are expected to be influenced by a hospital serving the area. Given the focus on population-level outcomes of the analyses that use market areas, we gave greater weight to the share of market area admissions accounted for by the selected hospital. For this reason, and because it is an established method that has been used in previous studies, we implemented Option 2 to define market areas for comparison hospitals.

D.3 Propensity Score Methodology

Overview—After selecting comparison hospitals and hospital market areas, we constructed person-level, admission-level, and ED visit-level propensity score weights. Generally, person-level weights were used in expenditure and utilization analyses. They were also used in the analyses of one quality of care outcome (the probability of an admission for an ambulatory care sensitive condition) and a set of spillover outcomes (the probability of an outpatient evaluation and management visit by place of service). ED visit-level weights were used in analyses of expenditures per ED visit and the percentage of ED visits that resulted in an inpatient admission. Admission-level weights were used in service mix, spillover, and most quality of care analyses, but ambulatory care sensitive condition admissions used person-level weights. The propensity score weights were used in outcome regression models to facilitate balance between Maryland and the comparison group on individual and market-area characteristics.

Person-level propensity weights were derived from logistic regressions for the probability of being a Maryland resident among Maryland and comparison group residents. We generated two sets of ED visit-level propensity scores with two different samples: (1) one that included only outpatient ED visits by Maryland and comparison group residents to any hospital and (2) another that included both outpatient ED visits and ED visits that resulted in an admission (inpatient ED visits) to Maryland and comparison group hospitals by residents of any state. We used the outpatient ED visit weight in our model for payment per ED visit, and the inpatient and outpatient ED visit weight in our outcome model for ED visits that resulted in an admission. The outpatient ED visit-level propensity weight was constructed from a logistic regression for the probability that an ED visit was made by a Maryland resident among all ED visits for Maryland and comparison group residents. The inpatient and outpatient ED visit-level propensity weight was constructed from a logistic regression model for the probability that an ED visit was made to a Maryland hospital among all ED visits to Maryland or comparison group hospitals.

Admission-level propensity score weights were derived from logistic regressions for (1) the probability an admission occurred in a Maryland hospital; (2) among Maryland and comparison group residents, the probability an admission occurred in a Maryland hospital; (3) among Maryland and comparison group residents, the probability that an index admission occurred in a Maryland hospital (for the readmissions outcome); (4) among Maryland and comparison group residents, the probability that an index admission for an episode of care occurred in a Maryland hospital (for episodes outcomes); and (5) the probability a person admitted to any hospital was a Maryland resident. To accommodate different outcomes, we used these five types of admission-level propensity scores, which are described in more detail in ***Table D-4***.

For the Final Report, we included a new covariate—lagged count of chronic conditions—in all Medicare propensity score models. We added the lagged count of chronic conditions covariate to the propensity score models so we could balance on all the individual-level covariates included in the outcome models. The addition of the chronic conditions covariate did not appear to affect overall covariate balance relative to results reported in the Third Annual Report.[25]

We also created two new admission-level propensity scores—for index admissions for readmissions and for episodes of care—and one new ED visit-level propensity score—for both outpatient and inpatient ED visits. We added propensity scores for readmissions and episodes of care because the populations included in these analyses differed slightly from the population in other admission-level analyses (see ***Table D-4***). Despite using new propensity scores in the Final Report and including 1.5 additional years of Medicare data, D-in-D estimates for these outcomes were similar in the Third Annual Report and the Final Report.

Table D-4
Types of admission-level propensity scores used in outcome models

Description	Population	Outcomes used
Probability of admission to a Maryland hospital	All inpatient admissions to Maryland and comparison group hospitals regardless of patient's residence	Service mix, spillover
Probability of admission to a Maryland hospital by a Maryland resident among Maryland and comparison group residents	All inpatient admissions to Maryland and comparison group hospitals among Maryland and comparison group residents only	Quality of care (follow-up visit within 14 days of discharge, ED visit within 30 days of discharge)
Probability of an index admission to a Maryland hospital by a Maryland resident among Maryland and comparison group residents	All index admissions to Maryland and comparison group hospitals among Maryland and comparison group residents only	Unplanned readmissions within 30 days of discharge
Probability of an index admission for an episode of care to a Maryland hospital among Maryland and comparison group residents	All index admissions for an episode of care to Maryland and comparison group hospitals among Maryland and comparison group residents only	Spillover (total episode payments, all payment windows and payment components; total pre-admission and post-discharge window payments, all payment components)
Probability of admitted person being a Maryland resident	All inpatient admissions to any hospital by Maryland and comparison group residents	Expenditures and utilization (length of stay, payment per admission)

25 https://downloads.cms.gov/files/cmmi/md-all-payer-thirdannrpt.pdf

We also added the new ED visit-level propensity score because we added a new ED visit-level outcome, the percentage of ED visits that resulted in an admission, which had a different population than our other ED visit-level outcome, payments per ED visit. The population for payments per ED visit was outpatient ED visits by Maryland and comparison group residents, but the population for percentage of ED visits that resulted in an admission was all inpatient and outpatient ED visits to Maryland and comparison group hospitals.

Because we created these new propensity scores, we present balance results for all years below.

To achieve balance on these characteristics, we included various combinations and functional forms of the following covariates in the logistic regression models:

- Age
- Race (white = 1)
- Dual eligible status (defined as having dual eligibility for Medicare and Medicaid during at least 1 month of the year)
- Gender (male = 1)
- Originally entitled to Medicare because of disability status
- End-stage renal disease (ESRD) status
- HCC score
- Lagged count of chronic conditions
- County population density
- County metropolitan area indicator

The propensity score is the predicted probability of the dependent variable being equal to 1 (i.e., being a Maryland resident) for each observation in the logistic regression. For each population, we created propensity score weights by assigning a weight of 1 to Maryland residents (or admissions or ED visits) and a weight of [propensity score/(1−propensity score)] for individuals (or admissions or ED visits) in the comparison group. We then calculated absolute standardized differences between Maryland and both the unweighted and weighted comparison groups to determine the residual level of covariate imbalance. This process of estimating a logistic regression, creating a propensity score weight, and reviewing post-weighting covariate balance was performed for each year of available data to create year-specific propensity score weights. The full covariate balance details for the overall Medicare population and commercial population analyses are shown in the following sections. Covariate balance details for the Medicare subpopulation analyses are available on request from CMS.

For all tables included in this appendix, we report both unweighted and propensity score-weighted covariate means and absolute mean standardized differences. The standardized difference is calculated as shown in ***Equation D.1*** for continuous variables or ***Equation D.2*** for dichotomous variables.

Continuous:

$$d = \frac{\left(\bar{x}_{treatment} - \bar{x}_{control}\right)}{\sqrt{\frac{s^2_{treatment} + s^2_{control}}{2}}}, \qquad \text{(D.1)}$$

where $\bar{x}_{treatment}$ and $\bar{x}_{control}$ denote the sample mean of the covariate in treated and untreated subjects, respectively, and $s^2_{treatment}$ and $s^2_{control}$ denote the sample variance of the covariate in treated and untreated subjects, respectively.

Dichotomous:

$$d = \frac{\left(\hat{p}_{treatment} - \hat{p}_{control}\right)}{\sqrt{\frac{\hat{p}_{treatment}\left(1 - \hat{p}_{treatment}\right) + \hat{p}_{control}\left(1 - \hat{p}_{control}\right)}{2}}}, \qquad \text{(D.2)}$$

where $\hat{p}_{treatment}$ and $\hat{p}_{control}$ denote the prevalence or mean of the dichotomous variable in treated and untreated subjects, respectively.

We present standardized differences for some variables that are not included in the propensity score logistic regression models but that are conceptually important. Standardized differences below 0.10 are considered to be adequately balanced. We failed to achieve technical balance on many of the county-level variables because they have large standard deviations due to the small number of counties and therefore the small effective sample size. However, comparison of the means shows they are similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

D.4 Model 1: Probability of Being a Maryland Resident Among Maryland Residents and Residents of Comparison Group Market Areas: Medicare

We estimated a logistic regression where the dependent variable was an indicator for being a Maryland resident or not. We included residents of Maryland and comparison hospital market areas in the sample for analyses. The following covariates were included in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, lagged chronic condition count, county population density, and a metropolitan area indicator. ***Tables D-5*** through ***D-12*** contain covariate balance diagnostics for 2011–2018.

All unweighted standardized differences for individual-level covariates except dual eligible status were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-5
Maryland Medicare population-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.17	0.08	0.14	0.15	0.01
Age 65–74	0.42	0.41	0.02	0.43	0.43	0.02
Age 75–84	0.29	0.28	0.02	0.29	0.29	0.002
Age >= 85	0.14	0.14	0.02	0.14	0.13	0.03
White	0.73	0.75	0.04	0.73	0.73	0.004
Dual eligible	0.16	0.24	0.16	0.16	0.16	0.003
Male	0.43	0.43	0.01	0.43	0.43	0.01
Disabled	0.2	0.25	0.09	0.2	0.21	0.02
End-stage renal disease	0.01	0.01	0.001	0.01	0.01	0.003
Hierarchical Condition Category score	1.12	1.15	0.03	1.12	1.13	0.01
Metropolitan area	0.95	0.95	0.003	0.95	0.95	0.0001
Lagged number of chronic conditions	5.97	5.82	0.04	5.92	5.95	0.01
Population density 2010	1,810.02	3,496.01	0.59	1,814.82	1,915.42	0.05
Poverty rate 2013	10.77	13.49	0.52	10.77	11.9	0.22
Percent <65 years uninsured	11.56	13.7	0.52	11.57	13.03	0.38
Proportion of county population aged 25+ without a high school diploma	0.11	0.13	0.29	0.11	0.11	0.02
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.01	0.35	0.34	0.12
Acute hospital beds per 1,000 residents	2.23	2.46	0.13	2.24	2.09	0.09
Primary care providers per 1,000 residents	0.87	0.89	0.07	0.87	0.79	0.22

Table D-6
Maryland Medicare population-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.17	0.08	0.14	0.15	0.01
Age 65–74	0.43	0.42	0.03	0.44	0.44	0.02
Age 75–84	0.28	0.27	0.02	0.28	0.28	0.001
Age >= 85	0.14	0.14	0.02	0.14	0.13	0.03
White	0.72	0.75	0.05	0.72	0.72	0.000
Dual eligible	0.16	0.24	0.15	0.16	0.17	0.003
Male	0.43	0.43	0.01	0.43	0.43	0.01
Disabled	0.2	0.25	0.09	0.2	0.21	0.02
End-stage renal disease	0.01	0.01	0.0004	0.01	0.01	0.002
Hierarchical Condition Category score	1.14	1.17	0.02	1.13	1.14	0.004
Metropolitan area	0.95	0.95	0.003	0.95	0.95	0.0013
Lagged number of chronic conditions	5.98	5.89	0.02	5.93	5.94	0.002
Population density 2010	1,799.07	3,459.54	0.58	1,804.12	1,899.36	0.04
Poverty rate 2013	10.74	13.42	0.52	10.74	11.85	0.22
Percent <65 years uninsured	11.56	13.64	0.50	11.56	12.98	0.37
Proportion of county population aged 25+ without a high school diploma	0.11	0.13	0.28	0.11	0.11	0.02
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.01	0.35	0.34	0.12
Acute hospital beds per 1,000 residents	2.22	2.45	0.13	2.22	2.08	0.08
Primary care providers per 1,000 residents	0.87	0.89	0.08	0.87	0.79	0.22

Table D-7
Maryland Medicare population-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.17	0.07	0.14	0.15	0.00
Age 65–74	0.44	0.43	0.03	0.44	0.45	0.02
Age 75–84	0.28	0.27	0.02	0.28	0.28	0.001
Age >= 85	0.14	0.13	0.02	0.14	0.13	0.03
White	0.71	0.74	0.06	0.71	0.71	0.004
Dual eligible	0.17	0.24	0.14	0.17	0.17	0.004
Male	0.43	0.43	0.01	0.43	0.43	0.01
Disabled	0.21	0.25	0.09	0.21	0.21	0.02
End-stage renal disease	0.01	0.01	0.001	0.01	0.01	0.002
Hierarchical Condition Category score	1.1	1.15	0.03	1.1	1.1	0.003
Metropolitan area	0.95	0.95	0.003	0.95	0.95	0.0008
Lagged number of chronic conditions	5.96	5.91	0.01	5.92	5.93	0.002
Population density 2010	1,800.4	3,432.43	0.57	1,805.07	1,888.79	0.04
Poverty rate 2013	10.74	13.36	0.51	10.74	11.81	0.21
Percent <65 years uninsured	11.56	13.59	0.49	11.57	12.95	0.36
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.27	0.11	0.11	0.03
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.00	0.35	0.34	0.11
Acute hospital beds per 1,000 residents	2.22	2.44	0.13	2.22	2.07	0.09
Primary care providers per 1,000 residents	0.86	0.89	0.08	0.87	0.79	0.21

Table D-8
Maryland Medicare population-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.17	0.06	0.14	0.14	0.002
Age 65–74	0.45	0.44	0.02	0.45	0.46	0.02
Age 75–84	0.27	0.27	0.01	0.27	0.27	0.0001
Age >= 85	0.14	0.13	0.01	0.13	0.13	0.03
White	0.7	0.74	0.08	0.7	0.71	0.01
Dual eligible	0.17	0.23	0.12	0.17	0.17	0.02
Male	0.43	0.44	0.01	0.43	0.44	0.01
Disabled	0.21	0.25	0.08	0.21	0.22	0.02
End-stage renal disease	0.01	0.01	0.0032	0.01	0.01	0.002
Hierarchical Condition Category score	1.1	1.14	0.03	1.1	1.1	0.002
Metropolitan area	0.95	0.95	0.001	0.95	0.96	0.0028
Lagged number of chronic conditions	5.96	5.94	0.01	5.91	5.92	0.002
Population density 2010	1,804.78	3,391.37	0.56	1,808.73	1,875.11	0.03
Poverty rate 2013	10.73	13.23	0.48	10.72	11.69	0.19
Percent <65 years uninsured	11.56	13.53	0.48	11.57	12.88	0.34
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.25	0.11	0.11	0.04
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.01	0.35	0.34	0.09
Acute hospital beds per 1,000 residents	2.22	2.42	0.11	2.22	2.05	0.10
Primary care providers per 1,000 residents	0.86	0.89	0.07	0.87	0.8	0.21

Table D-9
Maryland Medicare population-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.16	0.05	0.14	0.14	0.005
Age 65–74	0.45	0.44	0.02	0.46	0.47	0.02
Age 75–84	0.27	0.26	0.02	0.27	0.27	0.001
Age >= 85	0.13	0.13	0.00	0.13	0.12	0.02
White	0.69	0.75	0.09	0.69	0.7	0.02
Dual eligible	0.18	0.22	0.10	0.18	0.16	0.03
Male	0.43	0.44	0.02	0.43	0.44	0.01
Disabled	0.21	0.24	0.07	0.21	0.21	0.01
End-stage renal disease	0.01	0.01	0.004	0.01	0.01	0.002
Hierarchical Condition Category score	1.13	1.18	0.04	1.13	1.13	0.00004
Metropolitan area	0.95	0.95	0.005	0.96	0.96	0.00001
Lagged number of chronic conditions	5.94	5.93	0.002	5.89	5.92	0.007
Population density 2010	1,801.26	3,338.1	0.54	1,805.03	1,846.99	0.02
Poverty rate 2013	10.72	13.12	0.46	10.71	11.62	0.18
Percent <65 years uninsured	11.55	13.43	0.45	11.56	12.83	0.33
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.23	0.11	0.11	0.05
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.02	0.35	0.34	0.09
Acute hospital beds per 1,000 residents	2.21	2.4	0.11	2.21	2.04	0.10
Primary care providers per 1,000 residents	0.86	0.89	0.07	0.86	0.8	0.20

Table D-10
Maryland Medicare population-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.16	0.05	0.14	0.14	0.005
Age 65–74	0.46	0.45	0.02	0.46	0.47	0.02
Age 75–84	0.27	0.26	0.02	0.27	0.27	0.002
Age >= 85	0.13	0.13	0.005	0.13	0.12	0.02
White	0.69	0.74	0.10	0.69	0.7	0.02CS
Dual eligible	0.18	0.22	0.09	0.18	0.16	0.03
Male	0.43	0.44	0.02	0.43	0.44	0.01
Disabled	0.21	0.24	0.07	0.21	0.21	0.01
End-stage renal disease	0.01	0.01	0.003	0.01	0.01	0.003
Hierarchical Condition Category score	1.04	1.08	0.04	1.04	1.04	0.0004
Metropolitan area	0.96	0.95	0.006	0.96	0.96	0.001
Lagged number of chronic conditions	5.99	5.97	0.003	5.94	5.98	0.01
Population density 2010	1,786.23	3,303.96	0.53	1,790.44	1,834.39	0.02
Poverty rate 2013	10.66	13.06	0.46	10.66	11.58	0.19
Percent <65 years uninsured	11.55	13.39	0.44	11.56	12.8	0.32
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.23	0.11	0.11	0.05
Proportion of county population aged 25+ with 4+ years of college	0.35	0.36	0.01	0.35	0.34	0.09
Acute hospital beds per 1,000 residents	2.19	2.39	0.11	2.19	2.04	0.09
Primary care providers per 1,000 residents	0.86	0.89	0.07	0.86	0.79	0.21

Table D-11
Maryland Medicare population-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.14	0.15	0.05	0.14	0.14	0.005
Age 65–74	0.46	0.45	0.01	0.46	0.47	0.02
Age 75–84	0.28	0.27	0.02	0.27	0.27	0.0002
Age >= 85	0.13	0.13	0.006	0.13	0.12	0.02
White	0.68	0.74	0.11	0.68	0.69	0.02
Dual eligible	0.18	0.22	0.08	0.18	0.17	0.03
Male	0.43	0.44	0.02	0.43	0.44	0.01
Disabled	0.21	0.24	0.07	0.21	0.21	0.01
End-stage renal disease	0.01	0.01	0.005	0.01	0.01	0.003
Hierarchical Condition Category score	1.05	1.1	0.05	1.05	1.04	0.006
Metropolitan area	0.96	0.95	0.012	0.96	0.95	0.005
Lagged number of chronic conditions	6.05	6.02	0.006	5.99	6.05	0.01
Population density 2010	1,766.33	3,245.9	0.52	1,770.97	1,804.84	0.02
Poverty rate 2013	10.61	13	0.46	10.61	11.56	0.19
Percent <65 years uninsured	11.54	13.32	0.43	11.55	12.76	0.31
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.23	0.11	0.11	0.05
Proportion of county population aged 25+ with 4+ years of college	0.35	0.36	0.00	0.35	0.34	0.09
Acute hospital beds per 1,000 residents	2.17	2.38	0.12	2.17	2.03	0.09
Primary care providers per 1,000 residents	0.86	0.88	0.06	0.86	0.79	0.21

Table D-12
Maryland Medicare population-level propensity score balance, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.13	0.15	0.04	0.13	0.13	0.008
Age 65–74	0.45	0.45	0.01	0.46	0.47	0.02
Age 75–84	0.29	0.28	0.02	0.28	0.28	0.0005
Age >= 85	0.13	0.13	0.004	0.13	0.12	0.02
White	0.68	0.74	0.11	0.67	0.69	0.02
Dual eligible	0.17	0.21	0.08	0.17	0.16	0.02
Male	0.43	0.44	0.02	0.43	0.44	0.01
Disabled	0.21	0.24	0.06	0.2	0.21	0.01
End-stage renal disease	0.01	0.01	0.005	0.01	0.01	0.002
Hierarchical Condition Category score	0.99	1.04	0.05	0.98	0.98	0.007
Metropolitan area	0.95	0.95	0.010	0.95	0.96	0.009
Lagged number of chronic conditions	6.2	6.16	0.009	6.08	6.09	0.002
Population density 2010	1,744.27	3,211.76	0.52	1,754.66	1,930.92	0.08
Poverty rate 2013	10.56	12.96	0.47	10.55	11.64	0.22
Percent <65 years uninsured	11.53	13.27	0.42	11.55	12.75	0.31
Proportion of county population aged 25+ without a high school diploma	0.11	0.12	0.23	0.11	0.11	0.02
Proportion of county population aged 25+ with 4+ years of college	0.36	0.36	0.0001	0.36	0.35	0.09
Acute hospital beds per 1,000 residents	2.15	2.37	0.13	2.15	2.05	0.06
Primary care providers per 1,000 residents	0.86	0.88	0.06	0.87	0.8	0.19

D.5 Model 2: Probability of Admission to a Maryland Hospital Among All Admissions to a Maryland or Comparison Group Hospital: Medicare

We estimated a logistic regression of an admission to a Maryland hospital among all admissions to a Maryland or comparison group hospital during the year. We included the following covariates in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, lagged chronic condition count, and a metropolitan area indicator. We present covariate balance for all years. ***Tables D-13*** through ***D-20*** contain covariate balance diagnostics for years 2011–2018, respectively.

All unweighted standardized differences for individual-level covariates except the indicator for race were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-13
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.07	0.20	0.19	0.03
Age 65–74	0.28	0.28	0.01	0.28	0.29	0.04
Age 75–84	0.30	0.32	0.04	0.30	0.31	0.02
Age >= 85	0.22	0.23	0.01	0.22	0.21	0.04
White	0.70	0.82	0.23	0.70	0.70	0.003
Dual eligible	0.28	0.31	0.06	0.28	0.28	0.005
Male	0.43	0.44	0.02	0.43	0.43	0.004
Disabled	0.30	0.28	0.02	0.30	0.30	0.003
End-stage renal disease	0.07	0.06	0.05	0.07	0.07	0.002
Hierarchical Condition Category score	2.44	2.39	0.02	2.44	2.43	0.004
Metropolitan area	0.95	0.93	0.08	0.95	0.95	0.003
Lagged number of chronic conditions	8.63	8.74	0.03	8.63	8.63	0.002
Population density 2010	2,180.16	2,612.96	0.13	2,180.16	2,838.71	0.20
Poverty rate 2013	11.93	12.55	0.12	11.93	12.66	0.14
Percent <65 years uninsured	11.82	12.87	0.25	11.82	13.14	0.31
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.07	0.12	0.12	0.04
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.10	0.34	0.35	0.13
Acute hospital beds per 1,000 residents	2.61	2.22	0.20	2.61	2.24	0.19
Primary care providers per 1,000 residents	0.85	0.85	0.03	0.85	0.86	0.04

Table D-14
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.08	0.20	0.19	0.03
Age 65–74	0.28	0.29	0.01	0.28	0.30	0.03
Age 75–84	0.29	0.31	0.04	0.29	0.30	0.02
Age >= 85	0.22	0.23	0.01	0.22	0.21	0.04
White	0.69	0.82	0.24	0.69	0.69	0.002
Dual eligible	0.28	0.31	0.06	0.28	0.28	0.004
Male	0.43	0.44	0.02	0.43	0.43	0.003
Disabled	0.30	0.29	0.03	0.30	0.30	0.002
End-stage renal disease	0.07	0.06	0.04	0.07	0.07	0.001
Hierarchical Condition Category score	2.60	2.54	0.02	2.60	2.59	0.004
Metropolitan area	0.95	0.93	0.07	0.95	0.95	0.003
Lagged number of chronic conditions	8.74	8.84	0.02	8.74	8.73	0.002
Population density 2010	2,178.42	2,595.95	0.13	2,178.42	2,826.79	0.20
Poverty rate 2013	11.86	12.48	0.12	11.86	12.62	0.14
Percent <65 years uninsured	11.82	12.79	0.23	11.82	13.08	0.30
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.07	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.09	0.34	0.35	0.12
Acute hospital beds per 1,000 residents	2.58	2.22	0.19	2.58	2.23	0.18
Primary care providers per 1,000 residents	0.85	0.86	0.02	0.85	0.86	0.04

Table D-15
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.07	0.20	0.19	0.03
Age 65–74	0.29	0.30	0.01	0.29	0.31	0.04
Age 75–84	0.29	0.31	0.04	0.29	0.30	0.02
Age >= 85	0.22	0.23	0.02	0.22	0.21	0.04
White	0.68	0.82	0.25	0.68	0.69	0.002
Dual eligible	0.28	0.30	0.04	0.28	0.28	0.003
Male	0.43	0.44	0.02	0.43	0.43	0.004
Disabled	0.31	0.29	0.02	0.31	0.31	0.001
End-stage renal disease	0.07	0.06	0.04	0.07	0.07	0.002
Hierarchical Condition Category score	2.46	2.45	0.01	2.46	2.45	0.01
Metropolitan area	0.95	0.93	0.07	0.95	0.95	0.003
Lagged number of chronic conditions	8.76	8.90	0.03	8.76	8.75	0.002
Population density 2010	2,146.58	2,571.56	0.13	2,146.58	2,800.20	0.20
Poverty rate 2013	11.84	12.37	0.10	11.84	12.51	0.13
Percent <65 years uninsured	11.82	12.66	0.20	11.82	12.97	0.27
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.09	0.12	0.12	0.05
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.12	0.34	0.35	0.15
Acute hospital beds per 1,000 residents	2.57	2.20	0.19	2.57	2.22	0.18
Primary care providers per 1,000 residents	0.85	0.86	0.04	0.85	0.86	0.06

Table D-16
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.21	0.17	0.08	0.21	0.19	0.03
Age 65–74	0.30	0.30	0.00	0.30	0.31	0.03
Age 75–84	0.28	0.30	0.04	0.28	0.29	0.02
Age >= 85	0.21	0.23	0.03	0.21	0.20	0.03
White	0.68	0.82	0.26	0.68	0.68	0.001
Dual eligible	0.29	0.31	0.04	0.29	0.29	0.002
Male	0.44	0.45	0.02	0.44	0.44	0.01
Disabled	0.31	0.30	0.03	0.31	0.31	0.001
End-stage renal disease	0.07	0.06	0.04	0.07	0.07	0.001
Hierarchical Condition Category score	2.39	2.41	0.01	2.39	2.38	0.01
Metropolitan area	0.95	0.93	0.06	0.95	0.95	0.003
Lagged number of chronic conditions	8.77	8.96	0.05	8.77	8.75	0.004
Population density 2010	2,130.76	2,555.91	0.13	2,130.76	2,785.77	0.20
Poverty rate 2013	11.81	12.19	0.07	11.81	12.36	0.10
Percent <65 years uninsured	11.81	12.48	0.16	11.81	12.82	0.24
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.11	0.12	0.12	0.07
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.14	0.34	0.35	0.16
Acute hospital beds per 1,000 residents	2.55	2.16	0.20	2.55	2.19	0.19
Primary care providers per 1,000 residents	0.85	0.86	0.04	0.85	0.87	0.05

Table D-17
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.07	0.20	0.19	0.02
Age 65–74	0.31	0.30	0.01	0.31	0.32	0.02
Age 75–84	0.28	0.30	0.03	0.28	0.29	0.01
Age >= 85	0.21	0.23	0.05	0.21	0.20	0.02
White	0.68	0.82	0.26	0.68	0.68	0.0001
Dual eligible	0.29	0.30	0.03	0.29	0.29	0.002
Male	0.44	0.45	0.02	0.44	0.44	0.004
Disabled	0.31	0.30	0.03	0.31	0.31	0.002
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.001
Hierarchical Condition Category score	2.49	2.52	0.01	2.49	2.47	0.01
Metropolitan area	0.95	0.93	0.06	0.95	0.95	0.004
Lagged number of chronic conditions	8.82	9.03	0.05	8.82	8.80	0.004
Population density 2010	2,117.86	2,504.35	0.12	2,117.86	2,733.24	0.19
Poverty rate 2013	11.80	12.07	0.05	11.80	12.24	0.08
Percent <65 years uninsured	11.78	12.28	0.12	11.78	12.63	0.20
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.14	0.12	0.12	0.09
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.17	0.34	0.36	0.18
Acute hospital beds per 1,000 residents	2.54	2.14	0.21	2.54	2.17	0.19
Primary care providers per 1,000 residents	0.84	0.86	0.06	0.84	0.87	0.07

Table D-18
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.07	0.20	0.19	0.02
Age 65–74	0.32	0.31	0.01	0.32	0.33	0.03
Age 75–84	0.28	0.30	0.03	0.28	0.29	0.01
Age >= 85	0.21	0.22	0.04	0.21	0.20	0.02
White	0.68	0.82	0.26	0.68	0.68	0.001
Dual eligible	0.29	0.30	0.02	0.29	0.29	0.002
Male	0.44	0.45	0.02	0.44	0.44	0.004
Disabled	0.31	0.30	0.02	0.31	0.32	0.001
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.001
Hierarchical Condition Category score	2.13	2.24	0.06	2.13	2.11	0.01
Metropolitan area	0.95	0.93	0.07	0.95	0.95	0.003
Lagged number of chronic conditions	8.86	9.06	0.05	8.86	8.84	0.004
Population density 2010	2,076.71	2,455.44	0.12	2,076.71	2,689.30	0.19
Poverty rate 2013	11.73	12.06	0.06	11.73	12.21	0.09
Percent <65 years uninsured	11.80	12.22	0.10	11.80	12.55	0.17
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.13	0.12	0.12	0.09
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.16	0.34	0.36	0.18
Acute hospital beds per 1,000 residents	2.50	2.14	0.19	2.50	2.16	0.18
Primary care providers per 1,000 residents	0.84	0.86	0.06	0.84	0.87	0.07

Table D-19
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.07	0.19	0.18	0.02
Age 65–74	0.32	0.31	0.01	0.32	0.32	0.02
Age 75–84	0.29	0.30	0.03	0.29	0.29	0.02
Age >= 85	0.21	0.22	0.04	0.21	0.20	0.02
White	0.67	0.81	0.26	0.67	0.67	0.001
Dual eligible	0.29	0.30	0.01	0.29	0.29	0.002
Male	0.44	0.46	0.02	0.44	0.45	0.004
Disabled	0.31	0.30	0.02	0.31	0.31	0.001
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.001
Hierarchical Condition Category score	2.23	2.33	0.05	2.23	2.22	0.01
Metropolitan area	0.95	0.93	0.08	0.95	0.95	0.004
Lagged number of chronic conditions	9.00	9.16	0.04	9.00	8.98	0.004
Population density 2010	2,058.05	2,443.41	0.12	2,058.05	2,677.53	0.19
Poverty rate 2013	11.68	12.07	0.07	11.68	12.20	0.10
Percent <65 years uninsured	11.80	12.14	0.08	11.80	12.46	0.15
Proportion of county population aged 25+ without a high school diploma	0.12	0.11	0.12	0.12	0.12	0.08
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.15	0.34	0.36	0.18
Acute hospital beds per 1,000 residents	2.48	2.15	0.17	2.48	2.17	0.16
Primary care providers per 1,000 residents	0.84	0.86	0.06	0.84	0.87	0.08

Table D-20
Maryland Medicare admission-level propensity score balance for service mix and spillover outcomes, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.18	0.15	0.07	0.18	0.17	0.02
Age 65–74	0.31	0.30	0.01	0.31	0.32	0.03
Age 75–84	0.30	0.31	0.03	0.30	0.30	0.01
Age >= 85	0.21	0.23	0.04	0.21	0.20	0.02
White	0.67	0.81	0.26	0.67	0.67	0.0001
Dual eligible	0.28	0.28	0.01	0.28	0.28	0.001
Male	0.44	0.46	0.02	0.44	0.45	0.01
Disabled	0.31	0.30	0.02	0.31	0.31	0.001
End-stage renal disease	0.07	0.06	0.04	0.07	0.07	0.001
Hierarchical Condition Category score	1.93	2.01	0.05	1.93	1.92	0.01
Metropolitan area	0.95	0.93	0.08	0.95	0.95	0.004
Lagged number of chronic conditions	9.33	9.53	0.05	9.33	9.31	0.004
Population density 2010	2,025.68	2,401.00	0.12	2,025.68	2,647.14	0.19
Poverty rate 2013	11.62	12.08	0.09	11.62	12.20	0.11
Percent <65 years uninsured	11.75	12.12	0.09	11.75	12.41	0.15
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.11	0.12	0.12	0.08
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.13	0.34	0.36	0.17
Acute hospital beds per 1,000 residents	2.47	2.15	0.17	2.47	2.17	0.16
Primary care providers per 1,000 residents	0.84	0.86	0.05	0.84	.87	0.07

D.6 Model 3: Probability of Admission to a Maryland Hospital by a Maryland Resident: Medicare

We estimated a logistic regression for each admission to a Maryland or comparison group hospital among Maryland and comparison group market area residents during the year where the dependent variable was an indicator for whether the admission was to a Maryland hospital by a Maryland resident. We included the following covariates in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, lagged chronic condition count, and a metropolitan area indicator. We present covariate balance for all years. ***Tables D-21*** through ***D-28*** contain covariate balance diagnostics for years 2011–2018, respectively.

All unweighted standardized differences for individual-level covariates except the indicator for race were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-21
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.08	0.20	0.19	0.02
Age 65–74	0.27	0.27	0.01	0.27	0.29	0.03
Age 75–84	0.30	0.32	0.04	0.30	0.32	0.02
Age >= 85	0.23	0.24	0.03	0.23	0.21	0.04
White	0.69	0.80	0.21	0.69	0.69	0.01
Dual eligible	0.28	0.32	0.08	0.28	0.28	0.004
Male	0.42	0.43	0.01	0.42	0.43	0.005
Disabled	0.30	0.28	0.02	0.30	0.30	0.003
End-stage renal disease	0.07	0.06	0.05	0.07	0.07	0.002
Hierarchical Condition Category score	2.46	2.41	0.02	2.46	2.45	0.004
Metropolitan area	0.96	0.94	0.08	0.96	0.96	0.004
Lagged number of chronic conditions	8.68	8.87	0.05	8.68	8.67	0.004
Population density 2010	2,157.63	2,748.50	0.20	2,157.63	2,945.00	0.27
Poverty rate 2013	11.67	12.61	0.17	11.67	12.69	0.19
Percent <65 years uninsured	11.57	13.10	0.39	11.57	13.32	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.34	0.34	0.05	0.34	0.35	0.08
Acute hospital beds per 1,000 residents	2.62	2.27	0.18	2.62	2.28	0.18
Primary care providers per 1,000 residents	0.86	0.84	0.05	0.86	0.85	0.03

Table D-22
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.09	0.20	0.19	0.02
Age 65–74	0.28	0.28	0.01	0.28	0.29	0.03
Age 75–84	0.29	0.31	0.04	0.29	0.31	0.02
Age >= 85	0.23	0.24	0.04	0.23	0.21	0.04
White	0.68	0.80	0.22	0.68	0.68	0.004
Dual eligible	0.28	0.32	0.08	0.28	0.28	0.004
Male	0.43	0.43	0.01	0.43	0.43	0.003
Disabled	0.30	0.29	0.03	0.30	0.31	0.002
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.001
Hierarchical Condition Category score	2.62	2.58	0.01	2.62	2.61	0.003
Metropolitan area	0.96	0.94	0.07	0.96	0.96	0.003
Lagged number of chronic conditions	8.79	9.01	0.06	8.79	8.77	0.01
Population density 2010	2,151.59	2,739.07	0.20	2,151.59	2,943.44	0.27
Poverty rate 2013	11.59	12.56	0.18	11.59	12.66	0.20
Percent <65 years uninsured	11.57	13.05	0.38	11.57	13.29	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.04	0.34	0.35	0.07
Acute hospital beds per 1,000 residents	2.60	2.26	0.17	2.60	2.27	0.16
Primary care providers per 1,000 residents	0.86	0.84	0.06	0.86	0.85	0.04

Table D-23
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.17	0.08	0.20	0.19	0.02
Age 65–74	0.29	0.28	0.01	0.29	0.30	0.03
Age 75–84	0.29	0.31	0.04	0.29	0.30	0.02
Age >= 85	0.22	0.24	0.04	0.22	0.21	0.04
White	0.68	0.80	0.23	0.68	0.68	0.004
Dual eligible	0.28	0.32	0.06	0.28	0.29	0.003
Male	0.43	0.44	0.01	0.43	0.43	0.004
Disabled	0.31	0.29	0.03	0.31	0.31	0.0004
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.003
Hierarchical Condition Category score	2.47	2.48	0.003	2.47	2.46	0.01
Metropolitan area	0.96	0.94	0.06	0.96	0.96	0.004
Lagged number of chronic conditions	8.82	9.08	0.06	8.82	8.80	0.004
Population density 2010	2,132.66	2,739.69	0.21	2,132.66	2,940.58	0.28
Poverty rate 2013	11.57	12.45	0.16	11.57	12.58	0.19
Percent <65 years uninsured	11.57	12.94	0.35	11.57	13.21	0.41
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.03	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.07	0.34	0.35	0.10
Acute hospital beds per 1,000 residents	2.58	2.25	0.17	2.58	2.26	0.16
Primary care providers per 1,000 residents	0.86	0.85	0.03	0.86	0.85	0.02

Table D-24
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.21	0.17	0.09	0.21	0.20	0.02
Age 65–74	0.29	0.28	0.02	0.29	0.31	0.03
Age 75–84	0.28	0.31	0.05	0.28	0.29	0.02
Age >= 85	0.22	0.24	0.05	0.22	0.20	0.03
White	0.68	0.80	0.23	0.68	0.68	0.001
Dual eligible	0.29	0.32	0.05	0.29	0.29	0.002
Male	0.43	0.44	0.01	0.43	0.44	0.01
Disabled	0.31	0.30	0.03	0.31	0.32	0.001
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.002
Hierarchical Condition Category score	2.41	2.44	0.02	2.41	2.39	0.01
Metropolitan area	0.96	0.95	0.04	0.96	0.96	0.005
Lagged number of chronic conditions	8.82	9.15	0.08	8.82	8.79	0.01
Population density 2010	2,106.78	2,735.09	0.22	2,106.78	2,929.16	0.28
Poverty rate 2013	11.54	12.26	0.13	11.54	12.43	0.16
Percent <65 years uninsured	11.56	12.76	0.30	11.56	13.08	0.38
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.05	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.35	0.12
Acute hospital beds per 1,000 residents	2.56	2.22	0.18	2.56	2.24	0.17
Primary care providers per 1,000 residents	0.86	0.85	0.02	0.86	0.86	0.02

Table D-25
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.16	0.08	0.20	0.19	0.01
Age 65–74	0.30	0.29	0.03	0.30	0.31	0.02
Age 75–84	0.28	0.30	0.04	0.28	0.29	0.01
Age >= 85	0.22	0.25	0.07	0.22	0.21	0.02
White	0.67	0.80	0.23	0.67	0.67	0.0002
Dual eligible	0.29	0.32	0.05	0.29	0.29	0.002
Male	0.43	0.44	0.01	0.43	0.44	0.004
Disabled	0.31	0.29	0.03	0.31	0.31	0.003
End-stage renal disease	0.07	0.06	0.02	0.07	0.07	0.001
Hierarchical Condition Category score	2.50	2.55	0.02	2.50	2.48	0.01
Metropolitan area	0.96	0.95	0.03	0.96	0.96	0.005
Lagged number of chronic conditions	8.87	9.23	0.09	8.87	8.84	0.01
Population density 2010	2,091.44	2,706.04	0.21	2,091.44	2,897.46	0.27
Poverty rate 2013	11.53	12.13	0.11	11.53	12.30	0.14
Percent <65 years uninsured	11.53	12.56	0.25	11.53	12.88	0.33
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.08	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.14	0.34	0.35	0.15
Acute hospital beds per 1,000 residents	2.55	2.20	0.18	2.55	2.22	0.17
Primary care providers per 1,000 residents	0.86	0.86	0.00	0.86	0.86	0.002

Table D-26
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.16	0.08	0.20	0.19	0.01
Age 65–74	0.31	0.30	0.03	0.31	0.32	0.02
Age 75–84	0.28	0.30	0.03	0.28	0.29	0.01
Age >= 85	0.21	0.24	0.07	0.21	0.20	0.02
White	0.67	0.80	0.24	0.67	0.67	0.0002
Dual eligible	0.29	0.31	0.04	0.29	0.29	0.002
Male	0.44	0.45	0.02	0.44	0.44	0.005
Disabled	0.32	0.30	0.03	0.32	0.32	0.003
End-stage renal disease	0.07	0.06	0.03	0.07	0.07	0.002
Hierarchical Condition Category score	2.13	2.27	0.07	2.13	2.12	0.01
Metropolitan area	0.96	0.95	0.05	0.96	0.96	0.005
Lagged number of chronic conditions	8.91	9.29	0.09	8.91	8.88	0.01
Population density 2010	2,051.58	2,638.64	0.21	2,051.58	2,840.22	0.27
Poverty rate 2013	11.44	12.10	0.12	11.44	12.26	0.15
Percent <65 years uninsured	11.54	12.47	0.23	11.54	12.78	0.31
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.07	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.13	0.34	0.36	0.15
Acute hospital beds per 1,000 residents	2.51	2.20	0.16	2.51	2.21	0.15
Primary care providers per 1,000 residents	0.85	0.85	0.0002	0.85	0.86	0.01

Table D-27
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.08	0.19	0.19	0.01
Age 65–74	0.31	0.30	0.03	0.31	0.32	0.01
Age 75–84	0.29	0.30	0.04	0.29	0.29	0.01
Age >= 85	0.21	0.24	0.07	0.21	0.20	0.02
White	0.67	0.79	0.23	0.67	0.67	0.0002
Dual eligible	0.29	0.31	0.03	0.29	0.29	0.002
Male	0.44	0.45	0.01	0.44	0.45	0.01
Disabled	0.31	0.30	0.02	0.31	0.31	0.002
End-stage renal disease	0.07	0.06	0.02	0.07	0.07	0.002
Hierarchical Condition Category score	2.24	2.35	0.06	2.24	2.23	0.01
Metropolitan area	0.96	0.94	0.06	0.96	0.96	0.004
Lagged number of chronic conditions	9.05	9.38	0.08	9.05	9.02	0.01
Population density 2010	2,018.68	2,628.23	0.22	2,018.68	2,825.33	0.28
Poverty rate 2013	11.40	12.10	0.13	11.40	12.24	0.16
Percent <65 years uninsured	11.54	12.40	0.21	11.54	12.68	0.28
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.06	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.13	0.34	0.36	0.15
Acute hospital beds per 1,000 residents	2.49	2.20	0.15	2.49	2.22	0.14
Primary care providers per 1,000 residents	0.85	0.86	0.01	0.85	0.86	0.02

Table D-28
Maryland Medicare admission-level propensity score balance for quality of care outcomes, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.18	0.15	0.09	0.18	0.18	0.02
Age 65–74	0.30	0.29	0.03	0.30	0.31	0.02
Age 75–84	0.30	0.32	0.04	0.30	0.30	0.01
Age >= 85	0.22	0.25	0.07	0.22	0.21	0.02
White	0.66	0.79	0.23	0.66	0.66	0.001
Dual eligible	0.28	0.29	0.03	0.28	0.28	0.002
Male	0.44	0.45	0.02	0.44	0.45	0.01
Disabled	0.31	0.29	0.03	0.31	0.31	0.00003
End-stage renal disease	0.07	0.06	0.02	0.07	0.07	0.001
Hierarchical Condition Category score	1.94	2.05	0.06	1.94	1.93	0.01
Metropolitan area	0.96	0.94	0.07	0.96	0.96	0.01
Lagged number of chronic conditions	9.38	9.75	0.09	9.38	9.34	0.01
Population density 2010	2,008.44	2,597.21	0.21	2,008.44	2,810.96	0.28
Poverty rate 2013	11.36	12.17	0.15	11.36	12.30	0.18
Percent <65 years uninsured	11.50	12.43	0.23	11.50	12.69	0.29
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.04	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.10	0.34	0.36	0.13
Acute hospital beds per 1,000 residents	2.48	2.21	0.14	2.48	2.23	0.13
Primary care providers per 1,000 residents	0.86	0.85	0.01	0.86	0.86	0.01

D.7 Model 4: Probability of an Index Admission to a Maryland Hospital by a Maryland Resident: Medicare

We estimated a logistic regression for each index admission included in the unplanned readmissions analysis to a Maryland or comparison group hospital among Maryland and comparison group market area residents during the year where the dependent variable was an indicator for whether the admission was to a Maryland hospital by a Maryland resident. We included the following covariates in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, lagged chronic condition count, and a metropolitan area indicator. We present covariate balance for all years. ***Tables D-29*** through ***D-36*** contain covariate balance diagnostics for years 2011–2018, respectively. In these tables, mean values and standardized differences are not reported for the age <65 category because admissions for individuals who are under 65 years old are not included in the index admissions sample.[26]

Unweighted standardized differences for all individual-level covariates except for the indicator for race were below the 0.10 threshold in all years, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, most standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

[26] The Yale unplanned all-cause readmissions measure excludes index admissions for individuals under 65 years of age.

Table D-29
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.34	0.32	0.04	0.34	0.34	0.01
Age 75–84	0.38	0.39	0.02	0.38	0.40	0.03
Age >= 85	0.28	0.28	0.02	0.28	0.27	0.02
White	0.74	0.84	0.21	0.74	0.74	0.01
Dual eligible	0.19	0.24	0.11	0.19	0.19	0.01
Male	0.40	0.41	0.01	0.40	0.41	0.01
Disabled	0.12	0.14	0.04	0.12	0.12	0.0001
End-stage renal disease	0.05	0.04	0.02	0.05	0.05	0.002
Hierarchical Condition Category score	2.22	2.25	0.01	2.22	2.22	0.002
Metropolitan area	0.95	0.94	0.06	0.95	0.95	0.004
Lagged number of chronic conditions	9.21	9.28	0.02	9.21	9.20	0.001
Population density 2010	1,981.58	2,609.91	0.23	1,981.58	2,766.70	0.28
Poverty rate 2013	11.27	12.33	0.20	11.27	12.39	0.21
Percent <65 years uninsured	11.49	12.96	0.38	11.49	13.17	0.43
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.02	0.12	0.12	0.04
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.02	0.34	0.35	0.05
Acute hospital beds per 1,000 residents	2.45	2.23	0.12	2.45	2.23	0.12
Primary care providers per 1,000 residents	0.86	0.84	0.06	0.86	0.85	0.05

Table D-30
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.35	0.33	0.04	0.35	0.34	0.01
Age 75–84	0.37	0.38	0.02	0.37	0.39	0.03
Age >= 85	0.28	0.29	0.02	0.28	0.27	0.01
White	0.73	0.84	0.22	0.73	0.73	0.003
Dual eligible	0.19	0.24	0.10	0.19	0.19	0.002
Male	0.40	0.41	0.01	0.40	0.41	0.003
Disabled	0.13	0.14	0.03	0.13	0.13	0.002
End-stage renal disease	0.05	0.04	0.01	0.05	0.05	0.003
Hierarchical Condition Category score	2.33	2.36	0.01	2.33	2.32	0.004
Metropolitan area	0.96	0.94	0.06	0.96	0.96	0.004
Lagged number of chronic conditions	9.32	9.40	0.02	9.32	9.30	0.005
Population density 2010	1,969.53	2,621.43	0.24	1,969.53	2,798.29	0.30
Poverty rate 2013	11.17	12.31	0.22	11.17	12.40	0.23
Percent <65 years uninsured	11.49	12.94	0.37	11.49	13.19	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.03	0.12	0.12	0.05
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.01	0.35	0.35	0.03
Acute hospital beds per 1,000 residents	2.41	2.22	0.10	2.41	2.23	0.10
Primary care providers per 1,000 residents	0.86	0.84	0.06	0.86	0.85	0.05

Table D-31
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.36	0.34	0.04	0.36	0.36	0.01
Age 75–84	0.37	0.38	0.02	0.37	0.38	0.02
Age >= 85	0.27	0.28	0.02	0.27	0.27	0.02
White	0.73	0.84	0.22	0.73	0.73	0.00
Dual eligible	0.19	0.24	0.08	0.19	0.19	0.003
Male	0.41	0.42	0.01	0.41	0.41	0.004
Disabled	0.13	0.14	0.04	0.13	0.13	0.002
End-stage renal disease	0.05	0.04	0.01	0.05	0.05	0.002
Hierarchical Condition Category score	2.23	2.30	0.03	2.23	2.21	0.005
Metropolitan area	0.96	0.94	0.05	0.96	0.95	0.004
Lagged number of chronic conditions	9.31	9.46	0.04	9.31	9.29	0.01
Population density 2010	1,954.25	2,619.78	0.24	1,954.25	2,778.54	0.30
Poverty rate 2013	11.17	12.18	0.19	11.17	12.29	0.21
Percent <65 years uninsured	11.49	12.81	0.34	11.49	13.06	0.40
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.04
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.05	0.35	0.35	0.07
Acute hospital beds per 1,000 residents	2.41	2.21	0.11	2.41	2.22	0.10
Primary care providers per 1,000 residents	0.86	0.85	0.04	0.86	0.85	0.03

Table D-32
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.37	0.34	0.06	0.37	0.37	0.01
Age 75–84	0.36	0.37	0.03	0.36	0.37	0.03
Age >= 85	0.27	0.29	0.04	0.27	0.26	0.02
White	0.72	0.84	0.23	0.72	0.72	0.001
Dual eligible	0.19	0.24	0.08	0.19	0.20	0.003
Male	0.41	0.42	0.01	0.41	0.42	0.01
Disabled	0.13	0.15	0.03	0.13	0.13	0.002
End-stage renal disease	0.05	0.04	0.01	0.05	0.05	0.003
Hierarchical Condition Category score	2.18	2.28	0.05	2.18	2.17	0.01
Metropolitan area	0.95	0.95	0.02	0.95	0.95	0.01
Lagged number of chronic conditions	9.32	9.53	0.05	9.32	9.29	0.01
Population density 2010	1,925.48	2,620.24	0.26	1,925.48	2,766.70	0.30
Poverty rate 2013	11.14	12.00	0.17	11.14	12.16	0.19
Percent <65 years uninsured	11.48	12.66	0.30	11.48	12.96	0.37
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.08	0.35	0.35	0.08
Acute hospital beds per 1,000 residents	2.39	2.18	0.11	2.39	2.20	0.10
Primary care providers per 1,000 residents	0.87	0.85	0.03	0.87	0.85	0.03

Table D-33
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.38	0.35	0.07	0.38	0.38	0.005
Age 75–84	0.36	0.37	0.02	0.36	0.37	0.02
Age >= 85	0.26	0.29	0.06	0.26	0.26	0.01
White	0.72	0.84	0.23	0.72	0.72	0.001
Dual eligible	0.19	0.23	0.08	0.19	0.20	0.003
Male	0.41	0.42	0.01	0.41	0.42	0.01
Disabled	0.14	0.15	0.03	0.14	0.14	0.00
End-stage renal disease	0.05	0.04	0.01	0.05	0.05	0.00
Hierarchical Condition Category score	2.27	2.37	0.05	2.27	2.26	0.01
Metropolitan area	0.95	0.95	0.02	0.95	0.95	0.01
Lagged number of chronic conditions	9.33	9.57	0.06	9.33	9.30	0.01
Population density 2010	1,922.80	2,585.98	0.24	1,922.80	2,729.53	0.29
Poverty rate 2013	11.14	11.87	0.14	11.14	12.02	0.17
Percent <65 years uninsured	11.45	12.45	0.25	11.45	12.77	0.33
Proportion of county population aged 25+ without a high school diploma	0.12	0.11	0.04	0.12	0.12	0.003
Proportion of county population aged 25+ with 4+ years of college	0.34	0.36	0.11	0.34	0.36	0.11
Acute hospital beds per 1,000 residents	2.39	2.16	0.12	2.39	2.17	0.12
Primary care providers per 1,000 residents	0.86	0.86	0.02	0.86	0.85	0.02

Table D-34
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.39	0.36	0.06	0.39	0.39	0.001
Age 75–84	0.36	0.36	0.01	0.36	0.36	0.01
Age >= 85	0.26	0.28	0.06	0.26	0.25	0.01
White	0.72	0.83	0.22	0.72	0.72	0.001
Dual eligible	0.19	0.23	0.08	0.19	0.19	0.002
Male	0.42	0.43	0.02	0.42	0.42	0.01
Disabled	0.14	0.16	0.03	0.14	0.14	0.002
End-stage renal disease	0.05	0.04	0.02	0.05	0.05	0.003
Hierarchical Condition Category score	1.99	2.16	0.10	1.99	1.98	0.01
Metropolitan area	0.96	0.95	0.04	0.96	0.96	0.01
Lagged number of chronic conditions	9.35	9.63	0.07	9.35	9.33	0.01
Population density 2010	1,889.69	2,514.23	0.23	1,889.69	2,669.54	0.28
Poverty rate 2013	11.06	11.86	0.15	11.06	11.97	0.17
Percent <65 years uninsured	11.45	12.41	0.24	11.45	12.70	0.31
Proportion of county population aged 25+ without a high school diploma	0.12	0.11	0.03	0.12	0.12	0.001
Proportion of county population aged 25+ with 4+ years of college	0.35	0.36	0.10	0.35	0.36	0.11
Acute hospital beds per 1,000 residents	2.35	2.16	0.11	2.35	2.17	0.10
Primary care providers per 1,000 residents	0.86	0.85	0.02	0.86	0.85	0.02

Table D-35
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.38	0.35	0.07	0.38	0.38	0.005
Age 75–84	0.36	0.37	0.02	0.36	0.37	0.02
Age >= 85	0.25	0.28	0.06	0.25	0.25	0.01
White	0.71	0.83	0.22	0.71	0.71	0.001
Dual eligible	0.20	0.23	0.06	0.20	0.20	0.002
Male	0.43	0.43	0.01	0.43	0.43	0.01
Disabled	0.14	0.16	0.03	0.14	0.14	0.004
End-stage renal disease	0.05	0.05	0.01	0.05	0.05	0.003
Hierarchical Condition Category score	2.03	2.18	0.09	2.03	2.02	0.01
Metropolitan area	0.96	0.95	0.04	0.96	0.96	0.004
Lagged number of chronic conditions	9.44	9.69	0.06	9.44	9.42	0.01
Population density 2010	1,861.23	2,501.60	0.24	1,861.23	2,655.43	0.29
Poverty rate 2013	11.02	11.84	0.16	11.02	11.94	0.18
Percent <65 years uninsured	11.46	12.30	0.21	11.46	12.56	0.28
Proportion of county population aged 25+ without a high school diploma	0.12	0.11	0.03	0.12	0.12	0.003
Proportion of county population aged 25+ with 4+ years of college	0.35	0.36	0.10	0.35	0.36	0.11
Acute hospital beds per 1,000 residents	2.33	2.16	0.09	2.33	2.17	0.09
Primary care providers per 1,000 residents	0.86	0.86	0.01	0.86	0.86	0.005

Table D-36
Maryland Medicare admission-level propensity score balance for unplanned readmissions, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age 65–74	0.37	0.34	0.06	0.37	0.37	0.003
Age 75–84	0.37	0.38	0.02	0.37	0.37	0.01
Age >= 85	0.26	0.29	0.05	0.26	0.26	0.01
White	0.71	0.83	0.23	0.71	0.71	0.001
Dual eligible	0.19	0.22	0.06	0.19	0.19	0.001
Male	0.43	0.44	0.02	0.43	0.43	0.01
Disabled	0.15	0.16	0.04	0.15	0.14	0.01
End-stage renal disease	0.05	0.05	0.01	0.05	0.05	0.003
Hierarchical Condition Category score	1.79	1.94	0.10	1.79	1.78	0.01
Metropolitan area	0.96	0.94	0.06	0.96	0.96	0.003
Lagged number of chronic conditions	9.79	10.07	0.07	9.79	9.76	0.01
Population density 2010	1,864.21	2,486.34	0.23	1,864.21	2,667.09	0.29
Poverty rate 2013	11.01	11.93	0.18	11.01	12.00	0.19
Percent <65 years uninsured	11.43	12.38	0.24	11.43	12.61	0.30
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.00	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.35	0.35	0.07	0.35	0.36	0.10
Acute hospital beds per 1,000 residents	2.34	2.17	0.09	2.34	2.18	0.09
Primary care providers per 1,000 residents	0.86	0.85	0.03	0.86	0.86	0.01

D.8 Model 5: Probability of an Index Admission to a Maryland Hospital for an Episode of Care: Medicare

We estimated a logistic regression for each index admission to a Maryland or comparison group hospital for an episode of care among Maryland and comparison group market area residents during the year where the dependent variable was an indicator for whether the admission was to a Maryland hospital by a Maryland resident. We included the following covariates in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, lagged chronic condition count, and a metropolitan area indicator. We present covariate balance for all years. ***Tables D-37*** through ***D-44*** contain covariate balance diagnostics for years 2011–2018, respectively.

All unweighted standardized differences for individual-level covariates except for the indicator for race were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-37
Maryland Medicare admission-level propensity score balance for episode of care, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.18	0.16	0.06	0.18	0.18	0.02
Age 65–74	0.28	0.27	0.01	0.28	0.29	0.03
Age 75–84	0.31	0.33	0.04	0.31	0.32	0.03
Age >= 85	0.23	0.24	0.02	0.23	0.22	0.04
White	0.70	0.81	0.20	0.70	0.70	0.01
Dual eligible	0.27	0.31	0.08	0.27	0.27	0.01
Male	0.42	0.42	0.01	0.42	0.42	0.004
Disabled	0.28	0.27	0.01	0.28	0.28	0.003
End-stage renal disease	0.06	0.05	0.04	0.06	0.06	0.002
Hierarchical Condition Category score	2.27	2.26	0.003	2.27	2.26	0.003
Metropolitan area	0.96	0.94	0.08	0.96	0.96	0.003
Lagged number of chronic conditions	8.57	8.73	0.04	8.57	8.56	0.003
Population density 2010	2,088.29	2,714.05	0.22	2,088.29	2,894.92	0.28
Poverty rate 2013	11.53	12.58	0.19	11.53	12.63	0.20
Percent <65 years uninsured	11.56	13.09	0.39	11.56	13.29	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.34	0.34	0.03	0.34	0.35	0.07
Acute hospital beds per 1,000 residents	2.55	2.26	0.15	2.55	2.27	0.15
Primary care providers per 1,000 residents	0.86	0.84	0.05	0.86	0.85	0.03

Table D-38
Maryland Medicare admission-level propensity score balance for episode of care, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.07	0.19	0.18	0.02
Age 65–74	0.28	0.28	0.01	0.28	0.30	0.03
Age 75–84	0.30	0.32	0.04	0.30	0.31	0.03
Age >= 85	0.23	0.24	0.02	0.23	0.22	0.04
White	0.69	0.81	0.21	0.69	0.70	0.004
Dual eligible	0.27	0.31	0.08	0.27	0.27	0.004
Male	0.42	0.43	0.01	0.42	0.42	0.003
Disabled	0.29	0.28	0.02	0.29	0.29	0.002
End-stage renal disease	0.06	0.05	0.03	0.06	0.06	0.002
Hierarchical Condition Category score	2.39	2.38	0.004	2.39	2.38	0.004
Metropolitan area	0.96	0.94	0.07	0.96	0.96	0.004
Lagged number of chronic conditions	8.65	8.85	0.05	8.65	8.64	0.004
Population density 2010	2,090.76	2,709.29	0.22	2,090.76	2,902.92	0.28
Poverty rate 2013	11.46	12.54	0.20	11.46	12.62	0.21
Percent <65 years uninsured	11.56	13.06	0.38	11.56	13.29	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.03	0.34	0.35	0.06
Acute hospital beds per 1,000 residents	2.54	2.26	0.14	2.54	2.27	0.14
Primary care providers per 1,000 residents	0.86	0.84	0.05	0.86	0.85	0.04

Table D-39
Maryland Medicare admission-level propensity score balance for episode of care, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.06	0.19	0.18	0.02
Age 65–74	0.29	0.28	0.01	0.29	0.30	0.03
Age 75–84	0.29	0.31	0.04	0.29	0.30	0.03
Age >= 85	0.23	0.24	0.02	0.23	0.22	0.04
White	0.69	0.81	0.22	0.69	0.69	0.004
Dual eligible	0.27	0.31	0.06	0.27	0.27	0.003
Male	0.42	0.43	0.01	0.42	0.42	0.004
Disabled	0.29	0.28	0.01	0.29	0.29	0.001
End-stage renal disease	0.06	0.05	0.02	0.06	0.06	0.003
Hierarchical Condition Category score	2.28	2.32	0.02	2.28	2.27	0.004
Metropolitan area	0.96	0.94	0.07	0.96	0.96	0.004
Lagged number of chronic conditions	8.70	8.93	0.06	8.70	8.68	0.004
Population density 2010	2,079.72	2,703.63	0.22	2,079.72	2,890.19	0.28
Poverty rate 2013	11.46	12.43	0.18	11.46	12.53	0.20
Percent <65 years uninsured	11.56	12.95	0.35	11.56	13.20	0.42
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.01	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.06	0.34	0.35	0.08
Acute hospital beds per 1,000 residents	2.53	2.24	0.15	2.53	2.25	0.15
Primary care providers per 1,000 residents	0.86	0.85	0.03	0.86	0.85	0.02

Table D-40
Maryland Medicare admission-level propensity score balance for episode of care, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.08	0.19	0.18	0.02
Age 65–74	0.30	0.29	0.02	0.30	0.31	0.03
Age 75–84	0.29	0.31	0.05	0.29	0.30	0.02
Age >= 85	0.23	0.24	0.04	0.23	0.21	0.04
White	0.69	0.81	0.22	0.69	0.69	0.002
Dual eligible	0.28	0.31	0.06	0.28	0.28	0.002
Male	0.43	0.44	0.02	0.43	0.43	0.006
Disabled	0.30	0.29	0.02	0.30	0.30	0.001
End-stage renal disease	0.06	0.05	0.02	0.06	0.06	0.002
Hierarchical Condition Category score	2.24	2.30	0.03	2.24	2.22	0.005
Metropolitan area	0.96	0.95	0.04	0.96	0.96	0.004
Lagged number of chronic conditions	8.72	9.02	0.07	8.72	8.69	0.007
Population density 2010	2,056.41	2,708.05	0.23	2,056.41	2,890.09	0.29
Poverty rate 2013	11.43	12.25	0.15	11.43	12.39	0.18
Percent <65 years uninsured	11.56	12.79	0.31	11.56	13.09	0.38
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.03	0.12	0.12	0.005
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.09	0.34	0.35	0.10
Acute hospital beds per 1,000 residents	2.51	2.21	0.16	2.51	2.23	0.15
Primary care providers per 1,000 residents	0.86	0.85	0.02	0.86	0.85	0.02

Table D-41
Maryland Medicare admission-level propensity score balance for episode of care, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.07	0.19	0.18	0.02
Age 65–74	0.30	0.29	0.03	0.30	0.31	0.02
Age 75–84	0.29	0.30	0.03	0.29	0.29	0.01
Age >= 85	0.23	0.25	0.06	0.23	0.21	0.03
White	0.68	0.80	0.22	0.68	0.68	0.001
Dual eligible	0.28	0.31	0.05	0.28	0.28	0.002
Male	0.43	0.44	0.01	0.43	0.43	0.004
Disabled	0.30	0.29	0.02	0.30	0.30	0.002
End-stage renal disease	0.06	0.05	0.02	0.06	0.06	0.001
Hierarchical Condition Category score	2.32	2.40	0.03	2.32	2.31	0.004
Metropolitan area	0.96	0.95	0.04	0.96	0.96	0.004
Lagged number of chronic conditions	8.75	9.08	0.08	8.75	8.72	0.006
Population density 2010	2,042.77	2,681.08	0.22	2,042.77	2,857.02	0.28
Poverty rate 2013	11.43	12.12	0.13	11.43	12.27	0.16
Percent <65 years uninsured	11.52	12.61	0.27	11.52	12.91	0.34
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.06	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.12	0.34	0.35	0.13
Acute hospital beds per 1,000 residents	2.51	2.20	0.16	2.51	2.21	0.15
Primary care providers per 1,000 residents	0.85	0.85	0.00	0.85	0.85	0.0002

Table D-42
Maryland Medicare admission-level propensity score balance for episode of care, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.16	0.07	0.19	0.18	0.01
Age 65–74	0.31	0.30	0.03	0.31	0.32	0.02
Age 75–84	0.29	0.30	0.03	0.29	0.29	0.01
Age >= 85	0.22	0.24	0.06	0.22	0.21	0.02
White	0.68	0.80	0.23	0.68	0.68	0.0004
Dual eligible	0.28	0.30	0.04	0.28	0.28	0.002
Male	0.43	0.44	0.02	0.43	0.43	0.004
Disabled	0.30	0.29	0.02	0.30	0.30	0.003
End-stage renal disease	0.06	0.05	0.02	0.06	0.06	0.002
Hierarchical Condition Category score	2.01	2.14	0.08	2.01	1.99	0.008
Metropolitan area	0.96	0.95	0.05	0.96	0.96	0.004
Lagged number of chronic conditions	8.80	9.14	0.08	8.80	8.77	0.006
Population density 2010	2,002.72	2,615.38	0.22	2,002.72	2,802.23	0.28
Poverty rate 2013	11.34	12.10	0.14	11.34	12.23	0.17
Percent <65 years uninsured	11.52	12.52	0.25	11.52	12.81	0.32
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.05	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.36	0.13
Acute hospital beds per 1,000 residents	2.46	2.19	0.14	2.46	2.21	0.14
Primary care providers per 1,000 residents	0.85	0.85	0.00	0.85	0.85	0.01

Table D-43
Maryland Medicare admission-level propensity score balance for episode of care, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.18	0.15	0.07	0.18	0.17	0.02
Age 65–74	0.31	0.30	0.03	0.31	0.32	0.02
Age 75–84	0.29	0.31	0.03	0.29	0.30	0.02
Age >= 85	0.22	0.24	0.06	0.22	0.21	0.02
White	0.67	0.80	0.23	0.67	0.67	0.001
Dual eligible	0.28	0.30	0.03	0.28	0.28	0.001
Male	0.44	0.44	0.01	0.44	0.44	0.005
Disabled	0.30	0.29	0.01	0.30	0.30	0.001
End-stage renal disease	0.06	0.05	0.02	0.06	0.06	0.002
Hierarchical Condition Category score	2.10	2.21	0.06	2.10	2.09	0.006
Metropolitan area	0.96	0.94	0.06	0.96	0.96	0.005
Lagged number of chronic conditions	8.94	9.24	0.07	8.94	8.92	0.006
Population density 2010	1,978.91	2,597.45	0.22	1,978.91	2,788.34	0.28
Poverty rate 2013	11.30	12.09	0.15	11.30	12.21	0.17
Percent <65 years uninsured	11.53	12.45	0.23	11.53	12.72	0.29
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.05	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.36	0.13
Acute hospital beds per 1,000 residents	2.44	2.20	0.13	2.44	2.21	0.12
Primary care providers per 1,000 residents	0.85	0.85	0.003	0.85	0.86	0.01

Table D-44
Maryland Medicare admission-level propensity score balance for episode of care, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.17	0.15	0.08	0.17	0.17	0.02
Age 65–74	0.30	0.29	0.03	0.30	0.31	0.02
Age 75–84	0.30	0.32	0.04	0.30	0.31	0.02
Age >= 85	0.22	0.25	0.05	0.22	0.21	0.03
White	0.67	0.80	0.23	0.67	0.67	0.002
Dual eligible	0.27	0.29	0.03	0.27	0.27	0.002
Male	0.43	0.45	0.02	0.43	0.44	0.007
Disabled	0.30	0.28	0.02	0.30	0.30	0.0001
End-stage renal disease	0.06	0.05	0.01	0.06	0.06	0.002
Hierarchical Condition Category score	1.85	1.95	0.06	1.85	1.84	0.007
Metropolitan area	0.96	0.94	0.07	0.96	0.96	0.005
Lagged number of chronic conditions	9.24	9.58	0.08	9.24	9.21	0.007
Population density 2010	1,968.84	2,567.39	0.22	1,968.84	2,771.59	0.28
Poverty rate 2013	11.26	12.15	0.17	11.26	12.26	0.19
Percent <65 years uninsured	11.50	12.47	0.24	11.50	12.71	0.30
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.02	0.12	0.12	0.005
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.08	0.34	0.36	0.11
Acute hospital beds per 1,000 residents	2.44	2.21	0.12	2.44	2.22	0.12
Primary care providers per 1,000 residents	0.86	0.85	0.02	0.86	0.86	0.004

D.9 Model 6: Probability of Admission to a Hospital by a Maryland Resident: Medicare

We estimated a logistic regression for each admission to a hospital for Maryland and comparison group residents during the year where the dependent variable was an indicator for the admitted person being a Maryland resident. We included the following covariates in the model: age, race (white = 1), dual eligible status, gender (male = 1), originally disabled status, ESRD status, HCC score, and lagged count of chronic conditions. ***Tables D-45*** through ***D-52*** contains covariate balance diagnostics for all years.

Most unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-45
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.20	0.01	0.19	0.19	0.02
Age 65–74	0.28	0.28	0.01	0.28	0.29	0.03
Age 75–84	0.30	0.30	0.003	0.30	0.31	0.02
Age >= 85	0.22	0.22	0.01	0.22	0.21	0.03
White	0.69	0.72	0.06	0.69	0.69	0.004
Dual eligible	0.27	0.37	0.17	0.27	0.28	0.002
Male	0.43	0.44	0.02	0.43	0.43	0.00002
Disabled	0.29	0.32	0.04	0.29	0.30	0.0007
End-stage renal disease	0.07	0.07	0.02	0.07	0.07	0.001
Hierarchical Condition Category score	2.45	2.48	0.01	2.45	2.45	0.002
Metropolitan area	0.96	0.95	0.02	0.96	0.95	0.007
Lagged number of chronic conditions	8.64	8.69	0.01	8.64	8.62	0.005
Population density 2010	2,087.33	3,684.06	0.53	2,087.33	3,656.49	0.53
Poverty rate 2013	11.48	13.89	0.45	11.48	13.85	0.44
Percent <65 years uninsured	11.65	13.90	0.54	11.65	14.03	0.58
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.22	0.12	0.13	0.21
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.08	0.34	0.35	0.08
Acute hospital beds per 1,000 residents	2.53	2.52	0.01	2.53	2.50	0.01
Primary care providers per 1,000 residents	0.85	0.89	0.12	0.85	0.89	0.11

Table D-46
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.20	0.01	0.20	0.19	0.03
Age 65–74	0.28	0.28	0.01	0.28	0.30	0.03
Age 75–84	0.29	0.30	0.003	0.29	0.30	0.02
Age >= 85	0.22	0.22	0.01	0.22	0.21	0.03
White	0.68	0.72	0.07	0.68	0.68	0.004
Dual eligible	0.27	0.37	0.17	0.27	0.28	0.003
Male	0.43	0.44	0.02	0.43	0.43	0.00034
Disabled	0.30	0.33	0.04	0.30	0.30	0.0004
End-stage renal disease	0.07	0.07	0.01	0.07	0.07	0.002
Hierarchical Condition Category score	2.61	2.66	0.01	2.61	2.61	0.002
Metropolitan area	0.96	0.95	0.02	0.96	0.95	0.01
Lagged number of chronic conditions	8.74	8.83	0.02	8.74	8.72	0.005
Population density 2010	2,079.91	3,635.63	0.52	2,079.91	3,621.01	0.52
Poverty rate 2013	11.41	13.85	0.46	11.41	13.82	0.45
Percent <65 years uninsured	11.66	13.91	0.55	11.66	14.04	0.59
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.22	0.12	0.13	0.22
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.07	0.34	0.35	0.07
Acute hospital beds per 1,000 residents	2.50	2.51	0.004	2.50	2.49	0.003
Primary care providers per 1,000 residents	0.85	0.89	0.11	0.85	0.89	0.10

Table D-47
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.20	0.02	0.20	0.19	0.02
Age 65–74	0.29	0.29	0.01	0.29	0.30	0.02
Age 75–84	0.29	0.29	0.00	0.29	0.30	0.02
Age >= 85	0.22	0.22	0.01	0.22	0.21	0.02
White	0.67	0.72	0.07	0.67	0.68	0.004
Dual eligible	0.28	0.37	0.15	0.28	0.28	0.002
Male	0.43	0.45	0.02	0.43	0.43	0.00065
Disabled	0.30	0.33	0.04	0.30	0.30	0.0004
End-stage renal disease	0.07	0.07	0.00	0.07	0.07	0.002
Hierarchical Condition Category score	2.47	2.56	0.04	2.47	2.46	0.003
Metropolitan area	0.96	0.95	0.02	0.96	0.95	0.008
Lagged number of chronic conditions	8.77	8.90	0.03	8.77	8.75	0.005
Population density 2010	2,060.14	3,619.33	0.53	2,060.14	3,615.07	0.53
Poverty rate 2013	11.40	13.77	0.44	11.40	13.76	0.44
Percent <65 years uninsured	11.65	13.84	0.53	11.65	13.98	0.57
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.21	0.12	0.13	0.213
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.09	0.34	0.35	0.09
Acute hospital beds per 1,000 residents	2.49	2.49	0.001	2.49	2.48	0.005
Primary care providers per 1,000 residents	0.85	0.89	0.12	0.85	0.89	0.112

Table D-48
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.20	0.01	0.20	0.19	0.02
Age 65–74	0.30	0.29	0.02	0.30	0.31	0.03
Age 75–84	0.28	0.29	0.01	0.28	0.29	0.02
Age >= 85	0.22	0.22	0.02	0.22	0.20	0.03
White	0.67	0.72	0.09	0.67	0.67	0.003
Dual eligible	0.29	0.36	0.14	0.29	0.29	0.002
Male	0.43	0.45	0.02	0.43	0.44	0.0005
Disabled	0.31	0.33	0.03	0.31	0.31	0.0002
End-stage renal disease	0.07	0.07	0.002	0.07	0.07	0.002
Hierarchical Condition Category score	2.40	2.51	0.04	2.40	2.39	0.003
Metropolitan area	0.96	0.95	0.01	0.96	0.96	0.004
Lagged number of chronic conditions	8.78	9.00	0.05	8.78	8.75	0.006
Population density 2010	2,038.20	3,589.50	0.52	2,038.20	3,603.03	0.53
Poverty rate 2013	11.36	13.62	0.42	11.36	13.64	0.43
Percent <65 years uninsured	11.66	13.76	0.50	11.66	13.92	0.55
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.19	0.12	0.13	0.20
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.09	0.34	0.35	0.09
Acute hospital beds per 1,000 residents	2.47	2.47	0.001	2.47	2.46	0.004
Primary care providers per 1,000 residents	0.85	0.89	0.11	0.85	0.89	0.10

Table D-49
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.19	0.01	0.20	0.19	0.02
Age 65–74	0.31	0.30	0.02	0.31	0.32	0.02
Age 75–84	0.28	0.29	0.01	0.28	0.29	0.01
Age >= 85	0.21	0.22	0.03	0.21	0.21	0.02
White	0.67	0.73	0.11	0.67	0.67	0.002
Dual eligible	0.28	0.35	0.12	0.28	0.29	0.002
Male	0.44	0.45	0.01	0.44	0.44	0.001
Disabled	0.31	0.32	0.02	0.31	0.31	0.001
End-stage renal disease	0.07	0.07	0.001	0.07	0.07	0.001
Hierarchical Condition Category score	2.50	2.61	0.04	2.50	2.50	0.002
Metropolitan area	0.96	0.95	0.01	0.96	0.96	0.001
Lagged number of chronic conditions	8.83	9.03	0.05	8.83	8.81	0.01
Population density 2010	2,018.26	3,515.74	0.50	2,018.26	3,556.14	0.52
Poverty rate 2013	11.33	13.48	0.40	11.33	13.53	0.41
Percent <65 years uninsured	11.64	13.60	0.47	11.64	13.79	0.52
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.17	0.12	0.13	0.18
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.35	0.11
Acute hospital beds per 1,000 residents	2.45	2.44	0.003	2.45	2.44	0.003
Primary care providers per 1,000 residents	0.85	0.89	0.11	0.85	0.88	0.11

Table D-50
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.20	0.19	0.02	0.20	0.19	0.01
Age 65–74	0.31	0.31	0.02	0.31	0.32	0.02
Age 75–84	0.28	0.29	0.01	0.28	0.29	0.005
Age >= 85	0.21	0.22	0.03	0.21	0.20	0.02
White	0.66	0.73	0.11	0.66	0.66	0.002
Dual eligible	0.29	0.35	0.11	0.29	0.29	0.002
Male	0.44	0.45	0.02	0.44	0.44	0.001
Disabled	0.31	0.33	0.02	0.31	0.32	0.001
End-stage renal disease	0.07	0.07	0.002	0.07	0.07	0.001
Hierarchical Condition Category score	2.13	2.27	0.08	2.13	2.12	0.003
Metropolitan area	0.96	0.95	0.02	0.96	0.96	0.005
Lagged number of chronic conditions	8.87	9.11	0.06	8.87	8.85	0.005
Population density 2010	1,985.28	3,467.17	0.50	1,985.28	3,516.66	0.52
Poverty rate 2013	11.26	13.43	0.41	11.26	13.49	0.42
Percent <65 years uninsured	11.64	13.54	0.45	11.64	13.73	0.50
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.17	0.12	0.13	0.19
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.10	0.34	0.35	0.11
Acute hospital beds per 1,000 residents	2.41	2.44	0.01	2.41	2.44	0.01
Primary care providers per 1,000 residents	0.85	0.88	0.12	0.85	0.88	0.11

Table D-51
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.19	0.19	0.01	0.19	0.18	0.02
Age 65–74	0.31	0.31	0.02	0.31	0.32	0.02
Age 75–84	0.29	0.29	0.01	0.29	0.29	0.01
Age >= 85	0.21	0.22	0.03	0.21	0.20	0.01
White	0.66	0.73	0.12	0.66	0.66	0.002
Dual eligible	0.29	0.34	0.10	0.29	0.29	0.003
Male	0.44	0.45	0.01	0.44	0.45	0.001
Disabled	0.31	0.32	0.03	0.31	0.31	0.001
End-stage renal disease	0.07	0.07	0.0004	0.07	0.07	0.001
Hierarchical Condition Category score	2.23	2.38	0.08	2.23	2.22	0.002
Metropolitan area	0.96	0.95	0.03	0.96	0.95	0.01
Lagged number of chronic conditions	9.00	9.20	0.05	9.00	8.98	0.01
Population density 2010	1,946.34	3,391.53	0.49	1,946.34	3,449.13	0.51
Poverty rate 2013	11.20	13.36	0.41	11.20	13.43	0.42
Percent <65 years uninsured	11.64	13.44	0.43	11.64	13.63	0.48
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.17	0.12	0.13	0.19
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.09	0.34	0.35	0.09
Acute hospital beds per 1,000 residents	2.38	2.42	0.02	2.38	2.43	0.02
Primary care providers per 1,000 residents	0.85	0.88	0.10	0.85	0.88	0.10

Table D-52
Maryland Medicare admission-level propensity score balance for expenditure and utilization outcomes, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.18	0.17	0.02	0.18	0.18	0.02
Age 65–74	0.31	0.30	0.01	0.31	0.32	0.03
Age 75–84	0.30	0.30	0.01	0.30	0.30	0.01
Age >= 85	0.21	0.22	0.03	0.21	0.20	0.02
White	0.66	0.73	0.12	0.66	0.66	0.002
Dual eligible	0.27	0.33	0.09	0.27	0.28	0.002
Male	0.45	0.45	0.01	0.45	0.45	0.001
Disabled	0.31	0.32	0.02	0.31	0.31	0.001
End-stage renal disease	0.07	0.07	0.003	0.07	0.07	0.001
Hierarchical Condition Category score	1.92	2.05	0.07	1.92	1.92	0.002
Metropolitan area	0.96	0.95	0.03	0.96	0.95	0.02
Lagged number of chronic conditions	9.32	9.54	0.05	9.32	9.30	0.005
Population density 2010	1,939.46	3,351.28	0.48	1,939.46	3,417.87	0.50
Poverty rate 2013	11.18	13.37	0.41	11.18	13.46	0.43
Percent <65 years uninsured	11.60	13.44	0.44	11.60	13.62	0.49
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.18	0.12	0.13	0.20
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.07	0.34	0.35	0.07
Acute hospital beds per 1,000 residents	2.38	2.42	0.02	2.38	2.43	0.03
Primary care providers per 1,000 residents	0.85	0.88	0.09	0.85	0.88	0.09

D.10 Model 7: Probability of an Outpatient ED Visit by a Maryland Resident: Medicare

We estimated a logistic regression for each outpatient ED visit by Maryland and comparison group residents to any hospital during the year where the dependent variable was an indicator for the individual being a Maryland resident. We included the following covariates in the model: age, race (white = 1), dual eligible status in the year, gender (male = 1), originally disabled status, ESRD status, HCC score, and lagged chronic condition count. ***Tables D-53*** through ***D-60*** contains covariate balance diagnostics for all years.

Most unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-53
Maryland Medicare outpatient ED visit-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.33	0.36	0.06	0.33	0.33	0.02
Age 65–74	0.27	0.26	0.02	0.27	0.28	0.03
Age 75–84	0.24	0.23	0.02	0.24	0.25	0.01
Age >= 85	0.15	0.14	0.03	0.15	0.15	0.03
White	0.64	0.66	0.04	0.64	0.64	0.004
Dual eligible	0.36	0.47	0.18	0.36	0.36	0.002
Male	0.41	0.42	0.01	0.41	0.41	0.001
Disabled	0.41	0.46	0.07	0.41	0.42	0.002
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.0004
Hierarchical Condition Category score	1.81	1.81	0.0001	1.81	1.80	0.002
Metropolitan area	0.95	0.94	0.03	0.95	0.94	0.02
Lagged number of chronic conditions	7.30	7.20	0.02	7.30	7.28	0.006
Population density 2010	2,074.89	3,810.03	0.54	2,074.89	3,740.13	0.52
Poverty rate 2013	11.76	14.13	0.43	11.76	14.04	0.42
Percent <65 years uninsured	11.70	13.50	0.42	11.70	13.67	0.46
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.19	0.12	0.13	0.18
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.12	0.33	0.35	0.12
Acute hospital beds per 1,000 residents	2.58	2.61	0.01	2.58	2.58	0.001
Primary care providers per 1,000 residents	0.83	0.90	0.21	0.83	0.90	0.19

Table D-54
Maryland Medicare outpatient ED visit-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.33	0.36	0.06	0.33	0.32	0.02
Age 65–74	0.28	0.27	0.02	0.28	0.29	0.02
Age 75–84	0.23	0.23	0.02	0.23	0.24	0.02
Age >= 85	0.15	0.15	0.03	0.15	0.15	0.02
White	0.63	0.67	0.05	0.63	0.64	0.005
Dual eligible	0.36	0.47	0.18	0.36	0.36	0.003
Male	0.41	0.41	0.01	0.41	0.41	0.001
Disabled	0.42	0.46	0.07	0.42	0.42	0.002
End-stage renal disease	0.03	0.04	0.01	0.03	0.03	0.002
Hierarchical Condition Category score	1.89	1.91	0.01	1.89	1.88	0.002
Metropolitan area	0.95	0.94	0.03	0.95	0.94	0.02
Lagged number of chronic conditions	7.44	7.37	0.02	7.44	7.41	0.01
Population density 2010	2,064.16	3,781.87	0.54	2,064.16	3,732.19	0.53
Poverty rate 2013	11.78	14.09	0.42	11.78	14.02	0.41
Percent <65 years uninsured	11.72	13.47	0.41	11.72	13.65	0.45
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.18	0.12	0.13	0.17
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.14	0.33	0.35	0.14
Acute hospital beds per 1,000 residents	2.58	2.60	0.01	2.58	2.58	0.004
Primary care providers per 1,000 residents	0.83	0.90	0.22	0.83	0.90	0.20

Table D-55
Maryland Medicare outpatient ED visit-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.33	0.36	0.05	0.33	0.32	0.01
Age 65–74	0.28	0.27	0.03	0.28	0.29	0.01
Age 75–84	0.23	0.23	0.02	0.23	0.24	0.01
Age >= 85	0.15	0.15	0.02	0.15	0.15	0.01
White	0.62	0.67	0.07	0.62	0.62	0.004
Dual eligible	0.36	0.46	0.16	0.36	0.37	0.003
Male	0.41	0.42	0.01	0.41	0.41	0.001
Disabled	0.42	0.46	0.07	0.42	0.42	0.002
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.001
Hierarchical Condition Category score	1.84	1.88	0.02	1.84	1.84	0.002
Metropolitan area	0.95	0.94	0.02	0.95	0.94	0.01
Lagged number of chronic conditions	7.52	7.50	0.01	7.52	7.50	0.004
Population density 2010	2,084.23	3,731.29	0.51	2,084.23	3,705.49	0.51
Poverty rate 2013	11.82	14.04	0.40	11.82	14.00	0.40
Percent <65 years uninsured	11.75	13.39	0.38	11.75	13.60	0.43
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.15	0.12	0.13	0.16
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.14	0.33	0.35	0.14
Acute hospital beds per 1,000 residents	2.59	2.59	0.001	2.59	2.57	0.01
Primary care providers per 1,000 residents	0.83	0.90	0.22	0.83	0.90	0.21

Table D-56
Maryland Medicare outpatient ED visit-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.33	0.34	0.02	0.33	0.32	0.01
Age 65–74	0.29	0.28	0.03	0.29	0.30	0.01
Age 75–84	0.23	0.23	0.001	0.23	0.23	0.01
Age >= 85	0.15	0.15	0.01	0.15	0.14	0.01
White	0.61	0.67	0.11	0.61	0.61	0.003
Dual eligible	0.37	0.45	0.13	0.37	0.37	0.003
Male	0.41	0.42	0.02	0.41	0.41	0.001
Disabled	0.42	0.45	0.05	0.42	0.42	0.003
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.001
Hierarchical Condition Category score	1.82	1.86	0.02	1.82	1.82	0.002
Metropolitan area	0.95	0.94	0.04	0.95	0.94	0.02
Lagged number of chronic conditions	7.57	7.63	0.01	7.57	7.54	0.01
Population density 2010	2,112.42	3,645.29	0.48	2,112.42	3,683.52	0.50
Poverty rate 2013	11.83	13.91	0.38	11.83	13.95	0.39
Percent <65 years uninsured	11.76	13.42	0.38	11.76	13.65	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.13	0.12	0.13	0.14
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.15	0.33	0.35	0.16
Acute hospital beds per 1,000 residents	2.61	2.56	0.02	2.61	2.56	0.02
Primary care providers per 1,000 residents	0.83	0.90	0.22	0.83	0.90	0.21

Table D-57
Maryland Medicare outpatient ED visit-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.32	0.33	0.02	0.32	0.31	0.01
Age 65–74	0.30	0.29	0.03	0.30	0.31	0.01
Age 75–84	0.23	0.23	0.01	0.23	0.23	0.01
Age >= 85	0.15	0.15	0.01	0.15	0.15	0.003
White	0.60	0.68	0.13	0.60	0.60	0.003
Dual eligible	0.37	0.44	0.12	0.37	0.37	0.003
Male	0.41	0.42	0.02	0.41	0.41	0.001
Disabled	0.41	0.44	0.05	0.41	0.42	0.004
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.001
Hierarchical Condition Category score	1.89	1.94	0.03	1.89	1.88	0.002
Metropolitan area	0.95	0.94	0.04	0.95	0.94	0.02
Lagged number of chronic conditions	7.64	7.70	0.01	7.64	7.62	0.01
Population density 2010	2,107.10	3,565.77	0.46	2,107.10	3,632.95	0.48
Poverty rate 2013	11.82	13.79	0.36	11.82	13.87	0.37
Percent <65 years uninsured	11.77	13.41	0.38	11.77	13.66	0.44
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.11	0.12	0.13	0.13
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.14	0.33	0.35	0.14
Acute hospital beds per 1,000 residents	2.60	2.54	0.03	2.60	2.54	0.03
Primary care providers per 1,000 residents	0.83	0.89	0.19	0.83	0.89	0.19

Table D-58
Maryland Medicare outpatient ED visit-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.31	0.32	0.02	0.31	0.30	0.01
Age 65–74	0.31	0.30	0.02	0.31	0.31	0.01
Age 75–84	0.24	0.23	0.01	0.24	0.24	0.004
Age >= 85	0.15	0.15	0.01	0.15	0.15	0.01
White	0.60	0.67	0.13	0.60	0.60	0.003
Dual eligible	0.37	0.43	0.11	0.37	0.37	0.003
Male	0.41	0.42	0.02	0.41	0.42	0.002
Disabled	0.41	0.44	0.05	0.41	0.41	0.004
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.002
Hierarchical Condition Category score	1.66	1.71	0.04	1.66	1.65	0.002
Metropolitan area	0.95	0.94	0.05	0.95	0.94	0.03
Lagged number of chronic conditions	7.76	7.82	0.01	7.76	7.74	0.01
Population density 2010	2,087.50	3,551.60	0.46	2,087.50	3,620.71	0.49
Poverty rate 2013	11.72	13.73	0.37	11.72	13.82	0.38
Percent <65 years uninsured	11.78	13.35	0.36	11.78	13.60	0.43
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.11	0.12	0.13	0.14
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.13	0.34	0.35	0.13
Acute hospital beds per 1,000 residents	2.56	2.52	0.02	2.56	2.53	0.02
Primary care providers per 1,000 residents	0.83	0.89	0.18	0.83	0.89	0.18

Table D-59
Maryland Medicare outpatient ED visit-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.29	0.31	0.03	0.29	0.29	0.01
Age 65–74	0.31	0.30	0.02	0.31	0.31	0.01
Age 75–84	0.24	0.24	0.01	0.24	0.25	0.01
Age >= 85	0.16	0.15	0.002	0.16	0.15	0.01
White	0.60	0.67	0.13	0.60	0.60	0.003
Dual eligible	0.36	0.43	0.10	0.36	0.37	0.004
Male	0.42	0.43	0.02	0.42	0.42	0.002
Disabled	0.40	0.43	0.05	0.40	0.40	0.004
End-stage renal disease	0.04	0.04	0.01	0.04	0.04	0.002
Hierarchical Condition Category score	1.74	1.82	0.05	1.74	1.74	0.001
Metropolitan area	0.95	0.93	0.05	0.95	0.94	0.04
Lagged number of chronic conditions	7.93	7.96	0.01	7.93	7.90	0.01
Population density 2010	2,024.41	3,464.78	0.46	2,024.41	3,537.09	0.49
Poverty rate 2013	11.63	13.70	0.38	11.63	13.78	0.39
Percent <65 years uninsured	11.75	13.36	0.37	11.75	13.60	0.43
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.13	0.12	0.13	0.15
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.35	0.12
Acute hospital beds per 1,000 residents	2.51	2.51	0.001	2.51	2.52	0.002
Primary care providers per 1,000 residents	0.83	0.88	0.17	0.83	0.88	0.17

Table D-60
Maryland Medicare outpatient ED visit-level propensity score balance, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.28	0.29	0.03	0.28	0.28	0.01
Age 65–74	0.31	0.30	0.01	0.31	0.32	0.02
Age 75–84	0.25	0.25	0.01	0.25	0.25	0.01
Age >= 85	0.16	0.16	0.004	0.16	0.15	0.01
White	0.60	0.67	0.13	0.60	0.60	0.003
Dual eligible	0.35	0.41	0.10	0.35	0.35	0.004
Male	0.42	0.42	0.01	0.42	0.42	0.002
Disabled	0.39	0.42	0.05	0.39	0.39	0.004
End-stage renal disease	0.04	0.04	0.002	0.04	0.04	0.002
Hierarchical Condition Category score	1.57	1.64	0.05	1.57	1.57	0.002
Metropolitan area	0.94	0.93	0.04	0.94	0.94	0.02
Lagged number of chronic conditions	8.18	8.18	0.001	8.18	8.16	0.005
Population density 2010	1,971.89	3,459.07	0.48	1,971.89	3,532.82	0.50
Poverty rate 2013	11.53	13.68	0.40	11.53	13.76	0.41
Percent <65 years uninsured	11.72	13.32	0.37	11.72	13.55	0.43
Proportion of county population aged 25+ without a high school diploma	0.12	0.13	0.14	0.12	0.13	0.16
Proportion of county population aged 25+ with 4+ years of college	0.34	0.35	0.11	0.34	0.35	0.11
Acute hospital beds per 1,000 residents	2.47	2.51	0.02	2.47	2.51	0.02
Primary care providers per 1,000 residents	0.83	0.89	0.18	0.83	0.89	0.18

D.11 Model 8: Probability of an Outpatient or Inpatient ED Visit to a Maryland Hospital Among Maryland Residents: Medicare

We estimated a logistic regression for each outpatient or inpatient ED visit by Maryland and comparison group residents to a Maryland or comparison group hospital during the year where the dependent variable was an indicator for an ED visit to a Maryland hospital. We included the following covariates in the model: age, race (white = 1), dual eligible status in the year, gender (male = 1), originally disabled status, ESRD status, HCC score, and lagged chronic condition count. ***Tables D-61*** through ***D-68*** contains covariate balance diagnostics for all years.

Most unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, the majority of standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, standardized differences for all individual-level covariates were below the 0.10 threshold, indicating adequate balance. However, standardized differences for most county-level covariates were still above the 0.10 threshold after weighting because they have a large standard deviation due to the small number of counties and, therefore, the small effective sample size. Despite this, a comparison of the means shows they were similar in most instances. In addition, we controlled for these factors in the multivariate regression models.

Table D-61
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.28	0.25	0.07	0.28	0.27	0.02
Age 65–74	0.26	0.26	0.0002	0.26	0.28	0.03
Age 75–84	0.27	0.28	0.04	0.27	0.27	0.01
Age >= 85	0.20	0.21	0.03	0.20	0.18	0.04
White	0.66	0.78	0.22	0.66	0.66	0.005
Dual eligible	0.34	0.38	0.08	0.34	0.34	0.01
Male	0.41	0.42	0.01	0.41	0.42	0.004
Disabled	0.37	0.36	0.02	0.37	0.37	0.01
End-stage renal disease	0.05	0.05	0.02	0.05	0.05	0.001
Hierarchical Condition Category score	2.12	2.17	0.02	2.12	2.11	0.004
Metropolitan area	0.95	0.92	0.11	0.95	0.92	0.09
Lagged number of chronic conditions	7.97	8.26	0.07	7.97	7.95	0.005
Population density 2010	2,178.21	2,577.53	0.13	2,178.21	2,718.96	0.17
Poverty rate 2013	11.96	12.65	0.13	11.96	12.81	0.16
Percent <65 years uninsured	11.77	13.10	0.32	11.77	13.37	0.39
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.06	0.12	0.12	0.01
Proportion of county population aged 25+ with 4+ years of college	0.33	0.34	0.06	0.33	0.34	0.06
Acute hospital beds per 1,000 residents	2.64	2.25	0.20	2.64	2.27	0.19
Primary care providers per 1,000 residents	0.84	0.84	0.003	0.84	0.84	0.01

Table D-62
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.28	0.25	0.06	0.28	0.28	0.01
Age 65–74	0.27	0.26	0.01	0.27	0.28	0.02
Age 75–84	0.26	0.27	0.04	0.26	0.26	0.02
Age >= 85	0.19	0.21	0.04	0.19	0.18	0.03
White	0.65	0.78	0.24	0.65	0.65	0.003
Dual eligible	0.34	0.38	0.08	0.34	0.34	0.01
Male	0.41	0.42	0.01	0.41	0.42	0.003
Disabled	0.38	0.37	0.02	0.38	0.38	0.01
End-stage renal disease	0.05	0.05	0.001	0.05	0.05	0.002
Hierarchical Condition Category score	2.22	2.29	0.03	2.22	2.21	0.004
Metropolitan area	0.95	0.92	0.10	0.95	0.92	0.09
Lagged number of chronic conditions	8.06	8.36	0.07	8.06	8.03	0.008
Population density 2010	2,174.98	2,534.25	0.12	2,174.98	2,681.74	0.16
Poverty rate 2013	11.94	12.59	0.12	11.94	12.77	0.15
Percent <65 years uninsured	11.77	13.01	0.30	11.77	13.29	0.37
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.07	0.12	0.12	0.02
Proportion of county population aged 25+ with 4+ years of college	0.33	0.34	0.06	0.33	0.34	0.06
Acute hospital beds per 1,000 residents	2.63	2.25	0.20	2.63	2.27	0.18
Primary care providers per 1,000 residents	0.84	0.84	0.00	0.84	0.84	0.005

Table D-63
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.28	0.25	0.07	0.28	0.28	0.02
Age 65–74	0.27	0.27	0.01	0.27	0.28	0.02
Age 75–84	0.25	0.27	0.04	0.25	0.26	0.02
Age >= 85	0.19	0.21	0.04	0.19	0.18	0.03
White	0.64	0.78	0.25	0.64	0.64	0.002
Dual eligible	0.34	0.38	0.06	0.34	0.35	0.01
Male	0.42	0.42	0.01	0.42	0.42	0.004
Disabled	0.38	0.37	0.02	0.38	0.39	0.01
End-stage renal disease	0.05	0.05	0.003	0.05	0.05	0.002
Hierarchical Condition Category score	2.13	2.21	0.04	2.13	2.11	0.005
Metropolitan area	0.95	0.92	0.10	0.95	0.92	0.09
Lagged number of chronic conditions	8.11	8.43	0.08	8.11	8.08	0.006
Population density 2010	2,166.18	2,524.68	0.12	2,166.18	2,682.45	0.16
Poverty rate 2013	11.97	12.55	0.11	11.97	12.75	0.14
Percent <65 years uninsured	11.79	12.94	0.28	11.79	13.27	0.36
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.08	0.12	0.12	0.03
Proportion of county population aged 25+ with 4+ years of college	0.33	0.34	0.08	0.33	0.34	0.08
Acute hospital beds per 1,000 residents	2.63	2.23	0.20	2.63	2.26	0.19
Primary care providers per 1,000 residents	0.84	0.84	0.01	0.84	0.84	0.00003

Table D-64
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.29	0.25	0.08	0.29	0.28	0.01
Age 65–74	0.28	0.27	0.02	0.28	0.29	0.02
Age 75–84	0.25	0.27	0.04	0.25	0.25	0.01
Age >= 85	0.18	0.21	0.06	0.18	0.18	0.02
White	0.63	0.78	0.26	0.63	0.63	0.001
Dual eligible	0.35	0.38	0.04	0.35	0.35	0.01
Male	0.42	0.43	0.02	0.42	0.42	0.005
Disabled	0.39	0.37	0.03	0.39	0.39	0.01
End-stage renal disease	0.05	0.05	0.0002	0.05	0.05	0.001
Hierarchical Condition Category score	2.08	2.18	0.05	2.08	2.07	0.005
Metropolitan area	0.95	0.92	0.10	0.95	0.93	0.08
Lagged number of chronic conditions	8.12	8.49	0.09	8.12	8.08	0.009
Population density 2010	2,182.93	2,494.29	0.10	2,182.93	2,677.00	0.16
Poverty rate 2013	11.98	12.36	0.07	11.98	12.58	0.11
Percent <65 years uninsured	11.78	12.77	0.24	11.78	13.13	0.32
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.11	0.12	0.12	0.06
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.12	0.33	0.35	0.11
Acute hospital beds per 1,000 residents	2.64	2.19	0.23	2.64	2.22	0.21
Primary care providers per 1,000 residents	0.83	0.84	0.02	0.83	0.84	0.01

Table D-65
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.28	0.25	0.07	0.28	0.28	0.01
Age 65–74	0.29	0.28	0.02	0.29	0.29	0.01
Age 75–84	0.25	0.26	0.03	0.25	0.25	0.004
Age >= 85	0.18	0.21	0.07	0.18	0.18	0.01
White	0.62	0.78	0.27	0.62	0.62	0.001
Dual eligible	0.35	0.37	0.04	0.35	0.35	0.01
Male	0.42	0.43	0.02	0.42	0.42	0.004
Disabled	0.38	0.37	0.03	0.38	0.39	0.01
End-stage renal disease	0.05	0.05	0.0001	0.05	0.05	0.00
Hierarchical Condition Category score	2.15	2.28	0.06	2.15	2.14	0.004
Metropolitan area	0.95	0.92	0.09	0.95	0.93	0.08
Lagged number of chronic conditions	8.16	8.56	0.09	8.16	8.13	0.009
Population density 2010	2,179.28	2,461.64	0.09	2,179.28	2,658.22	0.15
Poverty rate 2013	11.99	12.27	0.05	11.99	12.49	0.09
Percent <65 years uninsured	11.78	12.66	0.21	11.78	13.04	0.30
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.13	0.12	0.12	0.08
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.14	0.33	0.35	0.13
Acute hospital beds per 1,000 residents	2.64	2.18	0.23	2.64	2.21	0.22
Primary care providers per 1,000 residents	0.83	0.84	0.03	0.83	0.84	0.02

Table D-66
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.27	0.24	0.06	0.27	0.27	0.01
Age 65–74	0.29	0.29	0.02	0.29	0.30	0.02
Age 75–84	0.25	0.26	0.03	0.25	0.25	0.002
Age >= 85	0.18	0.20	0.06	0.18	0.18	0.01
White	0.62	0.77	0.27	0.62	0.62	0.0004
Dual eligible	0.35	0.37	0.03	0.35	0.35	0.01
Male	0.42	0.43	0.02	0.42	0.42	0.005
Disabled	0.38	0.37	0.02	0.38	0.39	0.01
End-stage renal disease	0.05	0.05	0.003	0.05	0.05	0.001
Hierarchical Condition Category score	1.87	2.02	0.09	1.87	1.86	0.006
Metropolitan area	0.95	0.92	0.11	0.95	0.92	0.09
Lagged number of chronic conditions	8.26	8.64	0.09	8.26	8.23	0.007
Population density 2010	2,151.13	2,431.13	0.09	2,151.13	2,622.56	0.15
Poverty rate 2013	11.90	12.24	0.06	11.90	12.47	0.10
Percent <65 years uninsured	11.80	12.60	0.19	11.80	12.97	0.28
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.13	0.12	0.12	0.08
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.13	0.33	0.35	0.12
Acute hospital beds per 1,000 residents	2.60	2.17	0.22	2.60	2.20	0.20
Primary care providers per 1,000 residents	0.83	0.84	0.03	0.83	0.84	0.02

Table D-67
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.26	0.23	0.07	0.26	0.26	0.01
Age 65–74	0.30	0.29	0.02	0.30	0.31	0.02
Age 75–84	0.26	0.27	0.03	0.26	0.26	0.01
Age >= 85	0.18	0.21	0.06	0.18	0.18	0.02
White	0.61	0.77	0.27	0.61	0.61	0.0002
Dual eligible	0.35	0.36	0.02	0.35	0.35	0.005
Male	0.42	0.43	0.01	0.42	0.43	0.004
Disabled	0.38	0.36	0.02	0.38	0.38	0.01
End-stage renal disease	0.05	0.05	0.001	0.05	0.05	0.001
Hierarchical Condition Category score	1.95	2.12	0.09	1.95	1.95	0.005
Metropolitan area	0.95	0.92	0.11	0.95	0.92	0.10
Lagged number of chronic conditions	8.40	8.80	0.09	8.40	8.37	0.007
Population density 2010	2,106.55	2,420.66	0.10	2,106.55	2,605.60	0.15
Poverty rate 2013	11.82	12.26	0.08	11.82	12.49	0.12
Percent <65 years uninsured	11.77	12.56	0.19	11.77	12.93	0.28
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.11	0.12	0.12	0.05
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.12	0.33	0.35	0.12
Acute hospital beds per 1,000 residents	2.56	2.18	0.20	2.56	2.21	0.18
Primary care providers per 1,000 residents	0.83	0.84	0.03	0.83	0.84	0.02

Table D-68
Maryland Medicare outpatient and inpatient ED visit-level propensity score balance, 2018

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age <65	0.25	0.22	0.08	0.25	0.24	0.01
Age 65–74	0.30	0.29	0.01	0.30	0.31	0.03
Age 75–84	0.27	0.28	0.03	0.27	0.27	0.0003
Age >= 85	0.19	0.21	0.06	0.19	0.18	0.02
White	0.61	0.77	0.27	0.61	0.61	0.001
Dual eligible	0.33	0.35	0.03	0.33	0.33	0.01
Male	0.43	0.43	0.01	0.43	0.43	0.004
Disabled	0.37	0.35	0.02	0.37	0.37	0.01
End-stage renal disease	0.05	0.05	0.01	0.05	0.05	0.001
Hierarchical Condition Category score	1.74	1.87	0.08	1.74	1.73	0.005
Metropolitan area	0.95	0.92	0.10	0.95	0.92	0.09
Lagged number of chronic conditions	8.67	9.09	0.10	8.67	8.64	0.007
Population density 2010	2,045.19	2,400.01	0.12	2,045.19	2,588.57	0.18
Poverty rate 2013	11.70	12.22	0.10	11.70	12.44	0.14
Percent <65 years uninsured	11.72	12.51	0.19	11.72	12.86	0.27
Proportion of county population aged 25+ without a high school diploma	0.12	0.12	0.10	0.12	0.12	0.05
Proportion of county population aged 25+ with 4+ years of college	0.33	0.35	0.12	0.33	0.35	0.12
Acute hospital beds per 1,000 residents	2.52	2.17	0.18	2.52	2.20	0.17
Primary care providers per 1,000 residents	0.83	0.84	0.03	0.83	0.84	0.02

D.12 Propensity Score Weights and Balance Diagnostics for MarketScan Analyses

Regression analyses using the commercially insured population balanced on the following covariates:

- Age
- Gender (male = 1)
- Relationship to primary insured beneficiary (i.e., spouse, child)
- Insured beneficiary has prescription drug coverage
- Insured beneficiary has mental health and substance abuse treatment coverage
- Insured beneficiary has a consumer-driven high-deductible plan
- HCC score
- Rural residence

Details on each of these weights and the balance diagnostics are provided in ***Sections D.13***, ***D.14***, ***D.15***, and ***D.16***.

Creating balancing weights using MarketScan data differed from the Medicare analysis in two ways. First, due to data restrictions, we were unable to identify specific hospitals within a state. Therefore, we created person-level balancing weights, one type of admission-level balancing weight, and two types of ED visit-level balancing weights. Similar to the Medicare analyses, person-level weights were used in expenditure and utilization analyses. ED visit-level weights were used in analyses of expenditures per ED visit. All ED visit-level weights were used in the analysis of the probability that an ED visit would lead to a hospitalization. Admission-level weights were used in all admission-level outcomes. The propensity score weights were used in outcome regression models to facilitate balance between Maryland and the comparison group on individual and market area characteristics. Person-level propensity weights were derived from logistic regressions for the probability of being a Maryland resident among Maryland and comparison group residents. The ED visit-level propensity weights were constructed from a logistic regression for the probability that an ED visit was made by a Maryland resident among all ED visits for Maryland and comparison group residents. The outpatient ED visit weight included outpatient ED visits only whereas the all ED visit weight included both ED visits that lead to a hospitalization and outpatient ED visits. Admission-level propensity score weights were derived from logistic regressions for the probability of an admission being a Maryland resident to any hospital.

Second, we used a similar, but not identical, set of covariates to balance Maryland and the comparison group to those used for Medicare analyses. Some characteristics, such as dual status, were not relevant for this population. The county-level AHRF fields did not provide sufficient variation in Maryland to allow balancing due to anonymization constraints imposed by the data supplier. Essentially, the anonymization process reduced the AHRF variables to only seven observations in Maryland: six identified HSAs and a value for the rest of the state. We replaced these fields with a rural indicator to capture some of these geographic characteristics.

D.13 Model 1: Probability of Being a Maryland Resident Among Maryland Residents and Residents of Comparison Group Market Areas: MarketScan

We created propensity score weights where the outcome variable was an indicator for being a Maryland resident or not. We included residents of Maryland and comparison hospital market areas in the sample for analyses. The following covariates were included in the propensity score weight: age, prescription drug coverage, gender, coverage for mental health and substance abuse treatment, relationship of individual to primary insured beneficiary, a flag for consumer-driven health plan (high-deductible plan), HCC score, and an indicator for residence in a non-metropolitan area. ***Tables D-69*** through ***D-75*** contain covariate balance diagnostics for years 2011–2017, respectively.

Most of the unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, most standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, all covariates were adequately balanced with standardized differences well below the 0.10 threshold.

Table D-69
Maryland commercially insured population-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.84	0.80	0.11	0.84	0.84	0.001
Mental health and substance abuse coverage	0.85	0.85	0.02	0.85	0.85	0.003
Male	0.50	0.49	0.01	0.50	0.50	0.0003
Spouse of employee	0.21	0.19	0.03	0.21	0.21	0.0003
Child of employee	0.33	0.33	0.01	0.33	0.33	0.0001
Consumer-driven high-deductible plan	0.09	0.04	0.19	0.09	0.09	0.0000
Age	33.00	32.30	0.04	33.00	33.00	0.0000
Hierarchical Condition Category score	1.40	1.30	0.01	1.40	1.40	0.001
Non-metropolitan residence	0.05	0.05	0.02	0.05	0.05	0.002

Table D-70
Maryland commercially insured population-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.81	0.80	0.01	0.81	0.81	0.001
Mental health and substance abuse coverage	0.84	0.82	0.04	0.84	0.84	0.001
Male	0.50	0.49	0.01	0.50	0.50	0.0002
Spouse of employee	0.20	0.19	0.03	0.20	0.20	0.0002
Child of employee	0.33	0.33	0.02	0.33	0.33	0.0004
Consumer-driven high-deductible plan	0.10	0.05	0.21	0.10	0.10	0.0004
Age	33.00	32.30	0.04	33.00	33.00	0.0000
Hierarchical Condition Category score	1.40	1.30	0.01	1.40	1.40	0.0001
Non-metropolitan residence	0.05	0.05	0.01	0.05	0.05	0.001

Table D-71
Maryland commercially insured population-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.87	0.80	0.18	0.87	0.87	0.001
Mental health and substance abuse coverage	0.83	0.84	0.02	0.83	0.83	0.01
Male	0.50	0.50	0.003	0.50	0.50	0.0000
Spouse of employee	0.20	0.20	0.0004	0.20	0.20	0.0002
Child of employee	0.34	0.34	0.01	0.34	0.34	0.0000
Consumer-driven high-deductible plan	0.17	0.12	0.14	0.17	0.17	0.0001
Age	32.90	32.40	0.03	32.90	32.90	0.0003
Hierarchical Condition Category score	1.40	1.30	0.01	1.40	1.40	0.0002
Non-metropolitan residence	0.04	0.07	0.12	0.04	0.04	0.0003

Table D-72
Maryland commercially insured population-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.83	0.78	0.13	0.83	0.83	0.002
Mental health and substance abuse coverage	0.83	0.84	0.01	0.83	0.83	0.002
Male	0.50	0.50	0.004	0.50	0.50	0.0003
Spouse of employee	0.20	0.19	0.01	0.20	0.20	0.0002
Child of employee	0.34	0.34	0.003	0.34	0.34	0.001
Consumer-driven high-deductible plan	0.22	0.15	0.16	0.22	0.22	0.0002
Age	33.00	32.60	0.02	33.00	33.00	0.001
Hierarchical Condition Category score	1.40	1.40	0.01	1.40	1.40	0.0000
Non-metropolitan residence	0.02	0.04	0.11	0.02	0.02	0.002

Table D-73
Maryland commercially insured population-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.94	0.94	0.01	0.94	0.94	0.001
Mental health and substance abuse coverage	0.86	0.86	0.01	0.86	0.86	0.001
Male	0.49	0.49	0.01	0.49	0.49	0.0004
Spouse of employee	0.20	0.19	0.005	0.20	0.20	0.0002
Child of employee	0.34	0.34	0.01	0.34	0.34	0.0001
Consumer-driven high-deductible plan	0.25	0.19	0.15	0.25	0.25	0.001
Age	33.10	32.70	0.02	33.10	33.10	0.0001
Hierarchical Condition Category score	1.40	1.40	0.01	1.40	1.40	0.0003
Non-metropolitan residence	0.02	0.03	0.05	0.02	0.02	0.001

Table D-74
Maryland commercially insured population-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.95	0.95	0.0001	0.95	0.95	0.002
Mental health and substance abuse coverage	0.86	0.89	0.09	0.86	0.86	0.002
Male	0.49	0.49	0.01	0.49	0.49	0.0001
Spouse of employee	0.19	0.19	0.004	0.19	0.19	0.0003
Child of employee	0.34	0.34	0.00	0.34	0.34	0.0001
Consumer-driven high-deductible plan	0.27	0.22	0.13	0.27	0.27	0.001
Age	33.40	32.90	0.03	33.40	33.50	0.001
Hierarchical Condition Category score	1.40	1.30	0.01	1.40	1.40	0.001
Non-metropolitan residence	0.02	0.03	0.05	0.02	0.02	0.003

Table D-75
Maryland commercially insured population-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.96	0.95	0.06	0.96	0.96	0.001
Mental health and substance abuse coverage	0.94	0.93	0.06	0.94	0.94	0.01
Male	0.49	0.49	0.003	0.49	0.49	0.0003
Spouse of employee	0.19	0.19	0.003	0.19	0.19	0.001
Child of employee	0.34	0.34	0.004	0.34	0.34	0.0003
Consumer-driven high-deductible plan	0.32	0.25	0.16	0.32	0.33	0.002
Age	33.40	32.90	0.03	33.40	33.40	0.001
Hierarchical Condition Category score	1.30	1.30	0.01	1.30	1.30	0.0002
Non-metropolitan residence	0.01	0.02	0.03	0.01	0.01	0.001

D.14 Model 2: Probability of Admission Being a Maryland Resident Among All Admissions of Maryland and Comparison Group Residents

We created propensity score weights where the outcome variable was an indicator for being a Maryland resident for each admission by a Maryland or comparison hospital market area resident. The following covariates were included in the propensity score weight: age, prescription drug coverage, gender, coverage for mental health and substance abuse treatment, relationship of individual to primary insured, a flag for consumer-driven health plan (high-deductible plan), HCC score, and an indicator for residence in a non-metropolitan area. ***Tables D-76*** through ***D-82*** contain covariate balance diagnostics for years 2011–2017, respectively.

Several of the unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, most standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, all covariates were adequately balanced with standardized differences well below the 0.10 threshold.

Table D-76
Maryland commercially insured population admission-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.85	0.80	0.11	0.85	0.85	0.0001
Mental health and substance abuse coverage	0.86	0.88	0.03	0.86	0.86	0.0000
Male	0.38	0.38	0.01	0.38	0.38	0.0001
Spouse of employee	0.32	0.28	0.09	0.32	0.32	0.001
Child of employee	0.21	0.27	0.15	0.21	0.21	0.003
Consumer-driven high-deductible plan	0.07	0.03	0.17	0.07	0.07	0.002
Age	38.00	33.70	0.22	38.00	38.10	0.004
Hierarchical Condition Category score	13.20	11.80	0.06	13.20	13.30	0.003
Non-metropolitan residence	0.05	0.05	0.02	0.05	0.05	0.0004

Table D-77
Maryland commercially insured population admission-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.83	0.82	0.02	0.83	0.83	0.001
Mental health and substance abuse coverage	0.85	0.87	0.05	0.85	0.85	0.01
Male	0.37	0.38	0.01	0.37	0.37	0.0002
Spouse of employee	0.31	0.27	0.10	0.31	0.31	0.0004
Child of employee	0.22	0.29	0.17	0.22	0.22	0.004
Consumer-driven high-deductible plan	0.08	0.04	0.20	0.08	0.08	0.003
Age	37.40	32.80	0.23	37.40	37.50	0.01
Hierarchical Condition Category score	13.40	11.80	0.07	13.40	13.50	0.004
Non-metropolitan residence	0.05	0.05	0.01	0.05	0.05	0.001

Table D-78
Maryland commercially insured population admission-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.89	0.82	0.20	0.89	0.89	0.002
Mental health and substance abuse coverage	0.83	0.85	0.04	0.83	0.83	0.002
Male	0.38	0.38	0.01	0.38	0.37	0.001
Spouse of employee	0.31	0.28	0.06	0.31	0.31	0.003
Child of employee	0.24	0.30	0.15	0.24	0.24	0.004
Consumer-driven high-deductible plan	0.14	0.10	0.12	0.14	0.14	0.001
Age	36.30	33.10	0.16	36.30	36.40	0.004
Hierarchical Condition Category score	12.80	11.70	0.05	12.80	12.90	0.003
Non-metropolitan residence	0.05	0.07	0.10	0.05	0.05	0.001

Table D-79
Maryland commercially insured population admission-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.86	0.79	0.16	0.86	0.86	0.001
Mental health and substance abuse coverage	0.84	0.84	0.002	0.84	0.84	0.004
Male	0.37	0.38	0.01	0.37	0.37	0.0003
Spouse of employee	0.30	0.28	0.04	0.30	0.30	0.002
Child of employee	0.25	0.29	0.10	0.25	0.25	0.004
Consumer-driven high-deductible plan	0.19	0.13	0.17	0.19	0.19	0.002
Age	36.00	33.50	0.12	36.00	36.00	0.004
Hierarchical Condition Category score	14.00	12.70	0.05	14.00	14.00	0.001
Non-metropolitan residence	0.02	0.05	0.14	0.02	0.02	0.0004

Table D-80
Maryland commercially insured population admission-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.95	0.94	0.05	0.95	0.95	0.0002
Mental health and substance abuse coverage	0.86	0.87	0.03	0.86	0.86	0.001
Male	0.37	0.38	0.01	0.37	0.37	0.001
Spouse of employee	0.28	0.27	0.02	0.28	0.28	0.0004
Child of employee	0.28	0.31	0.07	0.28	0.27	0.002
Consumer-driven high-deductible plan	0.22	0.16	0.17	0.22	0.22	0.001
Age	35.20	33.00	0.11	35.20	35.20	0.003
Hierarchical Condition Category score	12.80	11.60	0.06	12.80	12.80	0.003
Non-metropolitan residence	0.02	0.03	0.06	0.02	0.02	0.002

Table D-81
Maryland commercially insured population admission-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.95	0.95	0.01	0.95	0.95	0.001
Mental health and substance abuse coverage	0.86	0.90	0.11	0.86	0.86	0.01
Male	0.37	0.38	0.02	0.37	0.37	0.002
Spouse of employee	0.28	0.27	0.03	0.28	0.28	0.002
Child of employee	0.27	0.31	0.09	0.27	0.27	0.004
Consumer-driven high-deductible plan	0.25	0.19	0.16	0.25	0.25	0.0000
Age	35.60	33.30	0.11	35.60	35.70	0.01
Hierarchical Condition Category score	13.60	11.60	0.09	13.60	13.70	0.01
Non-metropolitan residence	0.02	0.03	0.06	0.02	0.02	0.002

Table D-82
Maryland commercially insured population admission-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.97	0.94	0.11	0.97	0.97	0.003
Mental health and substance abuse coverage	0.95	0.92	0.09	0.95	0.95	0.01
Male	0.37	0.38	0.04	0.37	0.37	0.001
Spouse of employee	0.28	0.26	0.03	0.28	0.27	0.002
Child of employee	0.27	0.32	0.11	0.27	0.27	0.004
Consumer-driven high-deductible plan	0.30	0.22	0.18	0.30	0.30	0.01
Age	35.60	32.90	0.14	35.60	35.70	0.005
Hierarchical Condition Category score	12.30	11.30	0.05	12.30	12.30	0.002
Non-metropolitan residence	0.01	0.02	0.05	0.01	0.01	0.001

D.15 Model 3: Probability Being a Maryland Resident Among Outpatient ED Visits of Maryland and Comparison Group Residents

We created propensity score weights where the outcome variable was an indicator for being a Maryland resident for each outpatient ED visit by a Maryland or comparison hospital market area resident. The following covariates were included in the propensity score weight: age, prescription drug coverage, gender, coverage for mental health and substance abuse treatment, relationship of individual to primary insured, a flag for consumer-driven health plan (high-deductible plan), HCC score, and an indicator for residence in a non-metropolitan area. ***Tables D-83*** through ***D-89*** contain covariate balance diagnostics for years 2011–2017, respectively.

Several of the unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, most standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, all covariates were adequately balanced with standardized differences well below the 0.10 threshold.

Table D-83
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.84	0.80	0.11	0.84	0.84	0.001
Mental health and substance abuse coverage	0.87	0.86	0.03	0.87	0.87	0.003
Male	0.44	0.45	0.02	0.44	0.44	0.0002
Spouse of employee	0.21	0.19	0.06	0.21	0.21	0.001
Child of employee	0.35	0.37	0.05	0.35	0.35	0.0003
Consumer-driven high-deductible plan	0.07	0.03	0.16	0.07	0.07	0.001
Age	31.50	30.60	0.05	31.50	31.50	0.0004
Hierarchical Condition Category score	3.10	3.00	0.02	3.10	3.10	0.001
Non-metropolitan residence	0.07	0.07	0.03	0.07	0.07	0.003

Table D-84
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.84	0.82	0.05	0.84	0.84	0.001
Mental health and substance abuse coverage	0.85	0.84	0.04	0.85	0.85	0.001
Male	0.43	0.45	0.04	0.43	0.43	0.0004
Spouse of employee	0.21	0.19	0.06	0.21	0.21	0.0003
Child of employee	0.34	0.37	0.06	0.34	0.34	0.0001
Consumer-driven high-deductible plan	0.08	0.04	0.18	0.08	0.08	0.0001
Age	32.00	30.60	0.08	32.00	32.00	0.001
Hierarchical Condition Category score	3.30	3.10	0.02	3.30	3.30	0.0001
Non-metropolitan residence	0.06	0.07	0.01	0.06	0.06	0.003

Table D-85
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.89	0.82	0.20	0.89	0.89	0.002
Mental health and substance abuse coverage	0.83	0.83	0.001	0.83	0.84	0.01
Male	0.42	0.45	0.05	0.42	0.42	0.0004
Spouse of employee	0.21	0.20	0.04	0.21	0.21	0.0003
Child of employee	0.34	0.38	0.08	0.34	0.34	0.001
Consumer-driven high-deductible plan	0.14	0.10	0.13	0.14	0.14	0.001
Age	32.10	31.00	0.06	32.10	32.10	0.0003
Hierarchical Condition Category score	3.40	3.10	0.03	3.40	3.40	0.001
Non-metropolitan residence	0.06	0.09	0.12	0.06	0.06	0.002

Table D-86
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.85	0.79	0.16	0.85	0.85	0.002
Mental health and substance abuse coverage	0.84	0.84	0.02	0.84	0.84	0.001
Male	0.42	0.44	0.04	0.42	0.42	0.001
Spouse of employee	0.21	0.19	0.04	0.21	0.21	0.001
Child of employee	0.35	0.37	0.06	0.35	0.35	0.001
Consumer-driven high-deductible plan	0.19	0.13	0.14	0.19	0.19	0.003
Age	32.40	31.60	0.05	32.40	32.40	0.0002
Hierarchical Condition Category score	3.70	3.40	0.03	3.70	3.70	0.001
Non-metropolitan residence	0.03	0.06	0.14	0.03	0.03	0.001

Table D-87
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.96	0.94	0.10	0.96	0.96	0.002
Mental health and substance abuse coverage	0.86	0.86	0.02	0.86	0.86	0.002
Male	0.42	0.44	0.03	0.42	0.42	0.0002
Spouse of employee	0.20	0.19	0.02	0.20	0.20	0.0000
Child of employee	0.35	0.37	0.04	0.35	0.35	0.001
Consumer-driven high-deductible plan	0.21	0.16	0.14	0.21	0.21	0.001
Age	32.60	31.80	0.04	32.60	32.60	0.0004
Hierarchical Condition Category score	3.70	3.50	0.02	3.70	3.70	0.0002
Non-metropolitan residence	0.03	0.04	0.04	0.03	0.03	0.01

Table D-88
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.95	0.94	0.03	0.95	0.95	0.01
Mental health and substance abuse coverage	0.85	0.90	0.14	0.85	0.85	0.01
Male	0.42	0.43	0.03	0.42	0.42	0.0003
Spouse of employee	0.20	0.19	0.02	0.20	0.20	0.001
Child of employee	0.35	0.37	0.04	0.35	0.35	0.0002
Consumer-driven high-deductible plan	0.24	0.19	0.11	0.24	0.24	0.001
Age	33.10	32.30	0.04	33.10	33.10	0.001
Hierarchical Condition Category score	3.80	3.70	0.02	3.80	3.80	0.001
Non-metropolitan residence	0.03	0.04	0.07	0.03	0.02	0.01

Table D-89
Maryland commercially insured population outpatient ED visit-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.96	0.94	0.10	0.96	0.96	0.002
Mental health and substance abuse coverage	0.95	0.93	0.07	0.95	0.95	0.01
Male	0.43	0.44	0.02	0.43	0.43	0.0002
Spouse of employee	0.20	0.19	0.02	0.20	0.20	0.0002
Child of employee	0.35	0.37	0.04	0.35	0.35	0.001
Consumer-driven high-deductible plan	0.28	0.22	0.14	0.28	0.29	0.003
Age	33.20	32.50	0.04	33.20	33.20	0.001
Hierarchical Condition Category score	3.50	3.50	0.0004	3.50	3.50	0.001
Non-metropolitan residence	0.02	0.03	0.06	0.02	0.02	0.001

D.16 Model 4: Probability of Being a Maryland Resident Among Outpatient and Inpatient ED Visits of Maryland and Comparison Group Residents

We created propensity score weights where the outcome variable was an indicator for being a Maryland resident for each outpatient or inpatient ED visit by a Maryland or comparison hospital market area resident. The following covariates were included in the propensity score weight: age, prescription drug coverage, gender, coverage for mental health and substance abuse treatment, relationship of individual to primary insured, a flag for consumer-driven health plan (high-deductible plan), HCC score, and an indicator for residence in a non-metropolitan area. ***Tables D-90*** through ***D-96*** contain covariate balance diagnostics for years 2011–2017, respectively.

Several of the unweighted standardized differences for individual-level covariates were below the 0.10 threshold, suggesting that the sample was adequately balanced on these covariates even without propensity score weighting. Nonetheless, most standardized differences decreased after weighting, indicating that propensity score weighting generally improved covariate balance. After weighting, all covariates were adequately balanced with standardized differences well below the 0.10 threshold.

Table D-90
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.84	0.80	0.11	0.84	0.84	0.001
Mental health and substance abuse coverage	0.87	0.86	0.04	0.87	0.87	0.003
Male	0.44	0.45	0.02	0.44	0.44	0.0001
Spouse of employee	0.22	0.20	0.06	0.22	0.22	0.001
Child of employee	0.33	0.35	0.05	0.33	0.33	0.0004
Consumer-driven high-deductible plan	0.06	0.03	0.16	0.06	0.06	0.001
Age	32.70	31.80	0.05	32.70	32.70	0.0003
Hierarchical Condition Category score	4.90	4.50	0.03	4.90	4.90	0.001
Non-metropolitan residence	0.06	0.07	0.03	0.06	0.06	0.003

Table D-91
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.83	0.82	0.05	0.83	0.83	0.001
Mental health and substance abuse coverage	0.85	0.84	0.04	0.85	0.85	0.001
Male	0.43	0.45	0.04	0.43	0.43	0.0003
Spouse of employee	0.22	0.20	0.06	0.22	0.22	0.0003
Child of employee	0.32	0.35	0.06	0.32	0.32	0.0002
Consumer-driven high-deductible plan	0.08	0.04	0.18	0.08	0.08	0.0001
Age	33.10	31.70	0.08	33.10	33.10	0.001
Hierarchical Condition Category score	5.00	4.70	0.02	5.00	5.00	0.0004
Non-metropolitan residence	0.06	0.06	0.01	0.06	0.06	0.003

Table D-92
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.89	0.82	0.21	0.89	0.89	0.002
Mental health and substance abuse coverage	0.83	0.83	0.001	0.83	0.84	0.01
Male	0.43	0.45	0.05	0.43	0.43	0.0002
Spouse of employee	0.22	0.20	0.04	0.22	0.22	0.001
Child of employee	0.33	0.36	0.08	0.33	0.33	0.0004
Consumer-driven high-deductible plan	0.14	0.10	0.12	0.14	0.14	0.001
Age	33.00	32.00	0.06	33.00	33.00	0.0003
Hierarchical Condition Category score	5.00	4.60	0.03	5.00	5.00	0.001
Non-metropolitan residence	0.06	0.09	0.12	0.06	0.06	0.002

Table D-93
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.85	0.78	0.17	0.85	0.85	0.002
Mental health and substance abuse coverage	0.84	0.83	0.02	0.84	0.84	0.001
Male	0.43	0.45	0.04	0.43	0.43	0.001
Spouse of employee	0.22	0.20	0.05	0.22	0.22	0.001
Child of employee	0.33	0.36	0.06	0.33	0.33	0.001
Consumer-driven high-deductible plan	0.19	0.13	0.15	0.19	0.19	0.003
Age	33.40	32.50	0.05	33.40	33.40	0.0002
Hierarchical Condition Category score	5.40	5.10	0.03	5.40	5.40	0.0002
Non-metropolitan residence	0.03	0.06	0.15	0.03	0.03	0.001

Table D-94
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.96	0.94	0.10	0.96	0.96	0.002
Mental health and substance abuse coverage	0.86	0.86	0.01	0.86	0.86	0.002
Male	0.42	0.44	0.03	0.42	0.42	0.0001
Spouse of employee	0.21	0.20	0.03	0.21	0.21	0.0000
Child of employee	0.34	0.36	0.03	0.34	0.34	0.0004
Consumer-driven high-deductible plan	0.21	0.16	0.14	0.21	0.21	0.001
Age	33.40	32.70	0.04	33.40	33.40	0.0003
Hierarchical Condition Category score	5.40	5.10	0.02	5.40	5.40	0.0000
Non-metropolitan residence	0.03	0.04	0.05	0.03	0.03	0.005

Table D-95
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2016

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.95	0.94	0.03	0.95	0.95	0.005
Mental health and substance abuse coverage	0.85	0.90	0.13	0.85	0.85	0.01
Male	0.42	0.44	0.03	0.42	0.42	0.0004
Spouse of employee	0.21	0.20	0.02	0.21	0.21	0.001
Child of employee	0.34	0.35	0.04	0.34	0.34	0.0002
Consumer-driven high-deductible plan	0.24	0.19	0.12	0.24	0.24	0.001
Age	33.90	33.30	0.04	33.90	33.90	0.001
Hierarchical Condition Category score	5.60	5.30	0.02	5.60	5.60	0.002
Non-metropolitan residence	0.03	0.04	0.07	0.03	0.02	0.01

Table D-96
Maryland commercially insured population outpatient and inpatient ED visit-level propensity score balance, 2017

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Prescription drug coverage	0.96	0.94	0.10	0.96	0.96	0.002
Mental health and substance abuse coverage	0.95	0.93	0.08	0.95	0.95	0.01
Male	0.43	0.44	0.03	0.43	0.43	0.0003
Spouse of employee	0.21	0.20	0.02	0.21	0.21	0.0002
Child of employee	0.33	0.35	0.04	0.33	0.33	0.002
Consumer-driven high-deductible plan	0.28	0.22	0.14	0.28	0.29	0.003
Age	33.90	33.40	0.03	33.90	34.00	0.001
Hierarchical Condition Category score	5.20	5.20	0.001	5.20	5.20	0.0004
Non-metropolitan residence	0.02	0.03	0.06	0.02	0.02	0.002

APPENDIX E:
MEASURE SPECIFICATIONS

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We used estimates from claims and other secondary data to assess five domains of performance: (1) hospital financial performance, (2) service mix, (3) service utilization and expenditures, (4) quality of care, and (5) spillover effects. We created all claims-based measures for the Medicare population, and we created a subset of measures for the commercially insured population and the Medicaid population.

E.1 Hospital Financial Performance

To evaluate the change in financial performance for Maryland hospitals, we assessed the following measures:

- Percentage variation of hospital charges from approved rates for clinic services, outpatient emergency services, and inpatient medical/surgical acute services: We used the HSCRC's revenue and volumes data to calculate total revenues and volumes for three selected service lines (clinic services, outpatient emergency services, and inpatient medical/surgical acute services) for each hospital. We summed monthly revenues and volumes at the hospital level to create quarterly revenues and volumes for each hospital in Maryland. We divided quarterly revenue by quarterly volume for each service line to calculate the average charge for each service. We compared this average charge with the approved rate for each hospital.

- **Operating revenues:** Each hospital's annual gross revenues for patient services (total, inpatient, and outpatient) from the hospital's audited financial statements.

- **Total operating expenses:** Each hospital's annual total operating expenses from the hospital's audited financial statements.

- **Operating margin:** Each hospital's annual operating margin from the hospital's audited financial statements.

E.2 Service Utilization and Expenditures

E.2.1 Utilization

Utilization measures are reported in ***Section 4*** of the report as the number of events per 1,000 beneficiaries. Each measure is a count of the number of events (inpatient admissions, emergency department [ED] visits). We included events in a period's total if the discharge or service date on the claim was during the period. Measures included eligible beneficiaries in Maryland or comparison areas enrolled during the period. We reported all utilization measures for fee-for-service (FFS) Medicare beneficiaries and commercially insured individuals who were residents of either Maryland or comparison group ZIP codes. The measures created for Medicare and the commercially insured population using MarketScan data are signified with an asterisk (*) after the measure name. The measures also created for the commercially insured population in the Medical Care Data Base (MCDB) for comparison purposes with MarketScan are signified with a double asterisk (**). The measures created for Medicaid beneficiaries are signified with a pound symbol (#) after the measure name.

- **Number of inpatient admissions**#:** This is a count of admissions to an acute care hospital reported in the inpatient file for the year per beneficiary. For MarketScan and the MCDB, we converted the count of admissions to a binary variable indicating any admission per year. For Medicare, we identified all hospital admissions in which the last four digits of the provider values were 0001 through 0879 (acute inpatient) or 1300 through 1399 (critical access hospitals [CAHs]). We annualized counts of Medicare inpatient admissions by dividing the number of admissions for each beneficiary in each year by that beneficiary's eligibility fraction. We then rounded the number of admissions to the nearest integer.

  For MarketScan, we identified acute care hospital admissions by including all admissions with a place of service that indicates the admission was to an inpatient hospital (place of service = 21). For the MCDB, we identified acute care hospital admissions by including all admissions with a bill type indicating an inpatient hospital (11 or 12). For both Medicare and the commercial data sources, some records in the inpatient claims files may appear to be multiple admissions but are in fact transfers between facilities; these records were counted as a single admission. To combine transfers into one acute admission, we identified claims that had no more than 1 elapsed day between the discharge date of the index claim and the admission date of the subsequent claim. We combined the claims into one record by taking the earliest admission date and latest discharge date and summing all payment amounts.

  For Medicaid, we identified acute care hospital admissions by including all admissions in the MAX and TAF inpatient (IP) files with a type of service that indicated the admission was to an inpatient hospital (type of service = 01 for MAX, bill type = 111 for TAF). A large portion of admissions for Maryland in the TAF files was missing discharge date. As such, we used admission date to identify assign admissions to a period in the Medicaid data, and we were not able to combine transfers.

- **Number of ED visits**#:** This is a count of the number of visits to the ED that did not result in an inpatient hospital admission and the number of observation stays per beneficiary per year. For MarketScan and the MCDB, we converted the count to a binary variable indicating any ED visits or observation stays per year. We annualized counts of Medicare ED visits by dividing the number of ED visits for each beneficiary in each year by that beneficiary's eligibility fraction. We then rounded the number of ED visits to the nearest integer.

  For all data sources, we identified ED visits in the claims files as visits with a line item revenue center code equal to 0450 through 0459 or 0981 (ED care). For Medicaid, because revenue codes may be incomplete in the MAX files, we also identified ED visits where place-of-service code is equal to 23 and procedure code is equal to 99281, 99282, 99283, 99284, or 99285. We excluded claims where every line item of the ED claim has a procedure code equal to any of the following values: 70000 through 89999, G0106, G0120, G0122, G0130, G0202, G0204, G0206, G0219, G0235, G0252, G0255, G0288, G0389, S8035, S8037, S8040, S8042, S8080, S8085, S8092, or S9024. This criterion excludes claims for radiological or pathology/laboratory services only. For all data sources, we identified observation stays in the claims files as visits with a line item revenue center code equal to 0760 and *Current Procedural Terminology* [CPT] code = G0378 and number of times the service was performed ≥ 8 or line item revenue center code equal to 0762 (treatment or observation room). We counted multiple ED visits or observation stays on a single day once.

- **Length of stay*:** This represents the number of days elapsed during an acute inpatient admission (as defined above). For both data sources, the length of stay was calculated as discharge date − admission date + 1. For Medicare and MarketScan, values were assigned to a period based on discharge date and admission date, respectively.

E.2.2 Expenditures

We calculated weighted average expenditures on a PBPM basis. For each individual, we calculated PBPM payments as annual payments divided by the number of months enrolled during the year. We defined expenditures as payments made by Medicare or a commercial payer; we reported beneficiary cost sharing separately. For Medicare, the beneficiary cost sharing liability measures are composed of the sum of coinsurance and deductible payments. We included all individuals enrolled in the period in calculating the averages so that the figures also reflect the presence of individuals with zero medical costs. We did not risk adjust[27] or price standardize payments across geographic areas. We set negative payments on claims to zero.[28] We included claims in a period's total if the discharge or thru date on the claim was during the period. For the commercially insured population included in MarketScan, we only included expenditures for individuals enrolled in an indemnity plan because the managed care expenditures may be unreliable. We report all the following measures for Medicare beneficiaries and a subset of measures for commercial plan members who are residents of either Maryland or comparison group ZIP codes in ***Section 4*** of the report. The measures created for the commercially insured population using MarketScan data are signified with an asterisk (*) after the measure name. The measures also created for Medicaid beneficiaries are signified with a pound symbol (#) after the measure name.

- **Total**#:** This represents overall net payment amounts from all inpatient and outpatient (facility and professional) claims (i.e., Part A and Part B for Medicare); this excludes member cost sharing and pharmacy component expenditures (i.e., Part D for Medicare). For Medicaid, this represents all FFS net payment amounts for all inpatient, other therapy, long-term care, and pharmacy claims and all capitated payments. Although pharmacy claims are reported in MarketScan data and the MCDB, total payments in both data sources do not include pharmacy claims because MarketScan data do not include drug claims for every member.

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27 Although the expenditures were not formally risk adjusted, the comparison groups were weighted by the propensity score, which includes some risk adjustment measures. The outcomes models also include HCC score, a measure of health risk, as a covariate.

28 Negative claim amounts could be due to adjustments in payment amounts.

- **Total hospital**:** This represents the sum of net payments for inpatient facility, ED, and other hospital outpatient department services.

- **Inpatient facility**:** This represents the sum of net facility payments to a hospital for covered services provided during all inpatient admissions. For Medicare and the commercially insured population, we assigned inpatient admissions to a period based on the discharge date and admission date, respectively. Inpatient admissions were defined as above in the “Utilization” section.

- **ED visits**:** This is the overall payment amount for ED visits that did not lead to a hospitalization and for observation stays. ED visits and observation stays were defined as above in the “Utilization” section.

- **Other hospital outpatient department**:** This includes the overall payment amount for hospital outpatient department services, excluding ED and observation stay payments.

- **Post-acute care (PAC):** This includes the combined payment amounts for skilled nursing facilities (SNFs), long-term care hospitals, rehabilitation hospitals, and distinct hospital units with any of these bed designations. Because of the low PAC spending in the MarketScan data (less than 5 cents per member per month), we do not report PAC spending for the commercially insured population.

- **PAC—Skilled nursing facilities:** This is the overall payment amount for SNFs. To calculate this measure, we summed payments on SNF claims and on swing bed claims. We identified swing bed claims as inpatient claims for which the third character of the provider number is U, W, Y, or Z (swing bed designations for short-term hospitals, long-term hospitals, rehabilitation hospitals, CAHs, respectively).

- **PAC—Long-term care:** This is the overall payment amount for long-term care hospitals or long-term care units within a hospital. To calculate this measure, we summed payments from inpatient claims for which the third through sixth characters of the provider number were 2000 through 2299 (long-term care hospitals).

- **PAC—Rehabilitation:** This is the overall payment amount for rehabilitation hospitals or rehabilitation units within a hospital. We summed payments from inpatient claims for which the third through sixth characters of the provider number were 3025 through 3099 (rehabilitation hospitals), from outpatient claims for which the third through sixth characters of the provider number were 4500 through 4599 (comprehensive outpatient rehabilitation facilities), and from both inpatient and outpatient claims in which the third character of the provider number was R (rehabilitation unit in a CAH) or T (rehabilitation unit, excluded from prospective payment).

- **PAC—Home health:** This is the overall payment amount for home health. We summed payments from all home health claims and institutional claims for which the third through sixth characters of the provider number were 7000 through 7299 (home health agencies).[29]

- **Professional*:** This is the overall net payment amounts from all inpatient and outpatient professional claims.

- **Professional—Regulated:** This is the overall net payment amounts from all inpatient and outpatient professional claims for services rendered in facilities that are subject to Maryland's rate-setting regulations. We restricted professional claims to place of service equal to 21 (inpatient hospital), 22 (outpatient hospital), or 23 (ER hospital).

- **Professional—Unregulated:** This is the overall net payment amounts from all inpatient and outpatient professional claims for services rendered in facilities that are not subject to Maryland's rate-setting regulations. We restricted professional claims to place of service not equal to 21 (inpatient hospital), 22 (outpatient hospital), or 23 (ER hospital).

- **Other*:** This represents the sum of net payments for noninpatient and other services not categorized elsewhere, including those made for outpatient, and hospice services, along with durable medical equipment payments.

In addition to expenditure categories, we present the payment per inpatient admission and per ED visit as defined below. As with the expenditure outcomes, we excluded admissions and ED visits for commercially insured members not enrolled in an indemnity plan from the calculation for the MarketScan data because managed care payments may be unreliable.

- **Average payment per inpatient admission*:** This represents the sum of net facility payments to a hospital for covered services provided during an inpatient admission. For Medicare and MarketScan, inpatient admissions were defined as above and were assigned to a period based on the discharge date and admission date, respectively.

- **Average payment per ED visit*:** This represents the sum of net facility payments to a hospital for covered services provided during an ED visit or an observation stay. ED visits, observation stays, and payments were defined as above and were assigned to a period based on the thru date.

We present the following expenditure categories for beneficiary cost sharing. For all measures, the sum of coinsurance and deductible payments was calculated for Medicare only:

- **Total:** This represents the sum of beneficiary cost-sharing payments from institutional (inpatient, outpatient, short-term nursing facility) and noninstitutional (professional, durable medical equipment) claims. Home health and hospice claims were excluded because they are not subject to cost sharing.

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[29] There is a marginal amount of home health care provided in institutional settings.

- **Inpatient:** This represents the sum of beneficiary cost-sharing payments from inpatient claims as defined above.

- **ED visits:** This represents the sum of beneficiary cost-sharing payments for covered services provided during an ED visit or observation stay as defined above.

- **Other hospital outpatient department:** This represents the sum of beneficiary cost-sharing payments for covered services provided during a visit to the hospital outpatient department, excluding ED visits and observation stays.

- **Professional:** This represents the beneficiary cost-sharing payments from inpatient and outpatient professional claims.

E.3 Quality of Care

To evaluate the effect on quality of care, we report the following quality measures in ***Section 5*** of the report. We report all quality-of-care measures for FFS Medicare beneficiaries who were residents of either Maryland or comparison group ZIP codes. We further limited admission-level measures for Medicare beneficiaries to discharges from Maryland or comparison group hospitals. We reported a subset of quality-of-care measures for commercially insured individuals in MarketScan data. We also limited these measures to residents of either Maryland or comparison group market areas. Because MarketScan data do not include hospital identifiers, admission-level measures derived from these data include all hospital admissions for Maryland or comparison group market area residents. The measures created for the commercially insured population using MarketScan data are signified with an asterisk (*) after the measure name.

- **Follow-up visit within 14 days of hospital discharge*:** The measure is an indicator that is equal to 1 if there is a post-discharge visit within 14 days. We included discharges from Maryland hospitals or comparison group hospitals. We excluded a given discharge if there was a subsequent admission within 14 days. We included post-discharge visits if one of the following CPT codes was listed on an outpatient claim within 14 days of the discharge:

  99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99304, 99305, 99306, 99307, 99308, 99309, 99310, 99315, 99316, 99318, 99324, 99325, 99326, 99327, 99328, 99334, 99335, 99336, 99337, 99339, 99340, 99341, 99342, 99343, 99344, 99345, 99347, 99348, 99349, 99350, 99411, 99442, 99443, 99374, 99375, 99376, 99377, 99378, 99379, 99380, 99495, 99496, or revenue center codes 521 or 522 (to capture federally qualified health center [FQHC] visits)

- **ED visit within 30 days of hospital discharge*:** The measure is an indicator that is equal to 1 if there was an ED visit within 30 days after discharge. We included discharges from Maryland hospitals or comparison group hospitals. We excluded a given discharge if there was a subsequent admission within 30 days. We identified ED visits (including observation stays) in hospital outpatient claims as described above for "Number of ED visits." The subsequent ED visit could occur at any hospital; that is, we included ED visits regardless of whether they occurred at a Maryland or comparison group hospital.

- **Readmission within 30 days of hospital discharge*:** This measure was adapted from the Yale all-cause hospital-wide unplanned readmissions measure, released in March 2018.[30] The measure is an indicator that is equal to 1 if there was an unplanned readmission within 30 days to any hospital, regardless of whether it is a Maryland or comparison group hospital. For Medicare, index admissions had to be admissions by Maryland and comparison group residents to Maryland hospitals and comparison group hospitals, respectively. For the commercial analysis, index admissions included admissions to any hospital by Maryland and comparison group residents because MarketScan data do not include hospital identifiers. Index admissions had to meet several additional criteria. We identified an index hospital admission as an inpatient stay with a discharge date within the given measurement period (12 months, except 6 months for Medicare in 2018) minus 30 days from the end of the period. For Medicare, we included an index admission if the beneficiary was enrolled in Medicare FFS at admission and was age 65 or older at admission. We did not implement a similar age restriction for the commercial insurance readmissions measure because all individuals in the commercial data are under 65 years old. For Medicare and commercial insurance claims, we excluded index admissions for which the beneficiary did not have 30 days of post-discharge enrollment in Medicare Part A or commercial insurance coverage, was transferred to another short-term, acute care (STAC) hospital, died during hospitalization, was discharged against medical advice, was admitted for a primary psychiatric diagnosis, was admitted for rehabilitation, or was admitted for medical treatment of cancer. We did not count planned admissions as readmissions. Planned admissions include bone marrow, kidney, or other organ transplants; maintenance chemotherapy or rehabilitation; and a list of potentially planned procedures if they are not acute or complications of care. Unlike previous versions, the 2018 readmissions measure identified admissions and readmissions for rehabilitation using revenue center codes 0024, 0118, 0128, and 0148, as well as the Clinical Classification Software categories that were used in previous versions. The Clinical Classification Software categories group diagnoses into broad conditions.

- **Admission for an ambulatory care sensitive condition[31,32]:** The measure includes the population aged 18 or older who are residents of Maryland or the comparison group. The measure is an indicator that equals 1 if the beneficiary had at least one

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30 Yale New Haven Health Services Corporation–Center for Outcomes Research & Evaluation. (2018). 22018 All-cause hospital wide measure updates and specifications report: Hospital-level 30-day risk-standardized readmission measure–Version 7.0.

31 Agency for Healthcare Research and Quality. (2016a). Prevention quality overall composite: Technical specifications updates–Version 6.0 (ICD-10). Retrieved from https://www.qualityindicators.ahrq.gov/Archive/PQI_TechSpec_ICD10_v60.aspx

32 Agency for Healthcare Research and Quality. (2016b). Prevention quality overall composite: Technical specifications updates–Version 6.0 (ICD-9). Retrieved from https://www.qualityindicators.ahrq.gov/Modules/PQI_TechSpec_ICD09_v60.aspx

admission that met the inclusion and exclusion rules for any of the following prevention quality indicators (PQIs).

- The **Overall Composite (PQI #90)** includes 11 of the 14 individual PQIs:
  - PQI #01 Diabetes Short-Term Complications Admission Rate
  - PQI #03 Diabetes Long-Term Complications Admission Rate
  - PQI #05 Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate
  - PQI #07 Hypertension Admission Rate
  - PQI #08 Heart Failure Admission Rate
  - PQI #10 Dehydration Admission Rate
  - PQI #11 Bacterial Pneumonia Admission Rate
  - PQI #12 Urinary Tract Infection Admission Rate
  - PQI #14 Uncontrolled Diabetes Admission Rate
  - PQI #15 Asthma in Younger Adults Admission Rate
  - PQI #16 Rate of Lower-Extremity Amputation Among Patients With Diabetes
- **ED visits for selected conditions:** The measure is an indicator variable that is equal to 1 if the beneficiary had at least one ED visit that met the inclusion and exclusion rules for the following PQIs. We created a separate indicator variable for each PQI.
  - PQI #05 Chronic Obstructive Pulmonary Disease or Asthma in Older Adults
  - PQI #11 Bacterial Pneumonia
  - PQI #14 Uncontrolled Diabetes
  - PQI #08 Heart Failure

E.4 Service Mix

To evaluate the effect of the All-Payer Model on service mix, we report all the following measures for Medicare beneficiaries and a subset of measures for commercial plan members in ***Section 6*** of the report. The measures created for the commercially insured population in MarketScan data are signified below with an asterisk (*) after the measure name. For Medicare, measures include all inpatient admissions or ED visits to Maryland and comparison group hospitals, as appropriate. We identified inpatient admissions as defined above for “Number of inpatient admissions” under the “Utilization” section. ED visits include outpatient ED visits as defined in the “Number of ED visits” outcome above and ED visits that lead to an admission as defined in "Admissions through the ED" below. Because MarketScan data do not include hospital identifiers, all measures derived from this data source include all hospital admissions or ED visits for Maryland or comparison group market area residents.

- **Diagnosis-related group (DRG) weight per admission*:** This represents the DRG relative weight for an inpatient admission.

- **Admission classified as major or extreme severity or risk of mortality using the 3M All Patient Refined (APR) DRG Grouper[33]:** The measure is an indicator that is equal to 1 if the admission is classified as major/extreme by the grouper. We used version 32 of the 3M APR DRG Grouper for all claims that included ICD-9 codes and version 34 of the grouper for all claims that included ICD-10 codes. Version 32 was the most recent version of the grouper that processed claims with ICD-9 codes, and version 34 was the most recent grouper version available on the Chronic Conditions Data Warehouse (CCW) at the time of our analysis. We used only two grouper versions—rather than an updated grouper version for each fiscal year—because annual changes in the grouper's methodology created discontinuities in unadjusted trends for outcomes created using the grouper.

- **Admission includes an intensive care unit stay*:** The measure is an indicator that is equal to 1 if the admission has a revenue center code on the claim equal to 200, 201, 202, 203, 204, 206, 207, 208, 209, 210, 211, 212, 213, 214, or 219.

- **Case mix–adjusted payment per discharge*:** This represents the net facility payments for covered services provided during an inpatient admission divided by the DRG relative weight for the admission.

- **Unplanned admissions:** The measure is an indicator that is equal to 1 if the admission is not a planned admission. Planned admissions include bone marrow, kidney, or other organ transplants; maintenance chemotherapy or rehabilitation; and a list of potentially planned procedures if they are not acute or complications of care.[34] All other admissions are unplanned. These are the same criteria used to identify planned/unplanned admissions for the 30-day unplanned readmissions measure described above.

- **Admission through the ED*:** The measure is an indicator that is equal to 1 if the admission has a revenue center code on the claim equal to 0450 through 0459 or 0981.

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[33] 3M Health Information Systems. (2018, January 9). The standard for yesterday, today and tomorrow: 3M™ All Patient Refined DRGs. Retrieved from https://multimedia.3m.com/mws/media/910941O/3m-apr-drg-ebook.pdf

[34] Yale New Haven Health Services Corporation–Center for Outcomes Research & Evaluation. (2018). 22018 All-cause hospital wide measure updates and specifications report: Hospital-level 30-day risk-standardized readmission measure–Version 7.0.

- **ED visits that lead to a hospitalization*:** The measure is an indicator that is equal to 1 if the ED visit to a Maryland or comparison group hospital is identified in inpatient claims and 0 if the ED visit to a Maryland or comparison group hospital is identified in outpatient claims. ED visits are identified in both inpatient and outpatient files as described in the "Number of ED visits" outcome in the "Utilization" section above.

E.5 Spillover Effects

To evaluate spillover effects of the All-Payer Model, we report all the following measures for Medicare beneficiaries. The measure created for the commercially insured population using MarketScan data is signified with an asterisk (*) after the measure name.

- **Avoidance of complex inpatient cases:** This set of measures includes hospitalizations by Medicare beneficiaries in Maryland or comparison group hospitals.

  We created several outcome variables for these analyses, as follows.

  - **Transfer to another STAC hospital:** The measure is an indicator variable that is equal to 1 if an admission was followed by a claim for an admission at another STAC hospital. IPPS transfer rules were applied (even for Maryland hospitals) to determine whether the following claim qualified as an IPPS transfer. The admission date on the following STAC claim had to be either on the same date as the discharge date on the initial admission or only 1 day after. In addition, the initial admission had to be a short stay. A short stay is defined as a length of stay for the admission that is equal to or less than the geometric mean length of stay for all cases for the DRG, minus 1.[35]

  - **STAC transfer classified as major or extreme severity:** The measure is an indicator variable that is equal to 1 if an admission that is classified as major or extreme severity was followed by a claim for an admission at another STAC hospital. Case severity was determined using the 3M APR DRG Grouper. A transfer was classified as major or extreme severity if the grouper assigned a value of "3" or "4" (on a 1 to 4 scale) to risk of mortality at discharge. We used version 32 of the grouper for all claims that included ICD-9 codes, and version 34 of the grouper for all claims that included ICD-10 codes. We did not update grouper versions with each fiscal year because changes to grouper methodology over time led to discontinuities in unadjusted trends in grouper-created outcomes.

  - **PAC transfer:** The measure is an indicator variable that is equal to 1 if an admission was followed by a claim at a PAC provider. Long-term care hospitals, rehabilitation hospitals or units, SNFs or units, and home health agencies were considered PAC providers. We applied PAC transfer rules to determine whether the following claim qualified as a PAC transfer. The admission date on the PAC

[35] Medicare Payment Advisory Commission. (2016, October). Hospital acute inpatient services payment basics payment system. Retrieved from http://www.medpac.gov/docs/default-source/payment-basics/medpac_payment_basics_16_hospital_final.pdf

claim had to be within 3 days of the discharge date on the initial admission. In addition, the initial admission had to be a short stay. A short stay is defined as a length of stay for the admission that is equal to or less than the geometric mean length of stay for all cases for the DRG, minus 1. A final requirement was that the DRG for the hospital stay had to be classified as eligible for payment under Medicare's PAC transfer reimbursement rules.[36]

 – **PAC transfer classified as major or extreme severity:** The measure is an indicator variable that is equal to 1 if an admission that is classified as major or extreme severity was followed by a claim at a PAC provider. We determined case severity using the 3M APR DRG Grouper. We classified a transfer as major or extreme severity if the grouper assigned a value of "3" or "4" (on a scale of 1 to 4) to risk of mortality at discharge. As noted above, we used version 32 of the grouper for all claims that included ICD-9 codes, and version 34 of the grouper for all claims that included ICD-10 codes.

 – **Length of stay for admissions resulting in a PAC transfer:** This measure represents the number of days elapsed during an acute inpatient admission that resulted in a transfer to a PAC provider. As in the other length of stay measure, we calculated length of stay as discharge date − admission date + 1.

- **Inpatient episode payments:** We constructed episodes based on an index admission. We included admissions by Maryland or comparison group residents in Maryland or comparison group hospitals. We used the discharge date to assign the admission to a period. The episode windows are from 14 days before admission date to 30 days after discharge date. Episode payments included all Medicare payments (excluding beneficiary cost sharing) for home health, SNF, outpatient, inpatient, durable medical equipment, or professional claims. We broke out payments by pre-admission (14 days before admit date), index admission (admission through discharge date), and post-discharge (30 days after discharge date) time periods.

- **Outpatient medical exam visits by place of service*:** For Medicare, we used claims from the CCW carrier file to count outpatient medical exam (evaluation and management) visits at physician practices, urgent care centers, and hospital outpatient departments (claim type = 71 or 72). We used allowed claims from the CCW outpatient file to count evaluation and management visits at FQHCs (bill type = 77), rural health clinics (RHCs) (bill type = 71), and Method II CAHs (bill type = 85 and revenue center code = 096x, 097x, or 098x). The measures include Medicare FFS beneficiaries in Maryland and the comparison group.

  For MarketScan, outpatient claims were used to count medical exam visits at physician practices, urgent care centers, and hospital outpatient departments. The

[36] Medicare Payment Advisory Commission. (2016, October). Hospital acute inpatient services payment basics payment system. Retrieved from http://www.medpac.gov/docs/default-source/payment-basics/medpac_payment_basics_16_hospital_final.pdf.

measures include services provided to commercial plan members in Maryland and the comparison group.

For Medicare, the places (sites) of care categories are (1) physician practices, urgent care centers, and Method II CAHs; (2) hospital outpatient departments; and (3) FQHCs and RHCs. Method II CAHs and FQHC/RHCs are not included in MarketScan analyses. We do not report results for visits to FQHCs or RHCs for the commercially insured population because of low frequencies. We counted claims with any one of the following codes as an outpatient medical exam visit: 99201 through 99205 or 99211 through 99215; *Healthcare Common Procedure Coding System* Level II codes G0402, G0438, or G0439; or revenue center code 0521.

- For Medicare and MarketScan, the place-of-service codes used for the first category (physician practices, urgent care centers, and Method II CAHs) are 11 (physician office), 17 (walk-in clinic), 20 (urgent care), or 49 (independent clinic). For Medicare, we identified visits to Method II CAHs using bill type = 85 and revenue center code = 096x, 097x, or 098x, as noted above.

- For Medicare and MarketScan, the place-of-service code used for the second category is 22 (hospital outpatient department).

- For Medicare, we identified FQHCs where bill type = 77 and RHCs where bill type = 71.

For the Medicare and MarketScan analyses, we also counted the total number of outpatient medical exam visits across all sites of care at the person-year level. We annualized outpatient medical exam visits by dividing the number of visits for each person in each year by that person's eligibility fraction. We then rounded the number of visits to the nearest integer.

- **Out-of-state hospital admissions:** This analysis used Medicare inpatient claims for Maryland residents admitted to any STAC hospital and for non-Maryland residents admitted to Maryland hospitals. The state code component of the hospital ID (PRVDR_NUM) was used to classify a STAC claim as a Maryland hospital (hosp_state_cd = 21) or from another state. For some subanalyses, we classified hospitals outside Maryland as located in either border states or all other states. The border states are Delaware (hosp_state_cd = 08), the District of Columbia (09), Pennsylvania (39), Virginia (49), and West Virginia (51).

APPENDIX F:
MEDICAID DATA

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F.1 Introduction

The original evaluation design for the Maryland All-Payer Model included a difference-in-differences (D-in-D) analysis with Medicaid data that used the same comparison group hospital service areas and outcomes as were used for the Medicare and commercially insured populations. Similar to the commercial insurance data, the Medicaid data do not include hospital identifiers, so we planned to restrict the analysis to the outcomes used for the commercial population. To cover the All-Payer Model baseline and implementation periods, we planned to use a hybrid of Medicaid data from the CMS Medicaid Analytic eXtract (MAX) research files and Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAFs) for Maryland and the comparison group states. The Medicaid data sources are described in more detail below.

TAF processing was in early stages when we analyzed the data in November 2018 through April 2019, and many data elements were missing or incomplete. Additionally, data elements required for some planned outcomes were missing in the MAX files for Maryland. Complete data were not available for 2014 or 2015 (or both) for 9 of the 12 comparison group states. We also identified serious data anomaly issues with the three states that had available data. As a result, the All-Payer Model evaluation Final Report includes pre-post descriptive trend analyses for three outcomes (total expenditures, inpatient admissions per 1,000 beneficiaries, and emergency department [ED] visits per 1,000 beneficiaries) for Maryland only. The analyses used 2011 through 2012 for the baseline period and 2014 through 2017 for the All-Payer Model period, except for total expenditures which used 2014 through 2016. This appendix details the reasons for limiting the Medicaid analysis in this report to descriptive trends for these outcomes over this study period.

F.2 Medicaid Data Sources and Study Period

Key decision:

- We excluded 2013 data from the analysis.

As noted, we used a hybrid of Medicaid data from MAX research files and TAFs for each state. Each state's quarterly Medicaid Statistical Information System (MSIS) data are the source of the MAX files, and each state's monthly T-MSIS data are the source for the TAFs. The MAX file processing adds enhancements such as claims adjustments, creation of a national type of service field, and state-specific quality issues corrections to the MSIS files. To facilitate more timely data availability, Alpha-MAX files, which have fewer enhancements, are produced quarterly as interim files before the MAX data are finalized. MAX-T files incorporate both MSIS and T-MSIS data and apply the MAX enhancements to both data sources. The type of Medicaid data file that is available varies by state for the years 2013 through 2015.

At the time of our analysis in November 2018 through April 2019, Maryland MAX files were available for 2011 through 2012, and Alpha-MAX files were available for 2013. TAFs were available for 2014 through 2017. However, the Alpha-MAX data for Maryland for 2013 were not yet complete. As of our run date, the data included service dates only through mid-December 2013. Because of this, the service counts were slightly lower for 2013 than for the other years, although they would increase if data through the end of December were included. As such, we decided to drop the 2013 data from our analysis. The baseline period for the descriptive analysis was 2011 through 2012 using MAX files, and the post period was 2014 through 2017 using TAFs. However, capitated payment amounts were inaccurate in 2017 due to a data anomaly, so we used 2014 through 2016 for the post period for total expenditures.

F.3 Known TAF Issues

Key decision:

- Despite known issues with the TAFs, we could proceed with the analysis for Maryland.

At the time we conducted the analyses for the Final Report, two major issues with the TAFs were identified that made some states' data unusable for the Final Report. We determined that these issues had a minimal impact on Maryland, however, and were not a barrier to including Medicaid analysis in the Final Report.

These were the two major issues:

(1) In the monthly T-MSIS submissions states make to CMS, claims from previous months may be corrected or reversed. When that happens, an algorithm is applied to the group of claims that assigns the final action status to one claim. However, some claims were not assigned a final action status, which led to duplicate claims in the TAFs. This issue impacts both utilization and expenditure measures. According to CMS, this issue impacted only 0.1 percent of all claims for Maryland.

(2) Some enrollment records had overlapping enrollment beginning and end dates. To ensure this did not lead to duplication or over counting of enrollment periods, we applied an algorithm to the enrollment files to de-duplicate and remove overlap in records, using the MSIS ID to identify records for the same beneficiary. To determine length of enrollment for a given year, we summed the total number of unduplicated days during the year that the person was enrolled. We also validated the enrollment and demographic data as detailed in the following section on the sample population. Our validation of the data indicated that this issue had a minimal impact on the Maryland Medicaid data.

F.4 Sample Population

Key decisions:

- We excluded beneficiaries dually eligible for Medicare and Medicaid, beneficiaries with restricted benefits, and expansion enrollees from the analysis.
- The Maryland enrollment files were sufficiently valid to proceed with the analysis.

We limited the sample population to non-expansion, non-dually eligible Maryland Medicaid beneficiaries with full benefits who were enrolled for any part of the year. We excluded beneficiaries dually enrolled in Medicare because their complete utilization data is not captured in Medicaid claims data. We also excluded beneficiaries with restricted benefits because Medicaid claims may not capture their complete utilization. We excluded expansion enrollees because Maryland's Medicaid expansion coincided with the start of the All-Payer

Model in 2014 and newly covered beneficiaries may have different utilization patterns that would confound identification of changes in trends following All-Payer Model implementation.

We examined the 2015 and 2016 Beneficiary Summary File (BSF) for Maryland to determine whether the quality of beneficiary enrollment and demographic data was adequate to support analysis. We found that enrollment fields were well populated, and the distributions by eligibility category and managed care plan enrollment were similar to values reported by Kaiser Family Foundation State Health Facts.[37] ***Table F-1*** shows select enrollment variables for Maryland, comparing the values in TAF data with values reported in Kaiser State Health Facts.

Table F-1
Enrollment and demographic data for Maryland, TAFs vs. Kaiser Family Foundation State Health Facts

Variable	TAFs (year)	Kaiser State Health Facts (year)
Expansion enrollment	249,856 (2015)	277,000 (2016)
White (%)	28 (2015–2016)	31 (FY2013)
Male (%)	46 (2015–2016)	42 (FY2013)
Dually eligible for Medicare (%)	10 (2015)	12 (FY2013)
Number SSI beneficiaries	129,528 (2015)	120,234 (2015)
Enrollment category		
Aged/disabled	211,549 (2015)	259,900 (FY2014)
Adult	572,758 (2015)	502,900 (FY2014)
Child	525,286 (2015)	511,900 (FY2014)
Managed care penetration (%)	88 (2015–2016)	86 (2018)

SSI = Supplemental Security Income; TAFs = Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files.

We also validated the number of person-years for Maryland in the MAX files and TAFs over the study period, excluding dually eligible beneficiaries, beneficiaries with restricted benefits, and expansion enrollees. As shown in ***Table F-2***, the number of person-years generally increased over time, although the number decreased slightly in 2015 and 2016. We validated these numbers by comparing them with the Medicaid enrollment numbers by coverage type published on the Maryland Medicaid eHealth Statistics website by the Hilltop Institute.[38] Even

[37] Kaiser Family Foundation. (2018, December). Medicaid & CHIP. Retrieved from https://www.kff.org/state-category/medicaid-chip/

[38] Maryland Medicaid eHealth Statistics. (2019, February). Medicaid eligibility. Retrieved from https://md-medicaid.org/eligibility/index.cfm. Maryland Medicaid eHealth Statistics presents Medicaid eligibility for Maryland by coverage type for the following categories: Aged/disabled, Families and Children, Maryland Children’s Health Program, Other, and Primary Adult Care (PAC) (prior to 2014). After the Medicaid expansion in 2014, the PAC program was eliminated, and all Medicaid expansion enrollees are captured in the “Other” category. To provide numbers as comparable as possible to the population included from the MAX files and TAFs, we included the Families and Children, Maryland Children’s Health Program, and Other categories prior to 2014 and only the Families and Children and Maryland Children’s Health Program categories after 2014. Prior

after excluding Medicaid expansion beneficiaries, both sources show an increase in 2014 and then a slight decline in 2015 and 2016. Likewise, both sources show a return to 2014 levels in 2017.

Table F-2
Number of person-years for Maryland Medicaid beneficiaries by year, 2011–2017

Year	MAX/TAF	Maryland eHealth statistics†
2011	782,688	764,166
2012	818,177	809,497
2013	846,857	844,286
2014	903,951	854,788
2015	860,714	823,379
2016	869,138	816,934
2017	905,207	851,245

MAX = CMS Medicaid Analytic eXtract; TAF = Transformed Medicaid Statistical Information System (T-MSIS) Analytic File.

† Maryland Medicaid eHealth Statistics has the following eligibility categories: Families and Children, Maryland Children's Health Program, and Other prior to 2014 and Families and Children and Maryland Children's Health Program beginning in 2014.

F.5 Outcomes

Key decision:

- Data were available for three outcomes in the Final Report: total expenditures, inpatient admissions per 1,000 beneficiaries, and ED visits per 1,000 beneficiaries.

As noted above, we planned to include the same outcomes for the Medicaid population that were used for the commercial population. However, due to data limitations, we only provide descriptive trends for 3 outcomes: total expenditures, inpatient admissions per 1,000 beneficiaries, and ED visits per 1,000 beneficiaries. We detail the rationale for the decision about each outcome considered below.

F.5.1 Expenditures

✗ Expenditures by service category (inpatient, ED, other hospital outpatient, total hospital, professional, payment per admission, payment per ED visit)

We found that managed care encounters in Maryland always had $0 paid amounts in both the TAFs and the MAX files. Over 95 percent of the Medicaid population that is not dually eligible for Medicare in Maryland was enrolled in a managed

to 2014, the Other category included 50,000–55,000 enrollees, so the numbers for 2014 through 2017 would likely be 50,000–55,000 higher if we could identify the non-expansion enrollees in this category for these years.

care plan, so expenditure data were only available for a small fraction of the study population. We, therefore, could not calculate expenditures by service category or per admission or ED visit for the Maryland Medicaid population.

✓ Total expenditures

For total expenditures, we summed all fee-for-service net payment amounts for all inpatient, other therapy, long-term care, and pharmacy claims and all capitated payments. We did not have service-level payments for managed care enrollees, but we hypothesized that the capitated payments would reflect any reductions in utilization over time. Although we included this outcome, we found that the capitated payments for Maryland decreased substantially in 2017 due to an anomaly in Maryland's TAF data. As a result, we omitted 2017 from the analysis of trends in total expenditures.

F.5.2 Utilization

✓ Inpatient admissions per 1,000 beneficiaries

A large portion of the admissions (73%) in Maryland had a missing discharge date. Upon further exploration, we learned that, with one exception, all the admissions with missing discharge date were managed care encounters. Although not all managed care encounters had a missing discharge date, the majority did. Because of the high percentage of inpatient stays missing discharge date, we opted to calculate the inpatient admission rate using the admission date rather than the discharge date. In doing so, we could not roll up transfers as we did for the Medicare and commercial insurance populations because that requires having a valid discharge date. The Medicaid rates may, therefore, be slightly higher than expected.

✗ Length of stay

We could not calculate inpatient length of stay due to the large number of admissions missing discharge date.

✓ ED visits per 1,000 beneficiaries

For Medicare and the commercial insurance populations, ED visits were identified using revenue codes on claims. However, we found a high percentage of ED visit claims were missing revenue codes in the MAX files. Nonetheless, we were able to calculate ED visits for all years using an algorithm that relied on a hybrid of revenue code or procedure code combined with place of service that indicated an ED visit. The measure is defined in detail in ***Appendix E***.

F.5.3 Quality of Care

❌ Follow-up visits within 14 days

We could not calculate follow-up visit rates due to the large number of admissions missing discharge date.

❌ Unplanned 30-day readmissions per 1,000 discharges

We could not calculate 30-day readmission rates due to the large number of admissions missing discharge date.

❌ Ambulatory care sensitive condition (ACSC) admission rate per 1,000 beneficiaries

We found that diagnosis-related group (DRG) was missing for all admissions in Maryland in the TAFs. Because the algorithm for identifying ACSCs requires the DRG, we could not calculate the ACSC admission rate.

❌ ED visit within 30 days of hospital discharge

We could not calculate the rate of ED visits within 30 days of discharge due to the large number of admissions missing discharge date.

F.5.4 Service Mix

❌ DRG weight per admission

DRG was missing for all admissions in the Maryland TAFs, so we could not include the admission severity measure (DRG weight per admission).

❌ Admission includes an intensive care unit (ICU) stay

ICU stays are identified using revenue codes on admission claims. We found that over 70 percent of admissions were missing revenue codes in the MAX files, although virtually no admissions in the TAFs were missing revenue codes. As such, the mean number of revenue codes per admission in the MAX data was 3 to 5 for 2011, 2012, and 2013. In contrast, the mean number of revenue codes per admission in the TAF data was 11 to 12 for 2014, 2015, 2016, and 2017. Due to the high rate of missing revenue codes in the MAX files, we did not include this measure.

❌ Case-mix-adjusted payment per discharge

This measure relies on payment data and DRG. Since payment amount is $0 for managed care encounters and DRG was missing for all Maryland admissions in the TAFs, we could not calculate this measure.

❌ Unplanned admissions

This measure relies in part on revenue codes, which, as noted above, were missing for 70 percent of admissions in the Maryland MAX data. As such, we could not include this measure.

❌ Admission through the ED

This measure relies in part on revenue codes, which, as noted above, were missing for 70 percent of admissions in the Maryland MAX data. Due to the missing revenue codes, we identified only 14–16 percent of admissions for Maryland Medicaid beneficiaries as being through the ED in the MAX files and 60–64 percent in the TAFs. As such, we did not include this measure.

❌ Percentage of ED visits that lead to a hospitalization

This measure relies in part on revenue codes, which, as noted above, were missing for 70 percent of admissions in the Maryland MAX data. As such, we did not include this measure.

F.5.5 Spillover

❌ Outpatient medical exam visits by place of service

This set of outcomes identifies medical exam visits to hospital outpatient departments, physician offices, and federally qualified health centers or rural health clinics to determine whether global budgets had a spillover effect of increasing visits in non-hospital settings. We identify visits using place-of-service codes. In the Maryland other therapy (OT) TAFs, we found no claims where place of service = 22 (hospital outpatient) in all 4 years of data, and the place-of-service code was missing for more than 40 percent of claims. Therefore, we could not create visit rates for the different settings across all years. ***Table F-3*** shows the frequencies of place-of-service codes across all 4 years of the TAFs for Maryland.

Table F-3
Number of claims by place-of-service code, Maryland TAFs

SRVC_PLC_CD	Frequency	Percent
Missing	136,910,000	43.9
11 Office	92,131,466	29.5
12 Home	24,491,120	7.9
21 Inpatient Hospital	9,053,866	2.9
23 Emergency Room-Hospital	12,936,510	4.1
24 Ambulatory Surgical Center	736,047	0.2
25 Birthing Center	829	0.0
26 Military Treatment Facility	426	0.0
32 Nursing Facility	1,997,175	0.6
34 Hospice	602	0.0
41 Ambulance—Land	1,058,568	0.3
42 Ambulance—Air or Water	2,439	0.0
51 Inpatient Psychiatric Facility	179,747	0.1
52 Psychiatric Facility-Partial Hospitalization	109,096	0.0
53 Community Mental Health Center	211,646	0.4
54 Intermediate Care Facility/Individuals with Intellectual Disabilities	31,273	0.0
55 Residential Substance Abuse Treatment Facility	76,570	0.0
56 Psychiatric Residential Treatment Center	18	0.0
61 Comprehensive Inpatient Rehabilitation Facility	12,135	0.0
62 Comprehensive Outpatient Rehabilitation Facility	7,336	0.0
65 End-Stage Renal Disease Treatment Facility	103,603	0.0
71 State or Local Public Health Clinic	229,897	0.1
72 Rural Health Clinic	677	0.0
81 Independent Laboratory	30,818,249	9.9

TAF = Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files.

F.6 Comparison Group

Key decisions:

- We could not select the same comparison group as was used for Medicare and commercial population analyses.
- Rather than conducting a D-in-D analysis, we opted to provide descriptive trends for Maryland Medicaid beneficiaries over the study period.
- We could not provide a comparison group trend line due to data anomalies in the TAFs for comparison states.

The proposed D-in-D analysis required identifying residents of comparison group hospital service areas. We first assessed whether we could identify the comparison group in the TAFs. As shown in ***Table F-4***, we found that the missing rate for geographic variables required to identify residents of comparison group hospital market areas was high for several of our comparison states. As a result, we determined that we could not select the same comparison group using Medicaid data that we used for the analyses of Medicare and commercial populations. Instead, we decided to use a pre-post descriptive analysis of trends for the Medicaid population in Maryland.

Table F-4
Percentage of records missing zip code or county code by comparison state, 2016 TAF

State	Home zip code (% missing)	Home county code (% missing)	Mailing zip code (% missing)	Mailing county code (% missing)
Illinois	100.0	100.0	100.0	100.0
Kansas	100.0	100.0	100.0	100.0
Louisiana	0.0	0.0	100.0	100.0
Massachusetts	100.0	100.0	100.0	100.0
North Carolina	1.5	1.5	99.8	100.0
New Jersey	0.0	0.1	100.0	100.0
New York	2.8	3.3	100.0	100.0
Oklahoma	0.0	1.3	100.0	100.0
Pennsylvania	0.1	78.4	100.0	100.0
Texas	51.2	51.2	98.8	98.8
Virginia	1.5	1.6	100.0	100.0
West Virginia	0.0	0.2	96.8	96.8

TAF = Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files.

Even though we could not conduct a D-in-D analysis, we thought it was important to report trends for a comparison group to provide context for interpreting the Maryland trends. As an alternative to the comparison group HSAs, we considered using the comparison states in their entirety, which would not require geographic identifiers other than state. However, not all comparison states had complete data for the post period. As noted in the Medicaid data section above, states varied in the type of Medicaid files that were available for the years 2013 through 2015. For nine comparison states, TAF files were not being produced for either 2014 or 2015 or both. Instead, MAX-T files were being produced. At the time of our analysis, however, only Alpha-MAX files were available for these states. The following comparison states only had Alpha-MAX files for 2014 and 2015:

2014: Massachusetts, New York, Oklahoma, Texas, Virginia

2015: Louisiana, New Jersey, New York, Pennsylvania, West Virginia

Due to the potential of incomplete data in the Alpha-MAX files and lack of comparability with TAFs, we chose to consider only states that had TAFs for the complete post period. Three comparison states had complete TAF data for the post period: North Carolina, Illinois, and Kansas. However, the restricted benefits code was missing for 93 percent of beneficiaries in Illinois. As such, when we applied our inclusion criteria to select beneficiaries with full benefits into the sample, Illinois dropped out of the analysis completely for 2014 through 2016 and only a small portion of the sample was included in 2017. In addition, there were issues with linking claims files to enrollment files in the Kansas TAFs. Capitation payments also were not included in the Kansas OT file because of missing service dates. When examining the trends in total expenditures and inpatient admissions per 1,000 beneficiaries for Kansas and North Carolina, we noted that there was a discontinuity between the values calculated from MAX data for 2011 through 2012 and the values calculated from the TAFs for 2014 through 2017. As such, we determined that data anomalies in the TAFs were impacting the trends rather than actual changes in outcomes. We therefore concluded that no comparison group state had reliable data that could be compared to Maryland.

APPENDIX G:
HOSPITAL GLOBAL BUDGET TRENDS

List of Tables

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Table G-1
Number of hospitals by percent variation of revenues from budget, all Maryland hospitals and by hospital characteristic, FY 2014, FY 2015, FY 2016, FY 2017, and FY 2018

Hospital characteristic	FY 2014								FY 2015							
	Underage (−)				Overage (+)				Underage (−)				Overage (+)			
	> −2.0%	−1.01% to −2.0%	−0.51% to −1.0%	≤ −0.5%	≤ 0.5%	0.51% to 1.0%	1.01% to 2.0%	> 2.0%	> −2.0%	−1.01% to −2.0%	−0.51% to −1.0%	≤ −0.5%	≤ 0.5%	0.51% to 1.0%	1.01% to 2.0%	> 2.0%
All Maryland hospitals*	**1**	**1**	**1**	**16**	**20**	**5**	**1**	**1**	**2**	**1**	**4**	**17**	**19**	**1**	**0**	**2**
Participated in TPR																
No	1	1	1	12	15	4	1	1	2	0	4	12	16	1	0	1
Yes	0	0	0	4	5	1	0	0	0	1	0	5	3	0	0	1
Number of inpatient beds																
<150	1	1	0	4	5	3	0	0	2	1	1	5	4	0	0	1
150–349	0	0	0	8	13	1	0	1	0	0	1	7	14	0	0	1
350+	0	0	1	4	2	1	1	0	0	0	2	5	1	1	0	0
Teaching status†																
IBR ≤ 5%	1	1	1	10	16	3	0	1	2	1	2	14	13	0	0	1
IBR > 5%	0	0	0	6	4	2	1	0	0	0	2	3	6	1	0	1
DSH percentage†																
<20	1	0	0	4	11	1	0	1	0	1	1	9	7	0	0	0
20–30	0	1	0	9	4	2	0	0	1	0	1	6	7	0	0	1
>30	0	0	1	3	5	2	1	0	1	0	2	2	5	1	0	1
System affiliation																
Affiliated	0	1	1	12	10	3	1	1	1	0	4	9	13	1	0	1
Nonaffiliated	1	0	0	4	10	2	0	0	1	1	0	8	6	0	0	1

(continued)

Table G-1 (continued)
Number of hospitals by percent variation of revenues from budget, all Maryland hospitals and by hospital characteristic, FY 2014, FY 2015, FY 2016, FY 2017, and FY 2018

	FY 2016								FY 2017							
	Underage (−)				Overage (+)				Underage (−)				Overage (+)			
Hospital characteristic	> −2.0%	−1.01% to −2.0%	−0.51% to −1.0%	≤ −0.5%	≤ 0.5%	0.51% to 1.0%	1.01% to 2.0%	> 2.0%	> −2.0%	−1.01% to −2.0%	−0.51% to −1.0%	≤ −0.5%	≤ 0.5%	0.51% to 1.0%	1.01% to 2.0%	> 2.0%
All Maryland hospitals*	**3**	**0**	**1**	**20**	**16**	**4**	**0**	**2**	**0**	**1**	**2**	**20**	**20**	**2**	**1**	**0**
Participated in TPR																
No	3	0	1	15	12	4	0	1	0	1	1	15	17	1	1	0
Yes	0	0	0	5	4	0	0	1	0	0	1	5	3	1	0	0
Number of inpatient beds																
<150	1	0	0	4	6	2	0	1	0	1	2	4	5	2	0	0
150–349	2	0	1	12	7	1	0	0	0	0	0	12	10	0	1	0
350+	0	0	0	4	4	0	0	1	0	0	0	3	6	0	0	0
Teaching status†																
IBR ≤ 5%	1	0	0	6	5	0	0	1	0	0	0	6	6	0	1	0
IBR > 5%	2	0	1	14	11	4	0	1	0	1	2	14	14	2	0	0
DSH percentage†																
<20	0	0	1	9	6	1	0	1	0	1	1	7	8	1	0	0
20–30	0	0	0	9	4	3	0	0	0	0	1	8	7	0	0	0
>30	3	0	0	2	6	0	0	1	0	0	0	5	5	1	1	0
System affiliation																
Affiliated	2	0	1	14	8	3	0	1	0	0	2	11	15	0	1	0
Nonaffiliated	1	0	0	6	8	1	0	1	0	1	0	9	5	2	0	0

(continued)

Table G-1 (continued)
Number of hospitals by percent variation of revenues from budget, all Maryland hospitals and by hospital characteristic, FY 2014, FY 2015, FY 2016, FY 2017, and FY 2018

	FY 2018							
	Underage (−)				Overage (+)			
Hospital characteristic	> −2.0%	−1.01% to −2.0%	−0.51% to −1.0%	≤ −0.5%	≤ 0.5%	0.51% to 1.0%	1.01% to 2.0%	> 2.0%
All Maryland hospitals*	**1**	**2**	**1**	**22**	**17**	**2**	**0**	**1**
Participated in TPR								
No	1	0	1	18	15	1	0	0
Yes	0	2	0	4	2	1	0	1
Number of inpatient beds								
<150	1	2	0	3	6	1	0	1
150–349	0	0	1	15	7	0	0	0
350+	0	0	0	4	4	1	0	0
Teaching status†								-
IBR ≤ 5%	0	0	0	5	7	1	0	0
IBR > 5%	1	2	1	17	10	1	0	1
DSH percentage†								
<20	0	1	0	9	7	0	0	1
20–30	0	1	1	6	7	1	0	0
>30	1	0	0	7	3	1	0	0
System affiliation								
Affiliated	0	1	0	15	12	1	0	0
Nonaffiliated	1	1	1	7	5	1	0	1

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File.

Table G-2
Number of Maryland hospitals with permission to vary rates and with charged rates for selected rate centers outside the 5 percent corridor by quarter, Q3 of FY 2014 through Q4 of FY 2018

	FY 2014		FY 2015					FY 2016					FY 2017					FY 2018				
Hospital service and rate variation	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**
Number of hospitals with permission to vary rates more than 5%	N/A	N/A	2	3	9	21	N/A	16	16	14	14	N/A	9	14	10	12	N/A	14	14	17	20	N/A
Clinic services																						
# of hospitals with 5%–10% rate variation	11	13	8	11	13	11	7	13	12	20	13	14	11	18	12	12	16	13	9	11	15	12
# of hospitals with >10% rate variation	6	13	13	11	7	13	5	8	8	7	9	2	4	9	8	16	7	9	10	7	11	3
Outpatient emergency services																						
# of hospitals with 5%–10% rate variation	9	11	11	7	15	15	8	12	11	15	14	12	8	14	19	14	17	12	12	13	16	13
# of hospitals with >10% rate variation	7	12	6	12	6	13	2	9	8	9	8	2	5	8	7	14	4	7	10	8	9	3
Inpatient medical/ surgical acute services																						
# of hospitals with 5%–10% rate variation	15	13	9	12	14	15	9	14	15	17	8	13	11	15	8	15	15	10	18	15	12	11
# of hospitals with >10% rate variation	13	18	16	10	8	16	3	7	8	12	12	2	11	8	11	19	6	8	8	4	15	4

N/A = not applicable.

NOTES: In fiscal years (FYs), Q1 = July–September, Q2 = October–December, Q3 = January–March, and Q4 = April–June. Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016.

Table G-3
Percentage of Maryland hospitals with charged rates for inpatient medical/surgical acute services outside the 5 percent corridor by hospital characteristic and quarter, Q3 of FY 2014 through Q4 of FY 2018

		FY 2014		FY 2015					FY 2016					FY 2017					FY 2018				
Hospital characteristic	**Variation from rate order**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**	**Q1**	**Q2**	**Q3**	**Q4**	**Aggregate**
All Maryland hospitals*	**5%–10%**	**33**	**28**	**20**	**26**	**30**	**33**	**20**	**30**	**33**	**37**	**17**	**28**	**24**	**33**	**17**	**33**	**33**	**22**	**39**	**33**	**26**	**24**
	>10%	**28**	**39**	**35**	**22**	**17**	**35**	**7**	**15**	**17**	**26**	**26**	**4**	**24**	**17**	**24**	**41**	**13**	**17**	**17**	**9**	**33**	**9**
Participated in TPR																							
No	5%–10%	28	22	19	22	31	36	17	33	28	39	19	31	25	31	19	36	33	19	42	31	28	22
	>10%	25	36	33	17	17	33	8	14	22	25	28	3	28	17	19	44	14	17	14	8	28	8
Yes	5-10%	50	50	20	40	30	20	30	20	50	30	10	20	20	40	10	20	30	30	30	40	20	30
	>10%	40	50	40	40	20	40	0	20	0	30	10	10	10	20	40	30	10	20	30	10	50	10
Number of inpatient beds																							
<150	5%–10%	14	29	29	29	29	29	29	21	29	36	21	21	7	43	14	36	29	36	43	43	0	36
	>10%	50	64	36	36	21	43	14	29	21	36	29	14	21	21	43	43	14	14	36	14	64	14
150–349	5%–10%	48	26	22	22	30	35	17	35	39	35	9	39	26	26	22	26	39	13	39	35	43	17
	>10%	17	30	26	17	22	30	4	13	17	26	30	0	26	17	17	48	13	17	9	4	17	9
350+	5%–10%	22	33	0	33	33	33	11	33	22	44	33	11	44	33	33	44	22	22	33	11	22	22
	>10%	22	22	56	11	0	33	0	0	11	11	11	0	22	11	11	22	11	22	11	11	22	0
Teaching status†																							
IBR > 5%	5%–10%	46	38	15	15	38	46	15	54	23	46	23	31	31	31	38	31	46	15	62	38	38	31
	>10%	23	23	54	23	8	31	8	8	15	23	31	0	38	31	15	54	23	31	8	8	23	8
IBR ≤ 5%	5%–10%	30	27	24	30	27	30	15	21	36	33	15	27	21	33	9	33	27	24	30	30	21	21
	>10%	30	42	27	21	18	36	6	18	18	27	24	6	18	12	27	36	9	12	21	9	36	9

(continued)

Table G-3 (continued)
Percentage of Maryland hospitals with charged rates for inpatient medical/surgical acute services outside the 5 percent corridor by hospital characteristic and quarter, Q3 of FY 2014 through Q4 of FY 2018

Hospital characteristic	Variation from rate order	FY 2014 Q3	FY 2014 Q4	FY 2015 Q1	FY 2015 Q2	FY 2015 Q3	FY 2015 Q4	FY 2015 Aggregate	FY 2016 Q1	FY 2016 Q2	FY 2016 Q3	FY 2016 Q4	FY 2016 Aggregate	FY 2017 Q1	FY 2017 Q2	FY 2017 Q3	FY 2017 Q4	FY 2017 Aggregate	FY 2018 Q1	FY 2018 Q2	FY 2018 Q3	FY 2018 Q4	FY 2018 Aggregate
DSH percentage†																							
<20	5%–10%	28	6	17	22	33	28	33	33	22	28	11	28	28	22	17	50	33	17	39	28	17	17
	>10%	33	56	33	28	28	39	6	22	22	33	17	6	22	6	33	39	11	6	22	6	39	6
20–30	5%–10%	56	44	31	38	38	38	6	13	44	50	25	19	19	56	19	6	31	25	31	44	25	38
	>10%	19	25	38	13	0	25	6	6	6	13	25	6	19	19	13	50	13	25	19	6	31	6
>30	5%–10%	17	33	17	17	17	33	17	50	33	33	17	42	25	17	17	42	33	25	50	25	42	17
	>10%	33	33	33	25	25	42	8	8	25	33	42	0	33	33	25	33	17	25	8	17	25	17
System affiliation																							
Affiliated	5%–10%	31	24	17	38	28	41	21	34	28	38	21	31	31	31	10	38	28	24	41	31	28	31
	>10%	21	38	28	14	17	31	7	17	21	28	28	3	31	17	17	41	17	21	21	10	31	7
Nonaffiliated	5%–10%	35	35	24	6	35	18	18	24	41	35	12	24	12	35	29	24	41	18	35	35	24	12
	>10%	41	41	47	35	18	41	6	12	12	24	24	6	12	18	35	41	6	12	12	6	35	12

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital. In fiscal years, Q1 = July–September, Q2 = October–December, Q3 = January–March, and Q4 = April–June.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File.

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Table H-1
Total revenue, all Maryland hospitals and by hospital characteristic, FY 2012–FY 2018

Hospital characteristic	FY 2012 ($)	FY 2013 ($)	FY 2014 ($)	FY 2015 ($)	FY 2016 ($)	FY 2017 ($)	FY 2018 ($)
All Maryland hospitals*	**16,194,941,089**	**16,599,051,613**	**17,107,999,049**	**17,400,225,886**	**17,750,612,956**	**18,144,540,275**	**18,796,289,002**
Participated in TPR							
No	14,397,564,188	14,776,212,587	15,262,315,985	15,515,807,969	15,831,688,242	16,208,758,707	16,765,286,041
Yes	1,797,376,901	1,822,839,026	1,845,683,064	1,884,417,917	1,918,924,714	1,935,781,568	2,031,002,961
Number of inpatient beds							
<150	1,544,302,751	1,561,870,807	1,593,423,751	1,621,695,949	1,659,885,902	1,700,318,605	1,752,801,375
150–349	7,705,930,494	7,680,527,942	7,907,338,258	8,075,066,782	8,176,090,881	8,305,811,432	8,503,980,190
350+	6,944,707,844	7,356,652,864	7,607,237,040	7,703,463,156	7,914,636,173	8,138,410,238	8,539,507,437
Teaching status†							
IBR > 5%	8,315,087,545	8,742,909,659	9,029,129,486	9,130,005,541	9,286,163,515	9,492,583,206	9,769,444,519
IBR ≤ 5%	7,879,853,544	7,856,141,954	8,078,869,563	8,270,220,345	8,464,449,441	8,651,957,069	9,026,844,483
DSH percentage†							
<20	4,798,506,802	4,739,125,596	4,907,600,089	5,041,883,160	5,168,084,862	5,314,957,526	5,564,531,868
20–30	4,689,237,688	4,744,884,770	4,889,293,769	4,927,853,678	4,974,529,447	5,022,998,315	5,172,319,740
>30	6,707,196,599	7,115,041,248	7,311,105,191	7,430,489,048	7,607,998,648	7,806,584,434	8,059,437,394
System affiliation							
Affiliated	11,271,386,901	11,611,439,237	12,058,917,186	12,255,736,841	12,450,644,688	12,687,678,317	13,004,353,965
Nonaffiliated	4,923,554,188	4,987,612,376	5,049,081,863	5,144,489,045	5,299,968,268	5,456,861,958	5,791,935,037

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File. Includes regulated and unregulated services.

Table H-2
Gross inpatient revenue, all Maryland hospitals and by hospital characteristic, FY 2012–FY 2018

Hospital characteristic	FY 2012 ($)	FY 2013 ($)	FY 2014 ($)	FY 2015 ($)	FY 2016 ($)	FY 2017 ($)	FY 2018 ($)
All Maryland hospitals*	**9,597,246,933**	**9,387,513,675**	**9,718,459,334**	**9,324,320,896**	**9,336,278,899**	**9,495,524,948**	**9,937,078,148**
Participated in TPR							
No	8,762,891,648	8,543,217,701	8,874,869,018	8,485,619,206	8,514,563,520	8,659,932,248	9,091,510,891
Yes	834,355,286	844,295,974	843,590,316	838,701,690	821,715,379	835,592,700	845,567,257
Number of inpatient beds							
<150	747,028,053	719,314,915	706,270,869	689,569,097	682,022,168	684,976,837	699,270,110
150–349	4,431,528,019	4,166,414,805	4,165,547,145	4,127,160,543	4,083,530,370	4,195,203,282	4,474,057,264
350+	4,418,690,862	4,501,783,955	4,846,641,320	4,507,591,256	4,570,726,361	4,615,344,829	4,763,750,774
Teaching status†							
IBR > 5%	5,189,635,842	5,171,160,990	5,484,242,137	5,057,149,667	5,032,432,209	5,127,337,689	5,437,716,296
IBR ≤ 5%	4,407,611,092	4,216,352,685	4,234,217,198	4,267,171,229	4,303,846,689	4,368,187,258	4,499,361,852
DSH percentage†							
<20	2,666,752,863	2,499,886,338	2,577,593,944	2,615,190,886	2,618,874,284	2,688,898,763	2,751,143,128
20–30	2,661,476,061	2,555,412,466	2,561,686,222	2,330,266,594	2,300,169,354	2,320,146,102	2,529,046,874
<150	4,269,018,009	4,332,214,871	4,579,179,168	4,378,863,415	4,417,235,261	4,486,480,083	4,656,888,146
System affiliation							
Affiliated	7,073,840,488	6,974,831,286	7,332,008,961	6,972,283,364	6,959,670,464	7,032,575,912	7,277,655,645
Nonaffiliated	2,523,406,446	2,412,682,389	2,386,450,374	2,352,037,531	2,376,608,435	2,462,949,035	2,659,422,503

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File. Includes regulated and unregulated services.

Table H-3
Gross outpatient revenue, all Maryland hospitals and by hospital characteristic, FY 2012–FY 2018

Hospital characteristic	FY 2012 ($)	FY 2013 ($)	FY 2014 ($)	FY 2015 ($)	FY 2016 ($)	FY 2017 ($)	FY 2018 ($)
All Maryland hospitals*	6,597,694,156	7,211,537,939	7,389,539,715	8,075,904,991	8,414,334,057	8,649,015,327	8,859,210,854
Participated in TPR							
No	5,634,672,541	6,232,994,887	6,387,446,966	7,030,188,764	7,317,124,722	7,548,826,459	7,673,775,150
Yes	963,021,615	978,543,052	1,002,092,749	1,045,716,227	1,097,209,335	1,100,188,868	1,185,435,704
Number of inpatient beds							
<150	797,274,698	842,555,892	887,152,882	932,126,852	977,863,733	1,015,341,768	1,053,531,266
150–349	3,274,402,475	3,514,113,137	3,741,791,113	3,947,906,239	4,092,560,512	4,110,608,150	4,029,922,925
350+	2,526,016,982	2,854,868,909	2,760,595,720	3,195,871,900	3,343,909,812	3,523,065,410	3,775,756,663
Teaching status†							
IBR > 5%	3,125,451,703	3,571,748,669	3,544,887,350	4,072,855,875	4,253,731,306	4,365,245,517	4,331,728,222
IBR ≤ 5%	3,472,242,452	3,639,789,269	3,844,652,365	4,003,049,116	4,160,602,751	4,283,769,811	4,527,482,632
DSH percentage†							
<20	2,131,753,939	2,239,239,258	2,330,006,145	2,426,692,274	2,549,210,578	2,626,058,763	2,813,388,740
20–30	2,027,761,627	2,189,472,304	2,327,607,547	2,597,587,084	2,674,360,093	2,702,852,214	2,643,272,866
<150	2,438,178,590	2,782,826,377	2,731,926,023	3,051,625,633	3,190,763,386	3,320,104,351	3,402,549,248
System affiliation							
Affiliated	4,197,546,413	4,636,607,951	4,726,908,225	5,283,453,477	5,490,974,224	5,655,102,404	5,726,698,320
Nonaffiliated	2,400,147,743	2,574,929,988	2,662,631,490	2,792,451,514	2,923,359,833	2,993,912,923	3,132,512,534

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File. Includes regulated and unregulated services.

Table H-4
Total operating expenses, all Maryland hospitals and by hospital characteristic, FY 2012–FY 2018

Hospital characteristic	FY 2012 ($)	FY 2013 ($)	FY 2014 ($)	FY 2015 ($)	FY 2016 ($)	FY 2017 ($)	FY 2018 ($)
All Maryland hospitals*	**13,036,797,022**	**13,501,704,149**	**13,640,481,096**	**14,149,621,330**	**14,707,395,927**	**15,203,347,555**	**15,621,588,079**
Participated in TPR							
No	11,660,948,838	12,132,868,824	12,268,708,241	12,740,708,810	13,254,004,923	13,716,212,809	14,081,353,100
Yes	1,375,848,184	1,368,835,324	1,371,772,856	1,408,912,520	1,453,391,004	1,487,134,746	1,540,234,980
Number of inpatient beds							
<150	1,202,482,852	1,229,792,195	1,239,674,178	1,265,317,196	1,298,329,204	1,349,229,130	1,366,189,122
150–349	5,995,831,010	6,032,348,168	6,095,329,748	6,283,495,875	6,499,943,299	6,682,994,760	6,780,141,714
350+	5,838,483,160	6,239,563,785	6,305,477,170	6,600,808,260	6,909,123,423	7,171,123,665	7,475,257,243
Teaching status†							
IBR > 5%	6,799,234,818	7,203,718,433	7,263,188,155	7,614,136,340	7,969,408,055	8,212,178,308	8,512,432,405
IBR ≤ 5%	6,237,562,204	6,297,985,716	6,377,292,941	6,535,484,990	6,737,987,871	6,991,169,246	7,109,155,674
DSH percentage†							
<20	3,867,360,569	3,885,912,112	3,937,865,699	4,053,197,352	4,179,714,990	4,355,347,786	4,474,681,875
20–30	3,468,410,009	3,511,718,778	3,555,435,924	3,681,176,724	3,784,632,498	3,858,563,391	3,922,638,297
<150	5,701,026,444	6,104,073,259	6,147,179,473	6,415,247,254	6,743,048,438	6,989,436,378	7,224,267,907
System affiliation							
Affiliated	9,140,055,745	9,559,520,025	9,690,650,253	10,079,890,660	10,489,302,330	10,858,181,424	11,086,438,492
Nonaffiliated	3,896,741,277	3,942,184,123	3,949,830,843	4,069,730,670	4,218,093,597	4,345,166,131	4,535,149,587

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File. Includes regulated and unregulated services.

Table H-5
Operating margin percentages, all Maryland hospitals and by hospital characteristic, FY 2012–FY 2018

Hospital characteristic	FY 2012 ($)	FY 2013 ($)	FY 2014 ($)	FY 2015 ($)	FY 2016 ($)	FY 2017 ($)	FY 2018 ($)
All Maryland hospitals*	**2.5**	**1.2**	**2.8**	**3.7**	**3.3**	**2.7**	**3.4**
Participated in TPR							
No	2.5	0.7	2.5	3.4	3.2	2.5	3.2
Yes	2.5	5.0	5.8	6.5	5.1	5.1	4.5
Number of inpatient beds							
<150	0.0	-3.0	2.5	3.5	3.9	1.5	3.3
150–349	1.6	0.4	2.3	4.2	3.8	3.7	4.5
350+	3.3	1.7	2.9	3.0	2.8	2.0	2.3
Teaching status†							
IBR > 5%	2.3	0.9	2.5	2.4	1.9	1.7	1.8
IBR ≤ 5%	2.6	1.4	3.0	5.1	5.0	3.9	5.2
DSH percentage†							
<20	2.0	0.8	2.8	5.1	5.0	3.9	4.4
20–30	3.2	2.5	4.4	4.4	3.6	3.8	4.5
<150	2.4	0.8	1.9	2.5	2.2	1.4	2.1
System affiliation							
Affiliated	2.7	0.8	2.5	3.4	3.5	2.6	3.6
Nonaffiliated	2.0	1.9	3.1	4.3	3.0	3.1	2.7

IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because the hospital did not have a global budget until FY 2016. † IBR and DSH percentages were based on data from the 2014 Inpatient Prospective Payment System (IPPS) Impact File. Data for the University of Maryland Medical Center at Dorchester are reported under the University of Maryland Shore Medical Center at Easton in the IPPS Impact File. Therefore, teaching status and DSH percentage for these hospitals were based on their combined information in the IPPS Impact File. Includes regulated and unregulated services.

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MEDICARE AND COMMERCIAL INSURANCE CLAIMS ANALYSIS
ANNUAL RESULTS

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Unadjusted average total PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018

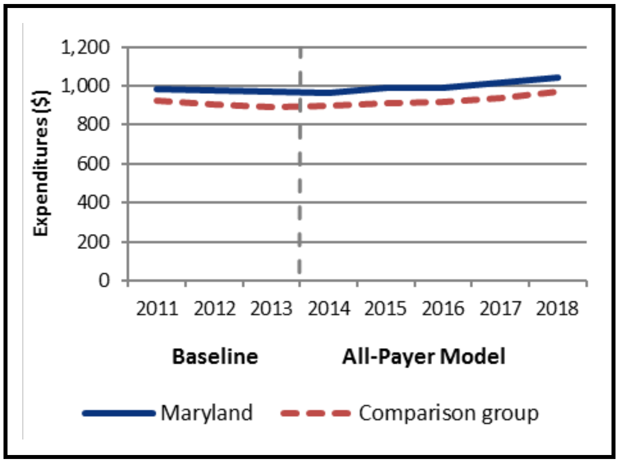
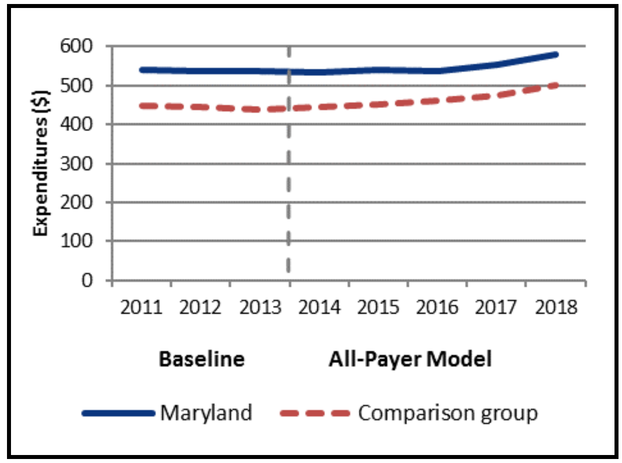


Figure I-2
Unadjusted average total hospital PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018



PBPM = per beneficiary per month.

- For Medicare beneficiaries, average total per beneficiary per month (PBPM) expenditures were similar and remained fairly constant from the baseline period through 2014 for Maryland and the comparison group (***Figure I-1***). Total PBPM expenditures increased slightly from 2015 to 2018 for both Maryland and the comparison group. Maryland consistently had slightly higher total PBPM expenditures than the comparison group throughout the baseline and All-Payer Model periods.

- Average total hospital PBPM expenditures were consistently higher in Maryland than in the comparison group (***Figure I-2***). Total hospital expenditures remained fairly constant for Maryland over the baseline period, then increased in 2015, and decreased in 2016 before increasing again in 2017 and 2018 during the All-Payer Model period. For the comparison group, total hospital expenditures remained fairly constant during the baseline period and then increased steadily during the All-Payer Model period.

Table I-1
Difference in the pre-post change in total expenditures and total hospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
Total PBPM ($)							
Year 1	942.78	885.28	932.03	893.76	−19.24 (−28.90, −9.59)	−2.0	0.001
Year 2	942.78	885.28	928.41	888.25	−17.35 (−33.42, −1.29)	−1.8	0.08
Year 3	942.78	885.28	979.03	954.54	−33.02 (−58.74, −7.30)	−3.5	0.03
Year 4	942.78	885.28	992.97	963.81	−28.34 (−60.38, 3.70)	−3.0	0.15
Year 5	942.78	885.28	1,044.19	1,024.77	−38.08 (−81.41, 5.25)	−4.0	0.15
Overall	942.78	885.28	968.18	936.45	−26.10 (−37.34, −14.85)	−2.8	<0.001
Total hospital PBPM ($)*							
Year 1	522.60	431.99	521.72	443.04	−11.94 (−18.88, −4.99)	−2.3	0.005
Year 2	522.60	431.99	515.99	439.64	−14.26 (−27.22, −1.30)	−2.7	0.07
Year 3	522.60	431.99	544.81	483.17	−28.97 (−48.30, −9.64)	−5.5	0.01
Year 4	522.60	431.99	556.66	491.82	−25.77 (−49.88, −1.66)	−4.9	0.08
Year 5	522.60	431.99	598.95	537.24	−28.91 (−61.65, 3.83)	−5.5	0.15
Overall	522.60	431.99	542.23	472.70	−21.31 (−29.83, −12.79)	−4.1	<0.001

(continued)

Table I-1 (continued)
Difference in the pre-post change in total expenditures and total hospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; PBPM=per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 10,281,981.

[*] Total hospital expenditures PBPM includes payments for inpatient facility services, emergency department visits, observation stays, and other hospital outpatient department services.

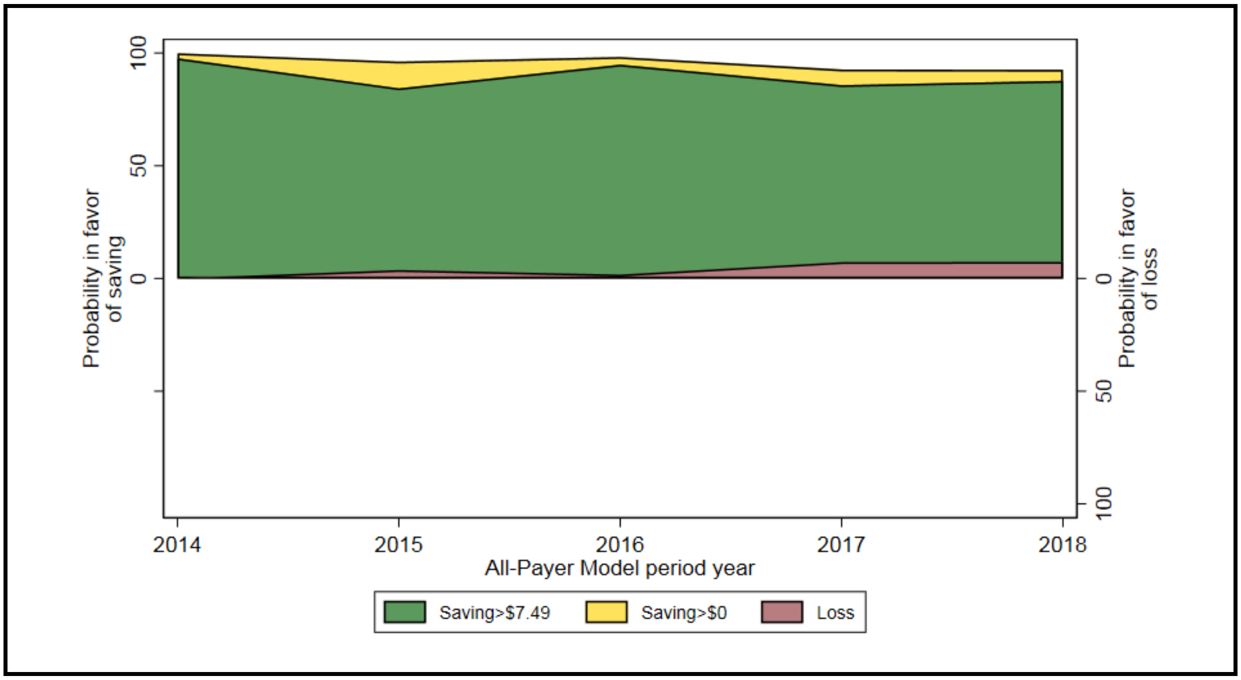
SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

To assist policymakers in understanding the future prospect of successful results for the Maryland All-Payer Model, we converted the D-in-D results into probabilities of any savings and probabilities that savings would exceed $7.49 PBPM, which is the amount required for Maryland to save Medicare $330 million over the 5 years of the model.[39] The Maryland All-Payer Model showed a high probability of both any savings on total expenditures and saving more than $7.49 PBPM in each year (***Figure I-3***). However, there was a low probability of loss that increased slightly in the fourth and fifth years of the All-Payer Model period. Similarly, the probability of both any hospital savings and hospital savings exceeding $7.49 PBPM was very high in each of the 5 years of the All-Payer Model, although the very low probability of loss increased slightly in the fifth year (***Figure I-4***). The results of these analyses indicate a nearly 100 percent chance that Maryland would have sufficient savings for both total cost of care and hospital spending to meet the term of their agreement with CMS that requires saving Medicare $330 million over the 5 years of the All-Payer Model.

Because annual estimates may be volatile, we also provide cumulative spending estimates. The cumulative effects on total spending and total hospital spending declined significantly in Maryland with each passing year of the All-Payer Model (***Figure I-5*** and ***Figure I-6*). The Maryland All-Payer Model showed a nearly 100 percent probability of any savings on total expenditures and hospital expenditures, and the probability of saving more than $7.49 PBPM in total and hospital expenditures was also nearly 100 percent (***Figure I-7*** and ***Figure I-8***).

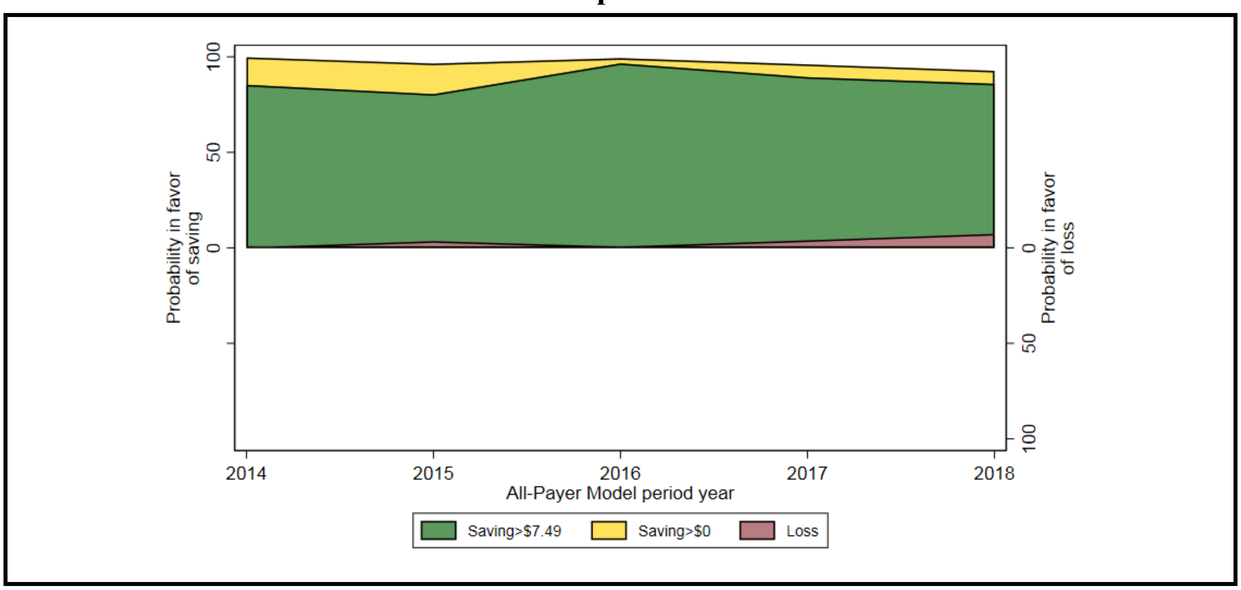
[39] We calculated the PBPM savings necessary to reach $330 million over 5 years by dividing $330 million by 44,049,392 (12 months * 5 years * 734,157), where 734,157 is the average weighted number of Medicare beneficiaries per month over the first 4.5 years of the All-Payer Model.

Figure I-3
Annual strength of evidence in favor of savings or losses on total PBPM expenditures for Medicare beneficiaries in Maryland, first 4.5 years of Maryland All-Payer Model implementation



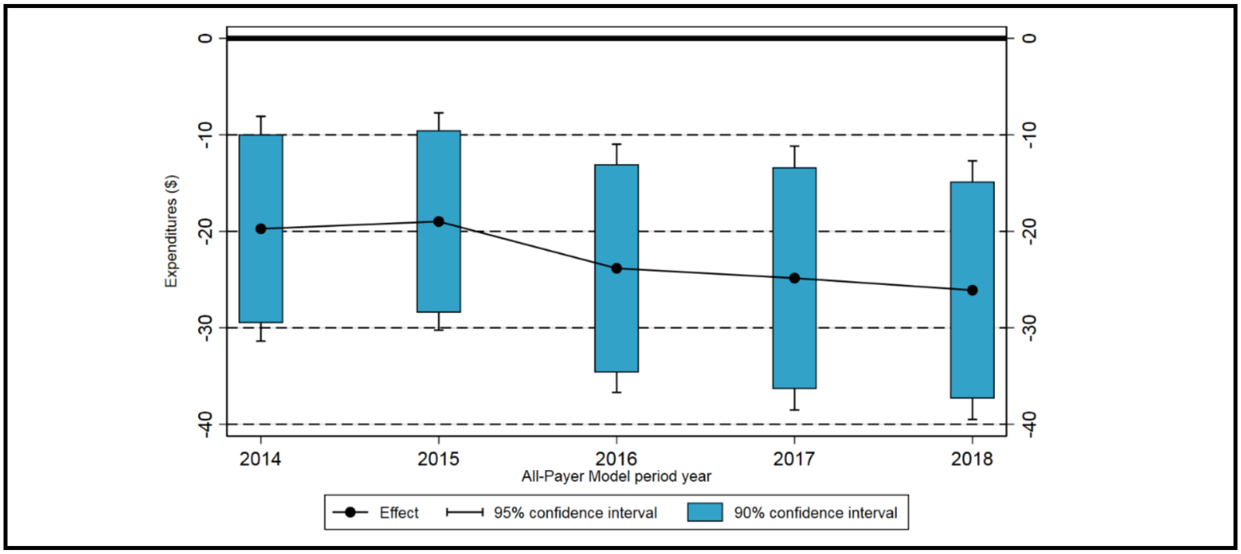
PBPM = per beneficiary per month.

Figure I-4
Annual strength of evidence in favor of savings or losses on total hospital PBPM expenditures for Medicare beneficiaries in Maryland, first 4.5 years of Maryland All-Payer Model implementation



PBPM = per beneficiary per month.

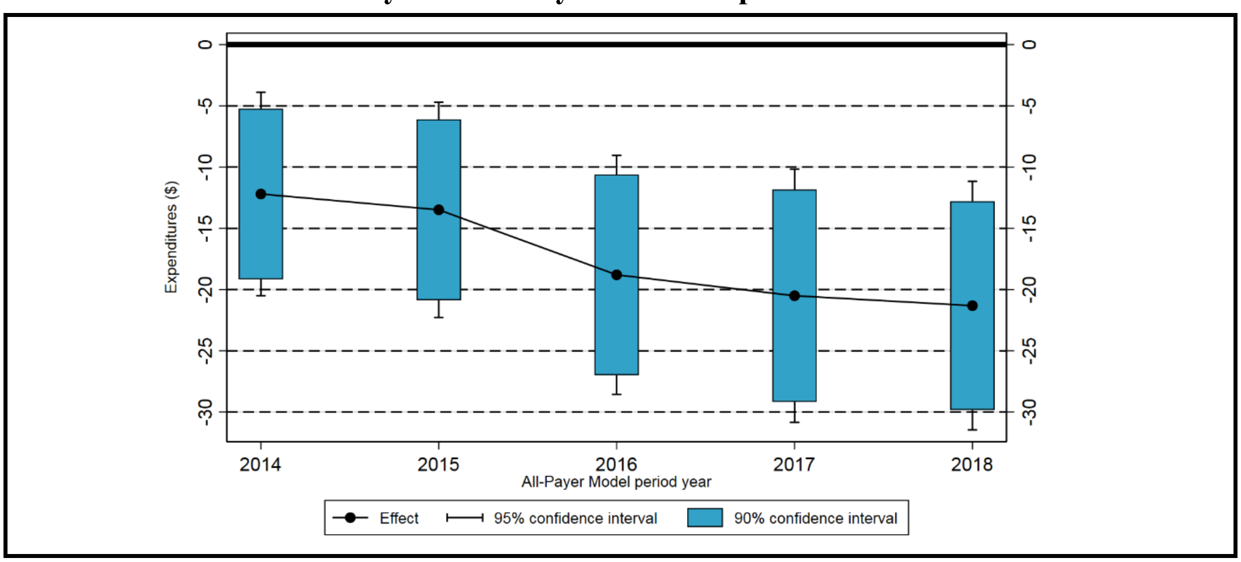
Figure I-5
Cumulative difference in the adjusted pre-post change in total PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation



PBPM = per beneficiary per month.

NOTES: Bars indicate 90% confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects.

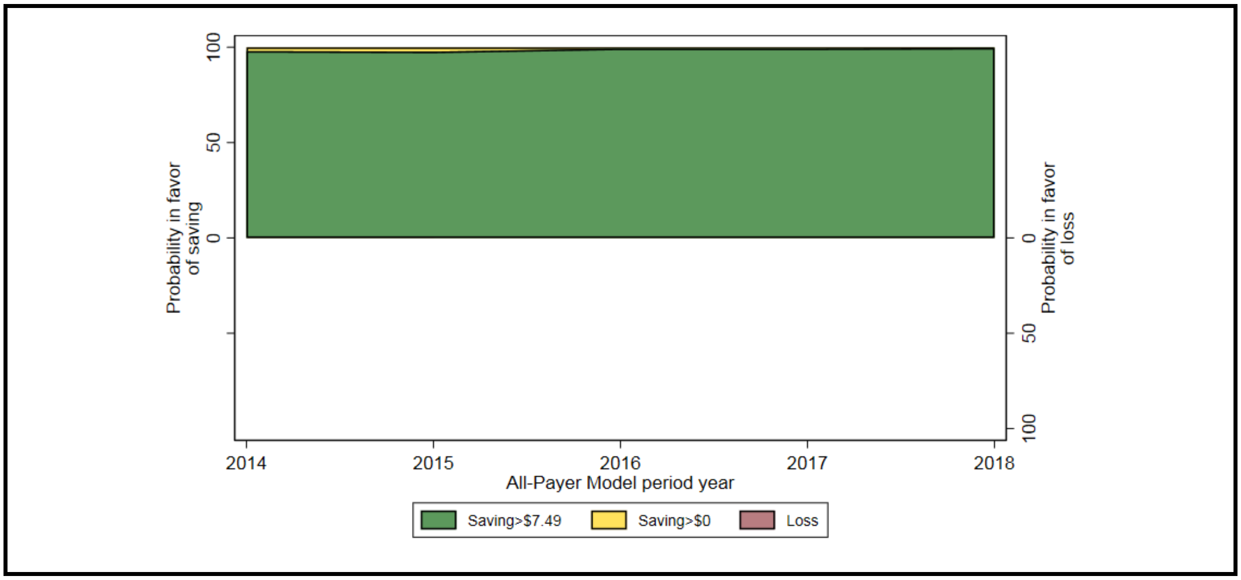
Figure I-6
Cumulative difference in the adjusted pre-post change in total hospital PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation



PBPM = per beneficiary per month.

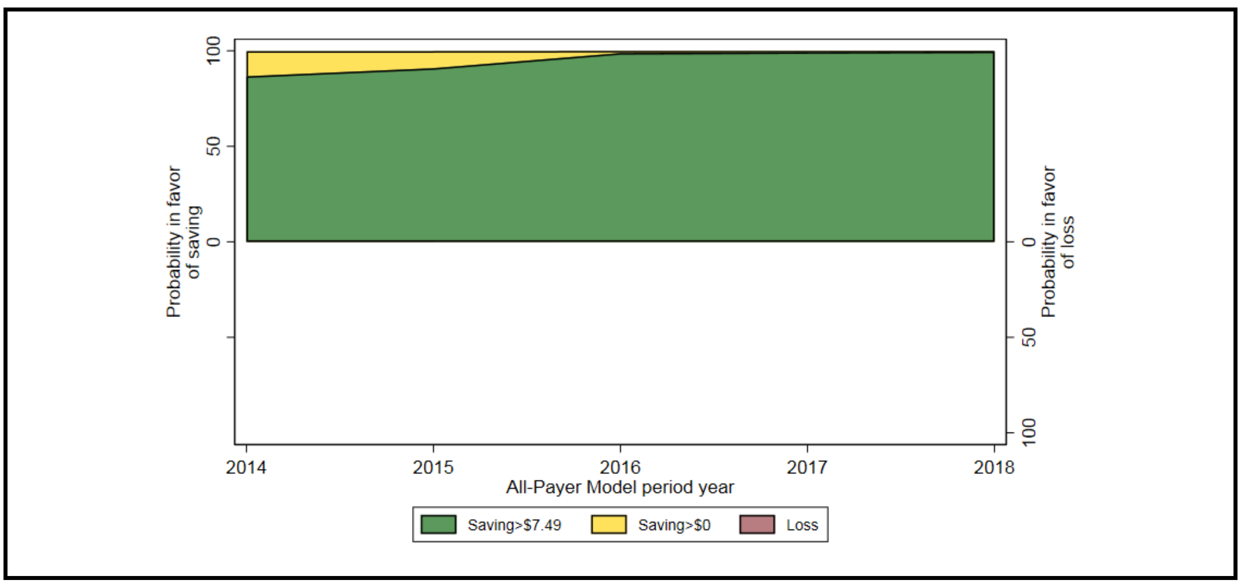
NOTES: Bars indicate 90% confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects

Figure I-7
Cumulative strength of evidence in favor of savings or losses on total PBPM expenditures for Medicare beneficiaries in Maryland, first 4.5 years of Maryland All-Payer Model implementation



PBPM = per beneficiary per month.

Figure I-8
Cumulative strength of evidence in favor of savings or losses on total hospital PBPM expenditures for Medicare beneficiaries in Maryland, first 4.5 years of Maryland All-Payer Model implementation



PBPM = per beneficiary per month.

Figure I-9
Unadjusted average total PMPM expenditures for commercial plan members in Maryland and the comparison group, 2011 through 2017

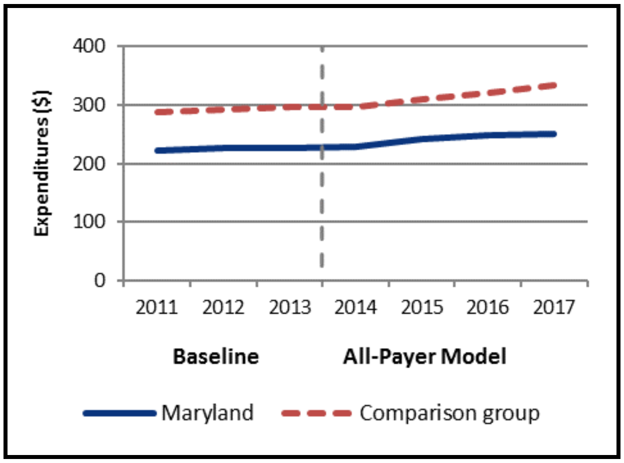
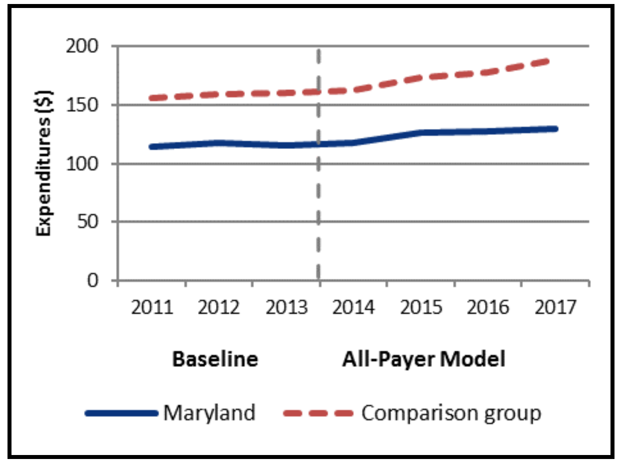


Figure I-10
Unadjusted average total hospital PMPM expenditures for commercial plan members in Maryland and the comparison group, 2011 through 2017



PMPM = per member per month.

- For commercial plan members, average total per member per month (PMPM) and total hospital PMPM expenditures remained fairly constant during the baseline period for Maryland and the comparison group (***Figure I-9*** and ***Figure I-10***). Total and total hospital expenditures increased steadily during the All-Payer Model period for the comparison group but remained fairly constant in Maryland after an increase in 2015. Maryland consistently had lower total PMPM and total hospital PMPM expenditures than the comparison group throughout the baseline and All-Payer Model periods.

Table I-2
Difference in the pre-post change in total expenditures and total hospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total PMPM ($)							
Year 1	221.16	289.98	231.19	300.39	−0.42 (−8.38, 7.53)	−0.2	0.93
Year 2	221.16	289.98	242.75	311.67	−0.15 (−10.43, 10.13)	−0.1	0.98
Year 3	221.16	289.98	247.81	321.87	−5.28 (−14.82, 4.25)	−2.4	0.36
Year 4	221.16	289.98	253.75	337.46	−14.95 (−26.30, −3.59)	−6.8	0.03
Overall	221.16	289.98	242.76	316.19	−4.65 (−9.46, 0.16)	−2.1	0.11
Total hospital PMPM ($)*							
Year 1	113.59	156.59	119.55	164.68	−2.16 (−8.31, 4.00)	−1.9	0.56
Year 2	113.59	156.59	127.30	174.07	−3.81 (−11.70, 4.09)	−3.4	0.43
Year 3	113.59	156.59	127.75	178.13	−7.41 (−14.45, −0.37)	−6.5	0.08
Year 4	113.59	156.59	132.10	191.73	−16.66 (−26.46, −6.86)	−14.7	0.01
Overall	113.59	156.59	126.05	175.95	−6.93 (−10.73, −3.14)	−6.1	0.003

(continued)

Table I-2 (continued)
Difference in the pre-post change in total expenditures and total hospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; PMPM=per member per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age category, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial insurance plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PMPM models is 3,824,639.

[*] Total hospital PMPM includes payments for inpatient facility services, emergency department visits, observation stays, and other hospital outpatient department services.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Figure I-11
Unadjusted all-cause acute inpatient admissions per 1,000 Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018

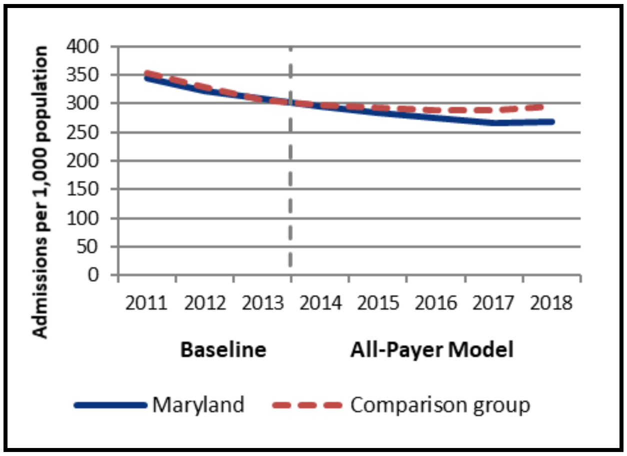
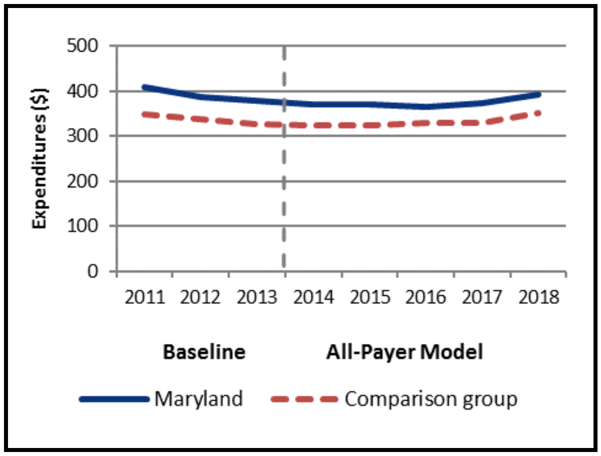


Figure I-12
Unadjusted average inpatient facility PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018



PBPM = per beneficiary per month.

- The rate of acute inpatient admissions for Medicare beneficiaries was similar in Maryland and the comparison group throughout the baseline and implementation periods. The rate decreased during the baseline period and continued to decrease during the implementation period, but it decreased more slowly for the comparison group than Maryland (***Figure I-11***).

- Average inpatient facility PBPM expenditures were consistently higher in Maryland than in the comparison group (***Figure I-12***). Average inpatient facility PBPM expenditures declined slightly for both groups throughout the baseline period and then leveled out during the implementation period before increasing slightly in 2017 and 2018. The increase in Maryland in 2017 may be due in part to the large rate increases in the first two quarters of 2017 to compensate for the lower than expected volume in the first half of FY 2017. The data point for 2018 only includes 6 months of data, so the increase may reflect seasonal fluctuations if there are systematic differences in the types or number of admissions at different times of the year, e.g., due to the flu season in the first few months of the year.

Table I-3
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
All-cause acute inpatient admissions per 1,000 population							
Year 1	322.0	328.7	288.4	300.1	−5.8 (−11.6, −0.1)	−1.8	0.10
Year 2	322.0	328.7	268.7	290.3	−17.0 (−25.9, −8.1)	−5.3	0.002
Year 3	322.0	328.7	268.7	296.4	−22.0 (−33.5, −10.5)	−6.8	0.002
Year 4	322.0	328.7	252.9	294.1	−36.8 (−52.2, −21.4)	−11.4	<0.001
Year 5	322.0	328.7	267.1	316.2	−43.6 (−62.0, −25.3)	−13.6	<0.001
Overall	322.0	328.7	269.2	297.6	−23.2 (−28.5, −17.8)	−7.2	<0.001
Acute inpatient LOS							
Year 1	6.5	6.2	6.6	6.2	0.09 (−0.03, 0.2)	1.3	0.21
Year 2	6.5	6.2	6.6	6.2	0.1 (−0.1, 0.2)	1.2	0.35
Year 3	6.5	6.2	6.6	6.2	0.1 (−0.1, 0.3)	1.4	0.43
Year 4	6.5	6.2	6.5	6.2	0.01 (−0.3, 0.3)	0.2	0.95
Year 5	6.5	6.2	6.6	6.3	0.01 (−0.3, 0.4)	0.2	0.96
Overall	6.5	6.2	6.6	6.2	0.1 (−0.03, 0.2)	0.9	0.26

(continued)

Table I-3 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
Inpatient facility PBPM ($)							
Year 1	392.85	328.40	386.76	323.27	−0.96 (−7.54, 5.63)	−0.2	0.81
Year 2	392.85	328.40	383.11	315.00	3.66 (−8.10, 15.42)	0.9	0.61
Year 3	392.85	328.40	408.37	345.35	−1.42 (−19.27, 16.42)	−0.4	0.90
Year 4	392.85	328.40	418.45	344.55	9.45 (−14.49, 33.39)	2.4	0.52
Year 5	392.85	328.40	459.09	377.98	16.66 (−17.85, 51.16)	4.2	0.43
Overall	392.85	328.40	406.11	337.26	4.30 (−4.02, 12.61)	1.1	0.40
Payment per inpatient admission ($)							
Year 1	14,303.17	11,066.45	15,202.91	11,642.43	323.76 (30.93, 616.59)	2.3	0.07
Year 2	14,303.17	11,066.45	15,846.91	11,799.44	810.76 (400.75, 1,220.76)	5.7	0.001
Year 3	14,303.17	11,066.45	16,292.55	12,341.14	714.69 (70.33, 1,359.04)	5.0	0.07
Year 4	14,303.17	11,066.45	17,335.47	12,542.08	1,556.67 (794.23, 2,319.11)	10.9	<0.001
Year 5	14,303.17	11,066.45	18,279.30	13,052.68	1,989.90 (1,152.52, 2,827.28)	13.9	<0.001
Overall	14,303.17	11,066.45	16,384.22	12,180.16	967.49 (705.46, 1,229.52)	6.8	<0.001

(continued)

Table I-3 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; LOS=length of stay; PBPM=per beneficiary per month.

Methods: A negative binomial regression model was used to obtain estimates of the differences in the number of acute inpatient admissions and the number of days in LOS. Number of admissions estimates were multiplied by 1,000 to obtain a rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the inpatient admission rate and PBPM models is 10,281,981. The total weighted N for the acute inpatient LOS and payment per admission models is 3,143,370.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Figure I-13
Unadjusted all-cause acute inpatient admissions per 1,000 commercial plan members in Maryland and the comparison group, 2011 through 2017

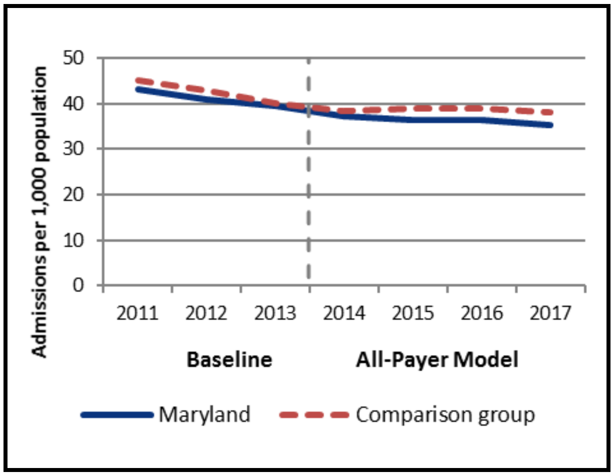
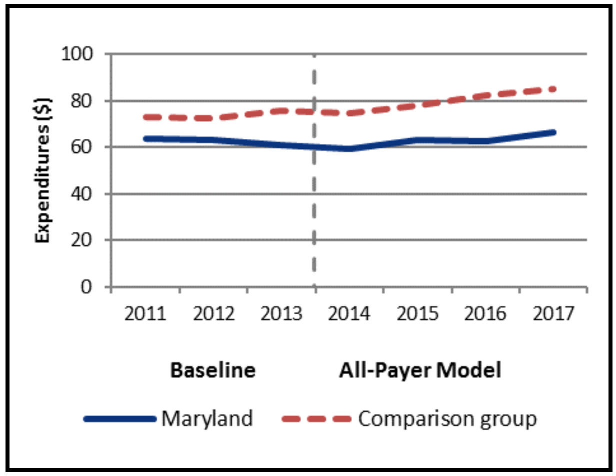


Figure I-14
Unadjusted average inpatient facility PMPM expenditures for commercial plan members in Maryland and the comparison group, 2011 through 2017



PMPM = per member per month.

- The rate of acute inpatient admissions for commercial plan members declined during the baseline period and the implementation period for both Maryland and the comparison group. The rate was consistently lower in Maryland than the comparison group (***Figure I-13***).

- Average inpatient facility PMPM expenditures were consistently lower in Maryland than in the comparison group (***Figure I-14***). Throughout the baseline and implementation period, average inpatient facility PMPM expenditures remained relatively flat for Maryland, although there was a slight upward trend during the All-Payer Model period. Comparison group inpatient facility PMPM expenditures increased throughout both periods.

Table I-4
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
All-cause acute inpatient admissions per 1,000 population							
Year 1	40.45	42.13	37.71	38.75	0.5 (−0.5, 1.4)	1.2	0.40
Year 2	40.45	42.13	36.62	39.31	−1.1 (−2.6, 0.4)	−2.8	0.21
Year 3	40.45	42.13	37.13	39.59	−0.9 (−2.3, 0.6)	−2.2	0.32
Year 4	40.45	42.13	35.91	38.79	−1.3 (−2.7, 0.1)	−3.2	0.13
Overall	40.45	42.13	36.92	39.09	−0.6 (−1.3, 0.05)	−1.5	0.13
Acute inpatient LOS							
Year 1	5.0	5.3	5.1	5.4	−0.05 (−0.2, 0.1)	−1.0	0.63
Year 2	5.0	5.3	5.2	5.4	0.05 (−0.2, 0.2)	0.9	0.71
Year 3	5.0	5.3	5.2	5.5	0.03 (−0.1, 0.2)	0.5	0.79
Year 4	5.0	5.3	5.4	5.5	0.2 (0.03, 0.3)	3.3	0.05
Overall	5.0	5.3	5.2	5.5	0.03 (−0.1, 0.1)	0.7	0.51

(continued)

Table I-4 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
Inpatient facility PMPM ($)							
Year 1	61.80	73.03	60.42	75.66	−4.02 (−8.11, 0.08)	−6.5	0.11
Year 2	61.80	73.03	63.42	78.63	−3.98 (−9.26, 1.30)	−6.4	0.22
Year 3	61.80	73.03	63.01	82.39	−8.16 (−14.17, −2.15)	−13.2	0.03
Year 4	61.80	73.03	67.53	86.23	−7.47 (−14.46, −0.49)	−12.1	0.08
Overall	61.80	73.03	63.28	80.25	−5.74 (−8.48, −3.00)	−9.3	<0.001
Payment per inpatient admission ($)							
Year 1	13,193.21	15,011.59	14,132.33	17,348.73	−1415.34 (−2187.54, −643.13)	−10.7	0.00
Year 2	13,193.21	15,011.59	15,725.10	17,817.24	−291.08 (−1099.75, 517.60)	−2.2	0.55
Year 3	13,193.21	15,011.59	15,348.97	18,796.78	−1646.75 (−2543.94, −749.55)	−12.5	0.00
Year 4	13,193.21	15,011.59	17,250.43	19,547.22	−495.73 (−1675.80, 684.35)	−3.8	0.49
Overall	13,193.21	15,011.59	15,438.54	18,257.42	−1017.96 (−1467.54, −568.39)	−7.7	<0.001

(continued)

Table I-4 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; LOS=length of stay; PMPM=per member per month.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of an acute inpatient admission. Probability of any admission estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 members. A negative binomial regression model was used to obtain estimates of the differences in the number of days in LOS. A weighted least squares model was used to obtain estimates of the difference expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the inpatient admission rate model is 4,045,874. The total weighted Ns for the acute inpatient LOS is 212,870 and for payment per admission models is 200,870. The total weighted N for the PMPM model is 3,824,639. The expenditure outcomes exclude commercial plan members with capitated payments.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Figure I-15
Unadjusted ED visits per 1,000 Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018

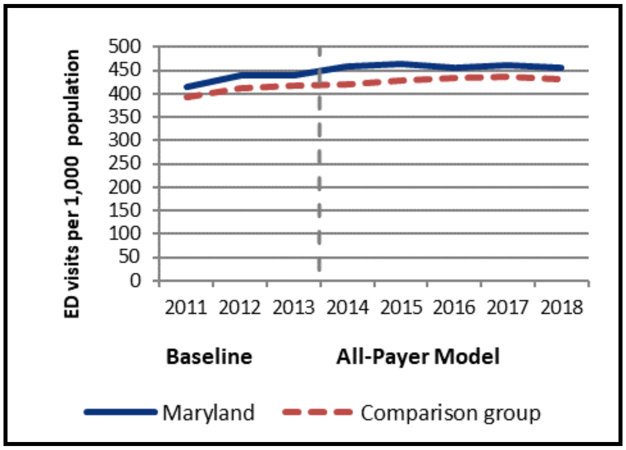
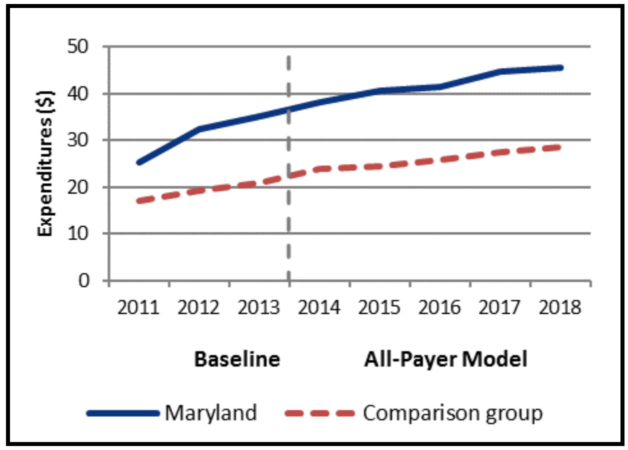
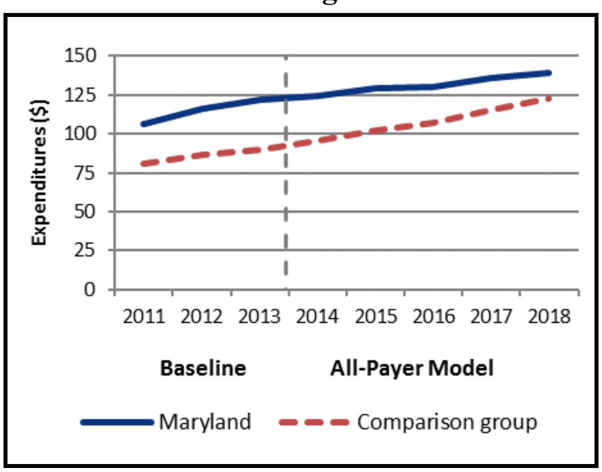


Figure I-16
Unadjusted average ED visit PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018



ED = emergency department; PBPM = per beneficiary per month.

Figure I-17
Unadjusted average other hospital outpatient department PBPM expenditures for Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018



PBPM = per beneficiary per month.

- The rate of emergency department (ED) visits for Medicare beneficiaries was slightly higher in Maryland than the comparison group throughout the baseline and implementation periods (***Figure I-15***). The rate of ED visits increased slightly throughout the baseline period and implementation period for the comparison group. The rate increased from the start of the baseline period through 2015 in Maryland, then declined slightly in 2016 and remained flat in 2017 and 2018.

- Average PBPM expenditures for ED visits and for other hospital outpatient department services were consistently higher in Maryland than in the comparison group (***Figure I-16*** and ***Figure I-17***). ED visit and other hospital outpatient department expenditures increased for both groups throughout the baseline and implementation periods.

Table I-5
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
ED visits per 1,000 population							
Year 1	454.2	416.7	480.6	431.2	10.3 (2.2, 18.5)	2.3	0.04
Year 2	454.2	416.7	490.0	438.9	11.4 (−0.7, 23.5)	2.5	0.12
Year 3	454.2	416.7	491.6	451.6	−0.5 (−17.7, 16.6)	−0.1	0.96
Year 4	454.2	416.7	496.8	450.0	6.1 (−16.1, 28.2)	1.3	0.65
Year 5	454.2	416.7	498.0	448.0	9.1 (−17.0, 35.3)	2.0	0.56
Overall	454.2	416.7	490.8	443.6	7.0 (−0.6, 14.7)	1.5	0.13
ED visits PBPM ($)							
Year 1	24.41	19.27	25.69	24.31	−3.77 (−5.05, −2.49)	−15.4	<0.001
Year 2	24.41	19.27	24.56	24.45	−5.03 (−6.91, −3.15)	−20.6	<0.001
Year 3	24.41	19.27	23.51	26.90	−8.54 (−11.63, −5.44)	−35.0	<0.001
Year 4	24.41	19.27	23.64	28.12	−9.63 (−13.75, −5.51)	−39.4	<0.001
Year 5	24.41	19.27	21.83	29.60	−12.92 (−18.13, −7.71)	−52.9	<0.001
Overall	24.41	19.27	24.05	26.36	−7.47 (−8.86, −6.08)	−30.6	<0.001

(continued)

Table I-5 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D−in−D (90% CI)	Relative difference (%)	p-value
Other hospital outpatient department PBPM ($)							
Year 1	105.34	84.32	109.27	95.46	−7.21 (−9.57, −4.86)	−6.8	<0.001
Year 2	105.34	84.32	108.32	100.19	−12.89 (−16.94, −8.84)	−12.2	<0.001
Year 3	105.34	84.32	112.94	110.93	−19.01 (−24.24, −13.78)	−18.0	<0.001
Year 4	105.34	84.32	114.56	119.14	−25.60 (−32.52, −18.67)	−24.3	<0.001
Year 5	105.34	84.32	118.03	129.66	−32.64 (−41.65, −23.64)	−31.0	<0.001
Overall	105.34	84.32	112.07	109.08	−18.14 (−20.57, −15.70)	−17.2	<0.001
Payment per ED visit ($)							
Year 1	683.34	568.24	668.81	676.31	−122.60 (−167.16, −78.03)	−17.9	<0.001
Year 2	683.34	568.24	628.00	677.84	−164.94 (−232.55, −97.32)	−24.1	<0.001
Year 3	683.34	568.24	595.97	717.61	−236.74 (−330.78, −142.70)	−34.6	<0.001
Year 4	683.34	568.24	584.11	755.07	−286.06 (−405.55, −166.57)	−41.9	<0.001
Year 5	683.34	568.24	535.20	796.29	−376.19 (−518.15, −234.24)	−55.1	<0.001
Overall	683.34	568.24	609.31	717.10	−222.88 (−264.65, −181.11)	−32.6	<0.001

(continued)

Table I-5 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; ED=emergency department; PBPM=per beneficiary per month.

Methods: A negative binomial regression model was used to obtain estimates of the differences in the number of ED visits. Number of ED visits estimates were multiplied by 1,000 to obtain a rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models and the ED visit model is 10,281,981. The total weighted N for payment per ED visit is 4,760,964.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Figure I-18
Unadjusted ED visits per 1,000 commercial plan members in Maryland and the comparison group, 2011 through 2017

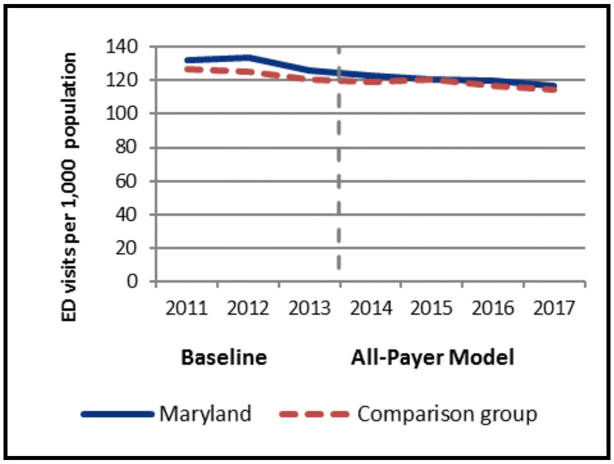
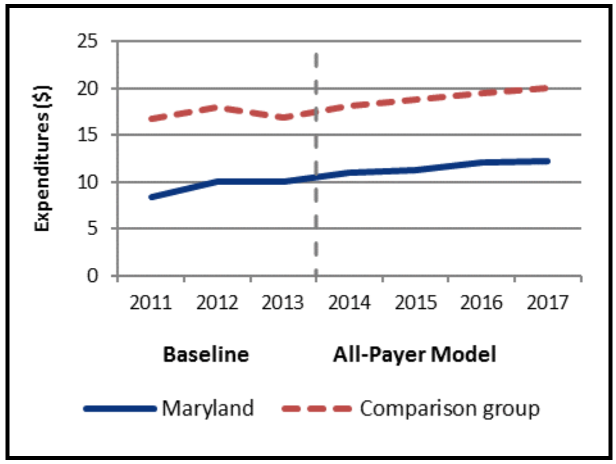
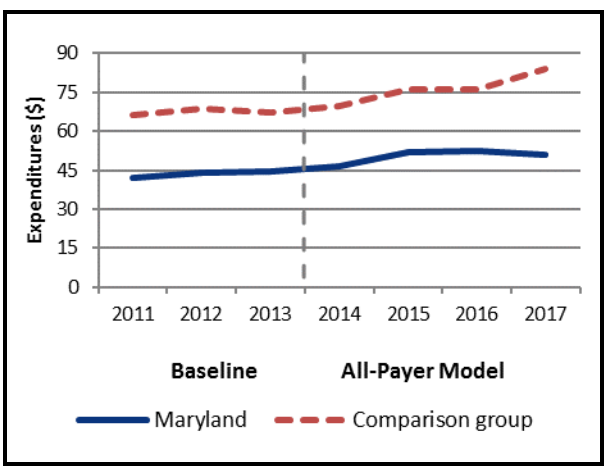


Figure I-19
Unadjusted average ED visit PMPM expenditures for commercial plan members in Maryland and the comparison group, 2011 through 2017



ED = emergency department; PMPM = per member per month.

Figure I-20
Unadjusted average other hospital outpatient department PMPM expenditures for commercial plan members in Maryland and the comparison group, 2011 through 2017



PMPM = per member per month.

- The rate of ED visits for commercial plan members was similar in Maryland and the comparison group throughout the baseline period and implementation period (*Figure I-18*). The ED visit rate decreased slightly from the baseline period to the implementation period for both groups.

- Average PMPM expenditures for ED visits and for other hospital outpatient department services were consistently lower in Maryland than in the comparison group (***Figures I-19*** and ***I-20***). Expenditures for ED visits increased in both groups throughout the baseline and implementation periods, but not always steadily. In Maryland, expenditures for other hospital outpatient department services increased slightly from 2011 to 2014 then leveled out for the last 3 years of the implementation period. In the comparison group, expenditures for other hospital outpatient department services increased throughout both the baseline and implementation periods.

Table I-6
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
ED visits per 1,000 population							
Year 1	128.6	122.7	123.8	120.6	−2.6 (−7.1, 1.8)	−2.0	0.33
Year 2	128.6	122.7	121.6	121.2	−5.4 (−10.5, −0.3)	−4.2	0.08
Year 3	128.6	122.7	121.6	118.1	−2.3 (−6.7, 2.1)	−1.8	0.39
Year 4	128.6	122.7	118.8	116.7	−3.5 (−9.1, 2.1)	−2.8	0.30
Overall	128.6	122.7	121.7	119.3	−3.4 (−5.8, −1.0)	−2.6	0.02
ED visits PMPM ($)							
Year 1	9.03	16.84	11.23	18.35	0.676 (−0.13, 1.48)	7.5	0.17
Year 2	9.03	16.84	11.60	19.10	0.29 (−0.71, 1.29)	3.2	0.63
Year 3	9.03	16.84	12.46	19.84	0.41 (−0.58, 1.40)	4.5	0.49
Year 4	9.03	16.84	12.79	20.68	−0.09 (−1.38, 1.19)	−1.0	0.90
Overall	9.03	16.84	11.95	19.38	0.36 (−0.14, 0.86)	3.9	0.24

(continued)

Table I-6 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Other hospital outpatient department PMPM ($)							
Year 1	42.76	66.72	47.91	70.61	1.23 (−2.62, 5.07)	2.9	0.60
Year 2	42.76	66.72	52.29	76.24	−0.03 (−4.63, 4.58)	−0.1	0.99
Year 3	42.76	66.72	52.29	75.89	0.33 (−4.23, 4.90)	0.8	0.90
Year 4	42.76	66.72	51.78	84.82	−9.11 (−15.70, −2.51)	−21.3	0.02
Overall	42.76	66.72	50.82	76.27	−1.51 (−3.93, 0.90)	−3.5	0.30
Payment per ED visit ($)							
Year 1	569.81	1,164.90	709.19	1,241.27	61.77 (24.02, 99.52)	10.8	0.01
Year 2	569.81	1,164.90	751.02	1,274.60	70.27 (13.19, 127.35)	12.3	0.04
Year 3	569.81	1,164.90	806.08	1,333.76	66.17 (1.72, 130.61)	11.6	0.09
Year 4	569.81	1,164.90	853.80	1,412.96	34.69 (−40.30, 109.69)	6.1	0.45
Overall	569.81	1,164.90	772.04	1,306.55	59.25 (30.91, 87.59)	10.4	<0.001

(continued)

Table I-6 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

CI=confidence interval; ED=emergency department; PMPM=per member per month.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of an ED visit. Probability of any ED visit estimate were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the difference-in-differences (D-in-D) estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the ED visit rate model is 4,045,874. The total weighted N for all PMPM models is 3,824,639. The total weighted N for payment per ED visit is 723,071. The expenditure outcomes exclude commercial plan members with capitated payments.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-7
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Professional PBPM—total ($)							
Year 1	242.77	245.32	242.32	249.85	−4.98 (−7.48, −2.49)	−2.1	0.001
Year 2	242.77	245.32	245.60	250.88	−2.74 (−6.80, 1.32)	−1.1	0.27
Year 3	242.77	245.32	256.49	264.31	−5.27 (−10.57, 0.04)	−2.2	0.10
Year 4	242.77	245.32	262.41	269.65	−4.70 (−12.35, 2.96)	−1.9	0.31
Year 5	242.77	245.32	263.03	270.26	−4.68 (−13.10, 3.73)	−1.9	0.36
Overall	242.77	245.32	253.09	260.02	−4.45 (−6.98, −1.92)	−1.8	0.004
Professional PBPM—regulated settings ($)							
Year 1	60.90	70.74	59.53	70.65	−1.28 (−2.10, −0.47)	−2.1	0.01
Year 2	60.90	70.74	57.18	69.69	−2.66 (−4.04, −1.29)	−4.4	0.001
Year 3	60.90	70.74	59.52	71.68	−2.32 (−4.28, −0.36)	−3.8	0.05
Year 4	60.90	70.74	58.51	71.93	−3.58 (−6.09, −1.07)	−5.9	0.02
Year 5	60.90	70.74	60.17	74.55	−4.54 (−7.51, −1.57)	−7.5	0.01
Overall	60.90	70.74	58.85	71.39	−2.71 (−3.57, −1.84)	−4.4	<0.001

(continued)

Table I-7 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Professional PBPM—unregulated settings ($)							
Year 1	181.88	174.58	182.79	179.20	−3.70 (−5.99, −1.40)	−2.0	0.01
Year 2	181.88	174.58	188.41	181.20	−0.07 (−3.95, 3.80)	−0.04	0.97
Year 3	181.88	174.58	196.97	192.62	−2.95 (−8.02, 2.12)	−1.6	0.34
Year 4	181.88	174.58	203.90	197.72	−1.12 (−8.27, 6.03)	−0.6	0.80
Year 5	181.88	174.58	202.86	195.71	−0.14 (−8.40, 8.11)	−0.1	0.98
Overall	181.88	174.58	194.25	188.63	−1.74 (−4.14, 0.65)	−1.0	0.23
Post-acute care PBPM—total ($)							
Year 1	108.05	163.86	99.64	161.59	−6.14 (−9.08, −3.21)	−5.7	<0.001
Year 2	108.05	163.86	97.24	158.47	−5.43 (−9.75, −1.10)	−5.0	0.04
Year 3	108.05	163.86	101.78	162.41	−4.82 (−10.86, 1.22)	−4.5	0.19
Year 4	108.05	163.86	95.37	156.14	−4.97 (−12.76, 2.82)	−4.6	0.29
Year 5	108.05	163.86	96.96	166.90	−14.13 (−24.36, −3.91)	−13.1	0.02
Overall	108.05	163.86	98.32	160.47	−6.32 (−9.08, −3.57)	−5.9	<0.001

(continued)

Table I-7 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Post-acute care PBPM—skilled nursing facilities ($)							
Year 1	71.07	80.29	67.76	79.72	−2.75 (−4.99, −0.51)	−3.9	0.04
Year 2	71.07	80.29	66.76	78.73	−2.75 (−6.01, 0.50)	−3.9	0.16
Year 3	71.07	80.29	67.84	80.26	−3.20 (−7.95, 1.54)	−4.5	0.27
Year 4	71.07	80.29	62.78	77.23	−5.23 (−11.55, 1.09)	−7.4	0.17
Year 5	71.07	80.29	63.36	81.90	−9.32 (−17.09, −1.56)	−13.1	0.05
Overall	71.07	80.29	65.94	79.31	−4.15 (−6.32, −1.99)	−5.8	0.002
Post-acute care PBPM—long-term care hospitals ($)							
Year 1	3.83	10.47	1.82	10.59	−2.12 (−3.22, −1.02)	−55.4	0.001
Year 2	3.83	10.47	1.67	8.76	−0.44 (−1.92, 1.03)	−11.6	0.62
Year 3	3.83	10.47	2.62	10.04	−0.77 (−2.80, 1.26)	−20.2	0.53
Year 4	3.83	10.47	2.33	8.69	0.29 (−1.96, 2.54)	7.5	0.83
Year 5	3.83	10.47	2.87	10.42	−0.90 (−4.14, 2.34)	−23.5	0.65
Overall	3.83	10.47	2.20	9.62	−0.77 (−1.64, 0.11)	−20.0	0.15

(continued)

Table I-7 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Post-acute care PBPM—rehabilitation hospitals ($)							
Year 1	5.81	20.17	6.63	21.16	−0.16 (−1.24, 0.91)	−2.8	0.80
Year 2	5.81	20.17	7.00	21.51	−0.15 (−1.81, 1.50)	−2.6	0.88
Year 3	5.81	20.17	8.08	22.46	−0.02 (−2.15, 2.11)	−0.4	0.99
Year 4	5.81	20.17	8.83	23.00	0.19 (−2.67, 3.05)	3.2	0.91
Year 5	5.81	20.17	9.54	24.25	−0.35 (−3.58, 2.89)	−6.0	0.86
Overall	5.81	20.17	7.86	22.28	−0.07 (−1.05, 0.91)	−1.2	0.91
Post-acute care PBPM—home health ($)							
Year 1	27.34	52.92	23.43	50.12	−1.11 (−2.37, 0.15)	−4.1	0.15
Year 2	27.34	52.92	21.81	49.47	−2.08 (−4.20, 0.05)	−7.6	0.11
Year 3	27.34	52.92	23.24	49.65	−0.82 (−2.68, 1.03)	−3.0	0.47
Year 4	27.34	52.92	21.44	47.23	−0.21 (−2.48, 2.06)	−0.8	0.88
Year 5	27.34	52.92	21.19	50.33	−3.56 (−7.37, 0.24)	−13.0	0.12
Overall	27.34	52.92	22.33	49.25	−1.33 (−2.29, −0.38)	−4.9	0.02

(continued)

Table I-7 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Other PBPM ($)*							
Year 1	69.36	44.11	68.35	39.28	3.82 (1.35, 6.28)	5.5	0.01
Year 2	69.36	44.11	69.58	39.26	5.07 (1.11, 9.03)	7.3	0.04
Year 3	69.36	44.11	75.95	44.65	6.04 (0.38, 11.69)	8.7	0.08
Year 4	69.36	44.11	78.54	46.19	7.10 (−0.18, 14.38)	10.2	0.11
Year 5	69.36	44.11	85.25	50.36	9.64 (0.53, 18.76)	13.9	0.08
Overall	69.36	44.11	74.53	43.26	5.99 (3.46, 8.52)	8.6	<0.001

CI=confidence interval; D-in-D=difference-in-differences; PBPM=per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 10,281,981.

* Other PBPM includes payments for noninpatient and other services, along with durable medical equipment payments.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-8
Difference in the pre-post change in nonhospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Professional PMPM ($)							
Year 1	96.01	120.28	99.41	123.12	0.55 (−3.12, 4.23)	0.6	0.80
Year 2	96.01	120.28	104.11	123.87	4.51 (−0.58, 9.60)	4.7	0.15
Year 3	96.01	120.28	109.01	129.89	3.38 (−1.11, 7.87)	3.5	0.22
Year 4	96.01	120.28	110.83	131.57	3.52 (−0.75, 7.79)	3.7	0.17
Overall	96.01	120.28	105.27	126.74	2.80 (0.63, 4.98)	2.9	0.03
Other PMPM ($)*							
Year 1	11.56	13.11	12.23	12.59	1.18 (−0.25, 2.60)	10.2	0.17
Year 2	11.56	13.11	11.33	13.72	−0.85 (−2.35, 0.66)	−7.3	0.35
Year 3	11.56	13.11	11.06	13.85	−1.26 (−2.72, 0.21)	−10.9	0.16
Year 4	11.56	13.11	10.82	14.17	−1.81 (−3.47, −0.14)	−15.6	0.07
Overall	11.56	13.11	11.43	13.50	−0.53 (−1.28, 0.23)	−4.6	0.25

(continued)

Table I-8 (continued)
Difference in the pre-post change in nonhospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

CI=confidence interval; D-in-D=difference-in-differences; PMPM=per member per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 3,824,639.

[*] Other PMPM includes payments for noninpatient and other services, including those made for other outpatient services.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-9
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total PBPM ($)							
Year 1	150.88	147.04	151.03	151.68	−4.49 (−5.81, −3.17)	−3.0	<0.001
Year 2	150.88	147.04	149.95	150.31	−4.20 (−6.06, −2.34)	−2.8	<0.001
Year 3	150.88	147.04	157.86	160.24	−6.23 (−9.52, −2.95)	−4.1	0.002
Year 4	150.88	147.04	158.30	162.30	−7.84 (−11.56, −4.12)	−5.2	<0.001
Year 5	150.88	147.04	174.44	182.15	−11.56 (−15.96, −7.17)	−7.7	<0.001
Overall	150.88	147.04	156.61	159.07	−6.37 (−7.69, −5.05)	−4.2	<0.001
Inpatient facility PBPM ($)							
Year 1	23.67	25.12	22.74	24.78	−0.58 (−1.08, −0.08)	−2.5	0.05
Year 2	23.67	25.12	22.28	24.75	−1.00 (−1.69, −0.32)	−4.2	0.02
Year 3	23.67	25.12	23.63	26.51	−1.42 (−2.45, −0.39)	−6.0	0.02
Year 4	23.67	25.12	22.88	26.64	−2.31 (−3.55, −1.08)	−9.8	0.002
Year 5	23.67	25.12	24.22	28.81	−3.13 (−4.76, −1.49)	−13.2	0.002
Overall	23.67	25.12	23.04	26.03	−1.54 (−1.99, −1.09)	−6.5	<0.001

(continued)

Table I-9 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
ED visits PBPM ($)							
Year 1	5.89	5.14	6.38	6.58	−0.95 (−1.26, −0.65)	−16.2	<0.001
Year 2	5.89	5.14	6.20	6.59	−1.15 (−1.56, −0.73)	−19.5	<0.001
Year 3	5.89	5.14	5.97	6.89	−1.68 (−2.37, −1.00)	−28.5	<0.001
Year 4	5.89	5.14	5.90	6.96	−1.82 (−2.73, −0.90)	−30.8	0.001
Year 5	5.89	5.14	5.53	7.39	−2.62 (−3.81, −1.43)	−44.5	<0.001
Overall	5.89	5.14	6.04	6.83	−1.54 (−1.85, −1.23)	−26.2	<0.001
Other hospital outpatient department PBPM ($)							
Year 1	25.15	21.15	25.83	23.42	−1.58 (−2.10, −1.07)	−6.3	<0.001
Year 2	25.15	21.15	25.41	23.34	−1.92 (−2.84, −1.00)	−7.6	<0.001
Year 3	25.15	21.15	26.23	25.24	−3.01 (−4.30, −1.71)	−12.0	<0.001
Year 4	25.15	21.15	26.07	26.19	−4.12 (−5.78, −2.45)	−16.4	<0.001
Year 5	25.15	21.15	27.21	29.12	−5.91 (−8.02, −3.80)	−23.5	<0.001
Overall	25.15	21.15	26.04	25.07	−3.04 (−3.62, −2.46)	−12.1	<0.001

(continued)

Table I-9 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Professional PBPM ($)							
Year 1	66.37	67.16	66.59	68.65	−1.27 (−1.90, −0.63)	−1.9	0.001
Year 2	66.37	67.16	66.58	68.14	−0.78 (−1.79, 0.23)	−1.2	0.21
Year 3	66.37	67.16	70.83	72.81	−1.20 (−2.53, 0.14)	−1.8	0.14
Year 4	66.37	67.16	73.19	74.77	−0.80 (−2.67, 1.08)	−1.2	0.48
Year 5	66.37	67.16	84.39	85.92	−0.74 (−2.86, 1.38)	−1.1	0.57
Overall	66.37	67.16	71.04	72.76	−0.98 (−1.60, −0.35)	−1.5	0.01

CI=confidence interval; D-in-D=difference-in-differences; ED=emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of beneficiary cost sharing. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

How to interpret the findings: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all models is 10,281,981.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Figure I-21
Unadjusted rate of discharges with an unplanned readmission within 30 days per 1,000 Medicare beneficiary discharges in Maryland and the comparison group, 2011 through 2018

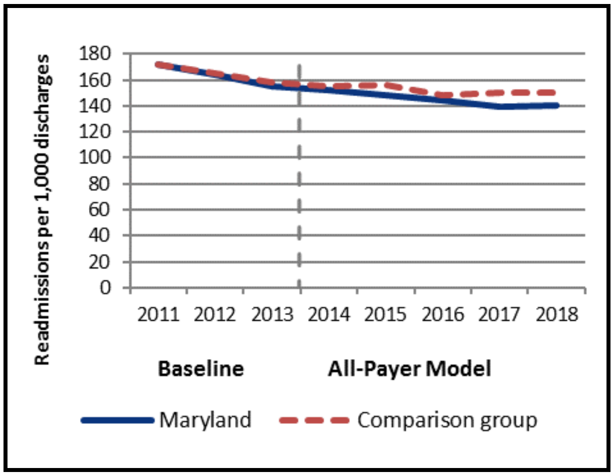
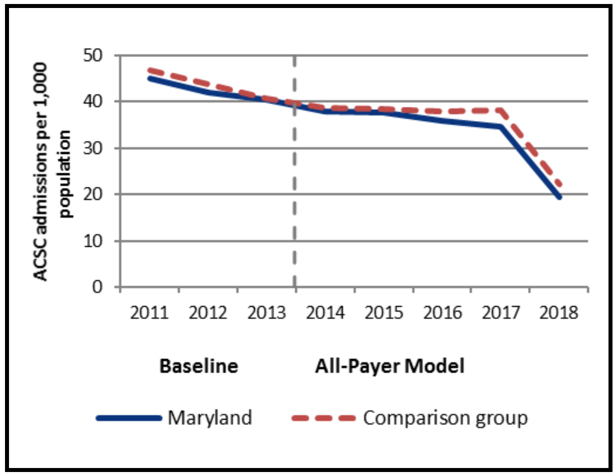


Figure I-22
Unadjusted rate of admissions for ambulatory care sensitive conditions per 1,000 Medicare beneficiaries in Maryland and the comparison group, 2011 through 2018



- For Medicare beneficiaries, the unplanned readmission rate was similar in Maryland and the comparison group over the baseline period but diverged slightly during the All-Payer Model period (***Figure I-21***). Unplanned readmissions declined steadily in Maryland between the start of the baseline period and the end of 2017 and were unchanged in 2018. Although the rate for the comparison group declined from the start of the baseline period to the end of the implementation period, unplanned readmissions declined slightly more in Maryland through the end of 2015 and again in 2017 and 2018.

- For Medicare beneficiaries, the rate of admissions for ambulatory care sensitive conditions (ACSCs) declined continually for Maryland and the comparison group over the baseline and All-Payer Model periods, except for Year 2017 when it remained flat in the comparison group (***Figure I-22***). Although the rates were similar at the start of the All-Payer Model period, the rate declined more rapidly in Maryland, particularly in 2016 and 2017. The sharp decline in 2018 is because the datapoint represents 6 months, rather than 12 months, of data.

Table I-10
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Unplanned readmissions within 30 days of discharge per 1,000 discharges							
Year 1	165.6	164.2	158.0	154.9	1.8 (−3.3, 6.8)	1.1	0.56
Year 2	165.6	164.2	153.3	154.5	−2.5 (−9.5, 4.4)	−1.5	0.55
Year 3	165.6	164.2	155.1	151.0	2.6 (−6.3, 11.6)	1.6	0.63
Year 4	165.6	164.2	149.1	151.6	−3.6 (−15.2, 8.0)	−2.2	0.61
Year 5	165.6	164.2	154.1	153.9	−1.1 (−15.4, 13.3)	−0.6	0.90
Overall	165.6	164.2	154.0	153.1	−0.5 (−4.5, 3.6)	−0.3	0.85
Hospital admissions for ACSCs per 1,000 population							
Year 1	41.2	43.6	35.6	38.4	−0.7 (−1.9, 0.4)	−1.8	0.28
Year 2	41.2	43.6	34.2	37.8	−1.6 (−3.0, −0.1)	−3.9	0.07
Year 3	41.2	43.6	33.8	38.6	−2.8 (−4.8, −0.8)	−6.9	0.02
Year 4	41.2	43.6	31.2	38.1	−5.2 (−7.8, −2.6)	−12.6	0.001
Year 5	41.2	43.6	17.3	22.1	−4.0 (−6.2, −1.9)	−9.8	0.002
Overall	41.2	43.6	31.8	36.4	−2.8 (−3.7, −1.9)	−6.7	<0.001

(continued)

Table I-10 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of discharges with an ED visit within 30 days of discharge							
Year 1	11.1	10.8	11.9	11.4	0.1 (−0.4, 0.6)	1.2	0.66
Year 2	11.1	10.8	12.1	11.8	0.03 (−0.7, 0.7)	0.2	0.95
Year 3	11.1	10.8	12.2	12.1	−0.2 (−1.1, 0.7)	−1.9	0.69
Year 4	11.1	10.8	12.8	12.3	0.1 (−1.0, 1.2)	1.0	0.87
Year 5	11.1	10.8	12.8	12.0	0.5 (−0.8, 1.8)	4.7	0.50
Overall	11.1	10.8	12.3	11.9	0.1 (−0.3, 0.4)	0.6	0.79
ED visits for bacterial pneumonia per 1,000 population							
Year 1	3.5	2.8	3.7	2.7	0.2 (−0.2, 0.6)	5.6	0.42
Year 2	3.5	2.8	4.0	3.1	0.1 (−0.4, 0.7)	3.1	0.74
Year 3	3.5	2.8	4.1	3.1	0.1 (−0.6, 0.9)	4.1	0.75
Year 4	3.5	2.8	4.3	3.2	0.2 (−0.7, 1.2)	6.0	0.71
Year 5	3.5	2.8	2.5	1.9	0.1 (−0.6, 0.7)	1.4	0.90
Overall	3.5	2.8	3.8	2.9	0.2 (−0.2, 0.5)	4.3	0.43

(continued)

Table I-10 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
ED visits for heart failure per 1,000 population							
Year 1	11.3	10.1	11.4	9.9	0.1 (−0.9, 1.1)	1.2	0.82
Year 2	11.3	10.1	12.5	9.8	1.4 (−0.2, 3.0)	12.3	0.15
Year 3	11.3	10.1	13.6	10.5	1.6 (−0.8, 3.9)	14.0	0.27
Year 4	11.3	10.1	14.5	10.9	2.0 (−0.9, 4.9)	17.6	0.26
Year 5	11.3	10.1	8.9	6.8	1.1 (−0.9, 3.1)	9.9	0.36
Overall	11.3	10.1	12.5	9.9	1.3 (0.3, 2.2)	11.2	0.03
ED visits for COPD and asthma per 1,000 population							
Year 1	25.7	22.1	26.5	22.6	0.2 (−1.6, 2.1)	1.0	0.83
Year 2	25.7	22.1	26.9	22.2	1.0 (−1.7, 3.7)	3.9	0.53
Year 3	25.7	22.1	21.0	17.2	1.0 (−2.0, 4.0)	3.8	0.59
Year 4	25.7	22.1	21.1	16.9	1.4 (−2.0, 4.8)	5.4	0.49
Year 5	25.7	22.1	12.9	10.5	0.6 (−2.0, 3.1)	2.2	0.71
Overall	25.7	22.1	22.6	18.7	0.9 (−0.4, 2.1)	3.4	0.26

(continued)

Table I-10 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

ACSC = ambulatory care sensitive condition; CI = confidence interval; COPD = chronic obstructive pulmonary disease; D-in-D = difference-in-differences; ED = emergency department.

<u>Methods</u>: A logistic regression model was used to obtain estimates for all outcomes. All models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). Admission-level models (unplanned readmissions and ED visit within 30 days of discharge) also adjusted for the hospital's resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage.

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for probability of an unplanned readmission is 1,980,821. The total weighted N for the number of ACSC admissions and ED visits by condition is 10,281,981. The total weighted N for probability of an ED visit within 30 days of discharge is 1,994,678.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Figure I-23
Unadjusted rate of discharges with an unplanned readmission within 30 days per 1,000 commercial plan member discharges in Maryland and the comparison group, 2011 through 2017

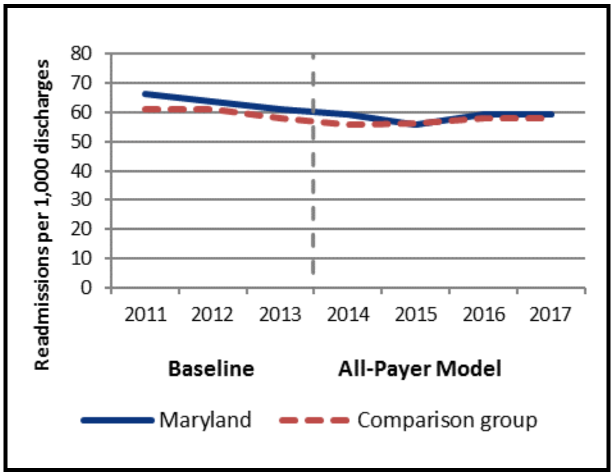
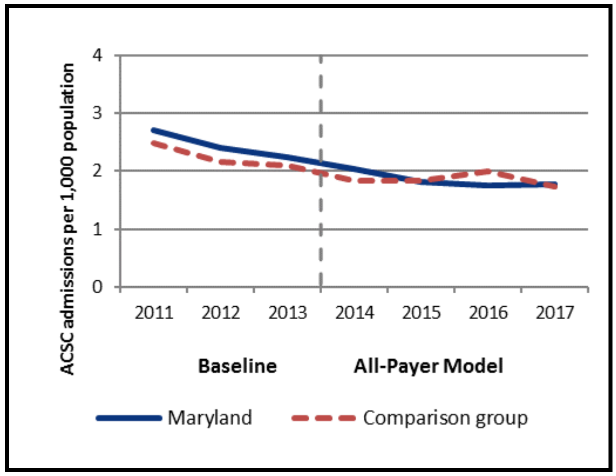


Figure I-24
Unadjusted rate of admissions for ambulatory care sensitive conditions per 1,000 commercial plan members in Maryland and the comparison group, 2011 through 2017



ACSC = ambulatory care sensitive condition.

- For commercial plan members, the unplanned readmission rate was consistently higher in Maryland than in the comparison group over the baseline period and the first year of the All-Payer Model period (***Figure I-23***). Beginning the second year of All-Payer Model implementation, the unplanned readmission rate was the same or slightly higher in Maryland than in the comparison group. In 2016 and 2017, the unplanned readmission rate increased slightly for both groups.

- For commercial plan members, the rate of admissions for ACSCs was slightly higher in Maryland than in the comparison group over the baseline and in 2014 but dropped slightly below the comparison group in 2015 (***Figure I-24***). In 2016 and 2017, the rate of admissions for ACSCs leveled out in Maryland while increasing and then declining for the comparison group. Between the start of the baseline period and the end of the All-Payer Model period, the rates for both groups decreased. Although ACSC admissions declined for both groups during both the baseline and All-Payer Model periods, the reduction was larger during the baseline period.

Table I-11
Difference in the pre-post change in rates of avoidable or reducible utilization for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Unplanned readmissions within 30 days of discharge per 1,000 discharges							
Year 1	62.9	59.6	60.1	56.6	0.4 (−4.5, 5.2)	0.6	0.90
Year 2	62.9	59.6	56.6	57.1	−3.6 (−10.0, 2.8)	−5.7	0.36
Year 3	62.9	59.6	59.6	58.2	−1.8 (−9.9, 6.3)	−2.8	0.72
Year 4	62.9	59.6	60.5	58.5	−1.2 (−6.9, 4.6)	−1.9	0.73
Overall	62.9	59.6	59.2	57.5	−1.4 (−4.6, 1.7)	−2.2	0.46
Hospital admissions for ACSCs per 1,000 population							
Year 1	3.1	2.9	2.7	2.4	0.1 (−0.2, 0.3)	1.8	0.67
Year 2	3.1	2.9	2.4	2.4	−0.2 (−0.5, 0.1)	−7.5	0.21
Year 3	3.1	2.9	2.2	2.6	−0.5 (−0.8, −0.3)	−17.1	0.00
Year 4	3.1	2.9	2.3	2.3	−0.1 (−0.5, 0.2)	−4.0	0.54
Overall	3.1	2.9	2.4	2.4	−0.2 (−0.3, −0.1)	−6.1	0.02

(continued)

Table I-11 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of discharges with an ED visit within 30 days of discharge							
Year 1	7.2	6.1	6.8	6.4	−0.8 (−1.6, 0.0)	−11.2	0.09
Year 2	7.2	6.1	6.9	6.5	−0.8 (−1.3, −0.3)	−10.8	0.01
Year 3	7.2	6.1	7.2	6.6	−0.6 (−1.2, 0.1)	−8.0	0.16
Year 4	7.2	6.1	8.2	6.3	0.8 (−0.3, 1.9)	11.2	0.21
Overall	7.2	6.1	7.2	6.5	−0.4 (−0.8, −0.04)	−5.9	0.07

ACSC = ambulatory care sensitive condition; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county. Estimates of the probability of any admission for an ACSC were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for probability of an unplanned readmission is 179,194. The total weighted N for probability of an ACSC admission is 3,122,712. The total weighted N for probability of an ED visit within 30 days of discharge is 166,076.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-12
Difference in the pre-post change in rate of follow-up visits within 14 days of discharge for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of discharges with a follow-up visit within 14 days of discharge							
Year 1	67.2	70.3	66.1	70.8	−1.6 (−2.9, −0.3)	−2.4	0.05
Year 2	67.2	70.3	67.7	71.2	−0.5 (−2.2, 1.2)	−0.7	0.64
Year 3	67.2	70.3	69.9	73.0	−0.1 (−2.1, 1.8)	−0.2	0.90
Year 4	67.2	70.3	71.1	73.8	0.2 (−1.9, 2.4)	0.3	0.87
Year 5	67.2	70.3	71.8	74.3	0.4 (−2.0, 2.9)	0.6	0.78
Overall	67.2	70.3	68.9	72.4	−0.4 (−1.3, 0.4)	−0.6	0.40

CI = confidence interval; D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in probability of a follow-up visit within 14 days of discharge. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, area wage index, and disproportionate share hospital percentage).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N is 2,195,401.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-13

Difference in the pre-post change in rate of follow-up visits within 14 days of discharge for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% confidence interval)	Relative difference (%)	p-value
Percentage of discharges with a follow-up visit within 14 days of discharge							
Year 1	43.1	42.6	43.7	44.6	−1.4 (−2.4, −0.3)	−3.1	0.03
Year 2	43.1	42.6	43.9	44.4	−0.9 (−2.2, 0.3)	−2.2	0.22
Year 3	43.1	42.6	44.8	45.0	−0.6 (−1.7, 0.5)	−1.4	0.37
Year 4	43.1	42.6	45.2	45.5	−0.7 (−2.5, 1.0)	−1.7	0.49
Overall	43.1	42.6	44.3	44.8	−0.9 (−1.6, −0.3)	−2.2	0.01

CI = confidence interval; D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in probability of a follow-up visit within 14 days of discharge. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N is 181,141.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-14
Difference in the pre-post change in severity of admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
DRG weight per admission							
Year 1	1.564	1.569	1.614	1.625	−0.007 (−0.034, 0.020)	−0.4	0.69
Year 2	1.564	1.569	1.662	1.639	0.028 (−0.008, 0.065)	1.8	0.20
Year 3	1.564	1.569	1.724	1.690	0.038 (−0.017, 0.093)	2.4	0.25
Year 4	1.564	1.569	1.769	1.709	0.065 (−0.009, 0.139)	4.2	0.15
Year 5	1.564	1.569	1.830	1.739	0.096 (0.017, 0.175)	6.1	0.05
Overall	1.564	1.569	1.706	1.673	0.038 (0.013, 0.062)	2.4	0.01
Percentage of acute admissions with a 3M APR DRG major/extreme severity or risk of mortality							
Year 1	15.6	12.1	17.7	14.3	−0.5 (-1.5, 0.5)	−3.3	0.38
Year 2	15.6	12.1	17.6	15.0	−1.5 (−2.9, 0.03)	−9.3	0.11
Year 3	15.6	12.1	17.3	14.9	−1.5 (−3.5, 0.5)	−9.9	0.20
Year 4	15.6	12.1	20.0	17.3	−1.7 (-4.4, 1.0)	−10.9	0.30
Year 5	15.6	12.1	21.7	19.0	−2.0 (−5.2, 1.3)	−12.7	0.31
Overall	15.6	12.1	18.5	15.7	−1.4 (−2.3, −0.5)	−8.8	0.01

(continued)

Table I-14 (continued)
Difference in the pre-post change in severity of admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI = confidence interval; D-in-D = difference-in-differences; DRG = diagnosis-related group; APR = All Patient Refined.

Methods: A weighted least squares model was used to obtain estimates of the difference in DRG weight. A logistic regression model was used to obtain estimates of the difference in percentage of major/extreme severity of illness or risk of mortality for inpatient admissions. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the DRG weight per admission model is 3,062,734. The total weighted N for the percentage of admissions with a 3M APR DRG major/extreme severity or risk of mortality model is 3,042,207.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-15
Difference in the pre-post change in severity of admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
DRG weight per admission							
Year 1	1.396	1.329	1.438	1.395	−0.024 (−0.045, −0.002)	−1.7	0.07
Year 2	1.396	1.329	1.446	1.411	−0.032 (−0.064, 0.001)	−2.3	0.11
Year 3	1.396	1.329	1.423	1.408	−0.052 (−0.090, −0.013)	−3.7	0.03
Year 4	1.396	1.329	1.449	1.417	−0.035 (−0.065, −0.005)	−2.5	0.06
Overall	1.396	1.329	1.439	1.406	−0.035 (−0.050, −0.019)	−2.5	<0.001

CI = confidence interval; D-in-D = difference-in-differences; DRG = diagnosis-related group.

Methods: A weighted least squares model was used to obtain estimates of the difference in DRG weight. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for the regression model is 212,432.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-16
Difference in the pre-post change in type of hospital admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of admissions through the ED							
Year 1	72.7	68.3	72.3	67.6	0.2 (−1.9, 2.3)	0.2	0.89
Year 2	72.7	68.3	71.9	67.9	−0.5 (−3.7, 2.7)	−0.6	0.81
Year 3	72.7	68.3	72.0	66.7	0.9 (−3.1, 4.9)	1.2	0.71
Year 4	72.7	68.3	72.8	66.7	1.9 (−3.2, 6.9)	2.5	0.54
Year 5	72.7	68.3	75.0	68.7	2.3 (−3.6, 8.2)	3.2	0.52
Overall	72.7	68.3	72.5	67.4	0.8 (−1.0, 2.5)	1.1	0.47
Percentage of ED visits that resulted in an admission							
Year 1	37.7	41.3	34.9	38.6	−0.2 (−1.5, 1.1)	−0.6	0.77
Year 2	37.7	41.3	33.6	38.0	−0.9 (−3.1, 1.2)	−2.5	0.48
Year 3	37.7	41.3	34.0	37.6	−0.2 (−3.2, 2.9)	−0.5	0.92
Year 4	37.7	41.3	32.4	37.6	−1.7 (−5.9, 2.5)	−4.6	0.50
Year 5	37.7	41.3	34.0	39.7	−2.1 (−7.5, 3.3)	−5.6	0.52
Overall	37.7	41.3	33.7	38.1	−0.9 (−2.3, 0.5)	−2.4	0.29

(continued)

Table I-16 (continued)
Difference in the pre-post change in type of hospital admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Rate of unplanned admissions per 1,000 discharges							
Year 1	789.3	812.7	784.9	808.7	−0.01 (−6.5, 6.5)	−0.01	>0.99
Year 2	789.3	812.7	779.5	804.6	−0.9 (−10.9, 9.1)	−0.1	0.88
Year 3	789.3	812.7	775.3	793.6	6.5 (−8.5, 21.5)	0.8	0.48
Year 4	789.3	812.7	766.2	792.1	−0.6 (−18.4, 17.1)	−0.1	0.95
Year 5	789.3	812.7	777.2	807.6	−6.2 (−26.4, 14.0)	−0.8	0.62
Overall	789.3	812.7	776.7	800.7	0.4 (−5.7, 6.6)	0.1	0.91

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates for all outcomes. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage). The percentage of acute admissions through the ED also included admission-level variables for DRG weight and whether the admission came from a skilled nursing facility.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the percentage of acute admissions through the ED is 3,062,721. The total weighted N for the percentage of ED visits that resulted in an admission is 7,152,438. The total weighted N for the rate of unplanned admissions per 1,000 discharges model is 3,062,734.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-17
Difference in the pre-post change in type of hospital admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of admissions through the ED							
Year 1	45.1	39.8	44.9	39.6	0.1 (−1.0, 1.3)	0.3	0.86
Year 2	45.1	39.8	43.9	38.8	−0.1 (−1.7, 1.6)	−0.1	0.95
Year 3	45.1	39.8	43.9	39.4	−0.7 (−2.2, 0.9)	−1.5	0.46
Year 4	45.1	39.8	43.7	39.4	−0.9 (−2.5, 0.7)	−2.0	0.35
Overall	45.1	39.8	44.2	39.3	−0.3 (−1.1, 0.4)	−0.7	0.46
Percentage of ED visits that resulted in an admission							
Year 1	12.8	12.7	12.2	11.6	0.5 (−0.03, 1.0)	3.8	0.12
Year 2	12.8	12.7	11.4	11.3	0.1 (−0.4, 0.6)	0.7	0.78
Year 3	12.8	12.7	11.5	11.5	−0.1 (−0.6, 0.5)	−0.6	0.83
Year 4	12.8	12.7	11.4	11.4	−0.1 (−0.6, 0.5)	−0.4	0.87
Overall	12.8	12.7	11.7	11.5	0.1 (−0.1, 0.4)	1.1	0.37

(continued)

Table I-17 (continued)
Difference in the pre-post change in type of hospital admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Rate of unplanned admissions per 1,000 discharges							
Year 1	629.7	618.9	595.1	601.5	−17.1 (−24.4, −9.9)	−2.7	<0.001
Year 2	629.7	618.9	602.2	600.3	−8.8 (−22.3, 4.7)	−1.4	0.29
Year 3	629.7	618.9	602.8	607.0	−14.8 (−28.4, −1.1)	−2.3	0.08
Year 4	629.7	618.9	596.6	601.1	−15.1 (−28.7, −1.5)	−2.4	0.07
Overall	629.7	618.9	598.9	602.4	−14.2 (−20.0, −8.3)	−2.3	<0.001

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates for all outcomes. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the percentage of acute admissions through the ED model and unplanned admissions model is 212,870. The total weighted N for the percentage of ED visits resulting in an admission model is 869,217.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-18
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Case-mix-adjusted payment per discharge ($)							
Year 1	10,198.25	6,523.69	10,675.28	6,713.39	287.32 (39.47, 535.18)	2.8	0.06
Year 2	10,198.25	6,523.69	11,041.40	6,642.12	724.71 (389.10, 1,060.33)	7.1	<0.001
Year 3	10,198.25	6,523.69	11,015.11	6,596.34	744.20 (217.58, 1,270.83)	7.3	0.02
Year 4	10,198.25	6,523.69	11,461.92	6,575.78	1,211.57 (650.31, 1,772.84)	11.9	<0.001
Year 5	10,198.25	6,523.69	11,735.43	6,625.89	1,434.98 (847.41, 2,022.56)	14.1	<0.001
Overall	10,198.25	6,523.69	11,115.70	6,632.50	808.63 (606.10, 1,011.16)	7.9	<0.001
Percentage of acute admissions with an ICU stay							
Year 1	27.2	45.1	28.7	45.5	1.2 (−0.5, 2.9)	4.3	0.25
Year 2	27.2	45.1	28.6	43.9	2.2 (−1.6, 6.0)	8.0	0.35
Year 3	27.2	45.1	28.4	45.1	1.2 (−4.7, 7.1)	4.4	0.74
Year 4	27.2	45.1	26.9	45.4	−0.5 (−8.4, 7.4)	−2.0	0.91
Year 5	27.2	45.1	26.3	46.3	−1.7 (−11.6, 8.2)	−6.1	0.78
Overall	27.2	45.1	28.0	45.1	0.7 (−1.8, 3.3)	2.7	0.64

(continued)

Table I-18 (continued)
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI = confidence interval; D-in-D = difference-in-differences; ICU = intensive care unit.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjusted payment per discharge. A logistic regression model was used to obtain estimates of the difference in the percentage of acute admission with an ICU stay. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage). The case-mix adjusted payment per discharge models also adjusted for the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. See ***Appendix A*** for additional detail.

The total weighted N for both models is 3,062,734.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-19
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Case-mix-adjusted payment per discharge ($)							
Year 1	9,428.17	10,908.18	10,000.08	12,220.56	−748.40 (−1301.63, −195.17)	−7.9	0.03
Year 2	9,428.17	10,908.18	11,019.82	12,624.48	−132.58 (−815.49, 550.34)	−1.4	0.75
Year 3	9,428.17	10,908.18	11,040.69	13,429.59	−916.82 (−1749.32, −84.33)	−9.7	0.07
Year 4	9,428.17	10,908.18	11,746.05	13,416.73	−198.59 (−896.09, 498.90)	−2.1	0.64
Overall	9,428.17	10,908.18	10,847.51	12,850.49	−531.68 (−874.57, −188.80)	−5.6	0.01
Percentage of acute admissions with an ICU stay							
Year 1	14.6	19.9	14.8	18.8	1.1 (0.1, 2.1)	7.5	0.06
Year 2	14.6	19.9	14.8	18.1	1.5 (0.7, 2.4)	10.6	0.00
Year 3	14.6	19.9	14.7	18.6	1.1 (0.3, 1.9)	7.5	0.03
Year 4	14.6	19.9	13.3	18.2	0.1 (−1.2, 1.3)	0.5	0.92
Overall	14.6	19.9	14.4	18.5	1.0 (0.5, 1.5)	6.8	<0.001

(continued)

Table I-19 (continued)
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

CI = confidence interval; D-in-D = difference-in-differences; ICU = intensive care unit.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjusted payment per discharge. A logistic regression model was used to obtain estimates of the difference in the percentage of acute admission with an ICU stay. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. See ***Appendix A*** for additional detail.

The total weighted N for the case-mix-adjusted payment per discharge model is 200,425. The total weighted N for the percentage of acute admissions with an ICU stay model is 212,870.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-20
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of admissions resulting in STAC transfer							
Year 1	1.3	0.6	1.2	0.6	−0.1 (−0.3, 0.05)	−9.1	0.24
Year 2	1.3	0.6	1.1	0.6	−0.2 (−0.4, −0.1)	−18.7	0.03
Year 3	1.3	0.6	1.0	0.7	−0.5 (−0.8, −0.1)	−35.9	0.03
Year 4	1.3	0.6	0.9	0.6	−0.4 (−0.9, 0.05)	−34.3	0.10
Year 5	1.3	0.6	0.8	0.6	−0.4 (−1.0, 0.1)	−33.7	0.19
Overall	1.3	0.6	1.0	0.6	−0.3 (−0.5, −0.2)	−25.2	<0.001
Percentage of STAC transfers classified as major or extreme severity							
Year 1	65.7	66.3	68.9	68.9	0.7 (−4.1, 5.4)	1.0	0.82
Year 2	65.7	66.3	70.7	72.4	−1.3 (−8.1, 5.6)	-1.9	0.76
Year 3	65.7	66.3	70.5	70.9	0.1 (−7.2, 7.4)	0.2	0.98
Year 4	65.7	66.3	74.1	73.0	1.8 (−7.5, 11.1)	2.7	0.75
Year 5	65.7	66.3	75.1	71.6	4.4 (−6.5, 15.2)	6.7	0.51
Overall	65.7	66.3	71.3	71.3	0.7 (−2.7, 4.0)	1.0	0.74

(continued)

Table I-20 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of admissions resulting in PAC transfer							
Year 1	2.1	2.1	2.4	2.2	0.1 (−0.1, 0.3)	5.7	0.30
Year 2	2.1	2.1	2.6	2.2	0.3 (−0.003, 0.5)	12.3	0.10
Year 3	2.1	2.1	2.5	2.1	0.3 (0.001, 0.6)	13.1	0.10
Year 4	2.1	2.1	2.4	2.0	0.3 (−0.1, 0.6)	12.2	0.18
Year 5	2.1	2.1	2.2	1.7	0.3 (0.009, 0.6)	15.2	0.09
Overall	2.1	2.1	2.4	2.1	0.2 (0.1, 0.4)	11.2	0.001
Length of stay for admissions resulting in a PAC transfer							
Year 1	5.2	5.1	5.0	4.9	−0.04 (−0.1, 0.1)	−0.7	0.54
Year 2	5.2	5.1	4.9	4.8	0.02 (−0.1, 0.1)	0.5	0.74
Year 3	5.2	5.1	5.1	4.8	0.2 (−0.1, 0.4)	3.3	0.24
Year 4	5.2	5.1	5.0	4.7	0.2 (−0.1, 0.6)	4.6	0.21
Year 5	5.2	5.1	5.1	4.7	0.2 (−0.1, 0.6)	4.6	0.21
Overall	5.2	5.1	5.0	4.8	0.1 (0.008, 0.2)	2.0	0.07

(continued)

Table I-20 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of PAC transfers classified as major or extreme severity							
Year 1	67.7	59.1	72.0	64.7	−0.9 (−3.9, 2.2)	−1.3	0.64
Year 2	67.7	59.1	72.0	63.9	−0.1 (−4.6, 4.4)	−0.1	0.98
Year 3	67.7	59.1	76.2	65.4	3.5 (−3.8, 10.8)	5.2	0.43
Year 4	67.7	59.1	76.9	64.9	4.9 (−4.8, 14.6)	7.2	0.41
Year 5	67.7	59.1	79.9	67.0	6.7 (−4.3, 17.7)	9.9	0.32
Overall	67.7	59.1	74.6	64.9	2.1 (−0.9, 5.1)	3.1	0.25

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PAC = post-acute care; STAC = short-term, acute care.

Methods: A logistic regression model was used to obtain estimates for all binary outcomes. A Poisson model was used for length of stay for admissions resulting in a PAC transfer. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage), and admission-level variables (DRG weight, whether an admission came from a skilled nursing facility, and whether an admission came from the ED).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

(continued)

Table I-20 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

The total weighted N for the percentage of admissions resulting in a STAC transfer and the percentage of admissions resulting in a PAC transfer is 3,062,721. The total weighted N for the percentage of STAC transfers classified as major or extreme severity is 26,256. The total weighted N for length of stay for admissions resulting in a PAC transfer is 60,296. The total weighted N for the percentage of PAC transfers classified as major or extreme severity is 60,045.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-21
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Place of service	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Hospital outpatient departments (%)							
Year 1	13.1	17.3	14.6	19.9	−0.6 (−1.7, 0.5)	−4.9	0.34
Year 2	13.1	17.3	14.6	21.4	−2.0 (−4.2, 0.2)	−15.2	0.13
Year 3	13.1	17.3	14.7	17.3	1.7 (−0.9, 4.3)	13.1	0.28
Year 4	13.1	17.3	14.3	17.8	0.9 (−2.1, 3.9)	6.7	0.63
Year 5	13.1	17.3	10.1	13.4	0.1 (−2.6, 2.8)	0.8	0.95
Overall	13.1	17.3	14.0	18.5	0.02 (−1.1, 1.1)	0.1	0.98
Physician offices[a] (%)							
Year 1	84.7	83.8	84.8	83.6	0.2 (0.01, 0.4)	0.3	0.09
Year 2	84.7	83.8	85.1	83.7	0.4 (0.05, 0.8)	0.5	0.06
Year 3	84.7	83.8	84.9	83.5	0.5 (−0.05, 1.0)	0.6	0.13
Year 4	84.7	83.8	84.9	83.2	0.8 (0.2, 1.4)	0.9	0.04
Year 5	84.7	83.8	78.0	75.7	1.1 (0.006, 2.1)	1.3	0.10
Overall	84.7	83.8	84.1	82.6	0.5 (0.3, 0.8)	0.6	<0.001

(continued)

Table I-21 (continued)
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Place of service	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
FQHCs and RHCs (%)							
Year 1	2.7	3.1	2.8	3.2	−0.03 (−0.1, 0.1)	−1.1	0.67
Year 2	2.7	3.1	3.0	3.2	0.1 (−0.2, 0.4)	5.0	0.45
Year 3	2.7	3.1	3.1	3.7	−0.2 (−0.6, 0.2)	−8.1	0.34
Year 4	2.7	3.1	3.2	4.1	−0.5 (−1.1, 0.2)	−16.6	0.26
Year 5	2.7	3.1	2.7	3.5	−0.4 (−1.2, 0.3)	−16.2	0.33
Overall	2.7	3.1	3.0	3.6	−0.2 (−0.4, 0.03)	−6.5	0.15
All sites of care combined (# of visits)							
Year 1	8.1	8.3	8.1	8.3	−0.003 (−0.07, 0.03)	−0.3	0.47
Year 2	8.1	8.3	8.2	8.3	0.1 (−0.005, 0.2)	1.1	0.12
Year 3	8.1	8.3	8.3	8.2	0.2 (0.1, 0.4)	2.7	0.01
Year 4	8.1	8.3	8.3	8.2	0.3 (0.1, 0.4)	3.5	0.002
Year 5	8.1	8.3	8.2	8.1	0.3 (0.1, 0.5)	3.9	0.005
Overall	8.1	8.3	8.2	8.2	0.2 (0.1, 0.2)	2.0	<0.001

(continued)

Table I-21 (continued)
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI = confidence interval; D-in-D = difference-in-differences; FQHC = federally qualified health center; RHC = rural health clinic.

Methods: A logistic regression model was used to obtain estimates of the difference in the percentage of beneficiaries with an outpatient medical exam visit by place of service. A negative binomial regression model was used to obtain estimates of the number of visits for all sites of care combined. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for all models is 10,281,981.

[a] Physician offices includes visits to urgent care centers and Method II critical access hospitals.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-22
Difference in the pre-post change in commercial plan members with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Hospital outpatient departments (%)							
Year 1	4.5	6.7	6.2	7.2	1.4 (0.2, 2.6)	31.8	0.05
Year 2	4.5	6.7	6.7	7.3	1.8 (0.3, 3.3)	41.2	0.04
Year 3	4.5	6.7	7.3	8.7	1.5 (−0.1, 3.0)	33.2	0.11
Year 4	4.5	6.7	7.1	9.0	1.0 (−0.2, 2.3)	23.6	0.17
Overall	4.5	6.7	6.8	8.0	1.4 (0.8, 2.1)	32.6	<0.001
Physician offices (%)							
Year 1	72.4	67.8	70.6	68.5	−2.4 (−3.4, −1.4)	−3.3	<0.001
Year 2	72.4	67.8	70.6	68.1	−2.0 (−3.2, −0.8)	−2.8	0.01
Year 3	72.4	67.8	70.3	67.3	−1.6 (−2.8, −0.5)	−2.2	0.02
Year 4	72.4	67.8	70.4	67.8	−1.9 (−3.0, −0.7)	−2.6	0.01
Overall	72.4	67.8	70.5	68.0	−2.0 (−2.6, −1.4)	−2.8	<0.001

(continued)

Table I-22 (continued)
Difference in the pre-post change in commercial plan members with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
All sites of care combined (# of visits)							
Year 1	3.2	3.0	3.2	3.2	−0.2 (−0.2, −0.1)	−4.8	<0.001
Year 2	3.2	3.0	3.3	3.2	−0.1 (−0.2, −0.02)	−2.6	0.04
Year 3	3.2	3.0	3.3	3.2	−0.1 (−0.1, 0.01)	−2.0	0.13
Year 4	3.2	3.0	3.3	3.2	−0.04 (−0.1, 0.04)	−1.2	0.41
Overall	3.2	3.0	3.3	3.2	−0.1 (−0.1, −0.1)	−2.8	<0.001

CI = confidence interval; D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in the percentage of commercial plan members with an outpatient medical exam visit by place of service. A negative binomial regression model was used to obtain estimates of the number of visits for all sites of care combined. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Appendix A* for additional detail.

The total weighted N for all models is 4,045,874.

[a] Physician offices includes visits to urgent care centers.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table I-23
Components of unadjusted Medicare payments for inpatient episodes of care by period, Maryland and comparison group, first 4.5 years of Maryland All-Payer Model implementation overall

Window/ payment component	Weighted mean payments				All-Payer Model minus baseline period		
	Baseline period		All-Payer Model period				
	Maryland	Comparison group	Maryland	Comparison group	Maryland	Comparison group	D-in-D
14-day pre-admission window							
Physician	326	361	407	401	80	39	41
Outpatient	273	180	339	228	66	48	18
Durable medical equipment	26	28	22	25	−4	−2	−1
Total	625	569	768	654	143	85	58
Index hospitalization window							
Index STAC hospital	12,063	9,847	13,569	10,662	1,506	814	692
Physician	1,311	1,501	1,433	1,557	122	56	66
Total	13,374	11,349	15,002	12,219	1,628	870	758
30-day post-discharge window							
Inpatient	3,022	3,429	2,970	3,598	−51	170	−221
STAC	2,727	2,212	2,681	2,236	−46	24	−70
Other inpatient	295	1,217	289	1,363	−6	146	−152
Skilled nursing facility	2,621	2,758	2,841	2,938	219	180	39
Durable medical equipment	80	82	62	69	−17	−13	−5
Outpatient	748	506	854	613	105	108	−2
Physician	792	958	863	1,005	71	48	24
Home health agency	602	762	695	806	93	44	49
Total	7,866	8,493	8,286	9,030	420	537	−116
Total episode, all payment components	21,865	20,411	24,056	21,903	2,191	1,492	700
Total pre-admission and post-discharge windows, all payment components	8,491	9,062	9,054	9,684	563	621	−58
Number of observations	463,775	400,855	655,860	550,378	N/A	N/A	N/A

D-in-D = difference-in-differences; N/A = not applicable; STAC = short-term, acute care.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-24
Difference in the pre-post change in Medicare payments for inpatient episodes of care for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Window	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total episode, all payment windows and payment components							
Year 1	23,366.19	19,835.34	23,992.10	20,265.36	195.90 (−228.25, 620.04)	0.8	0.45
Year 2	23,366.19	19,835.34	24,417.76	20,134.79	752.13 (202.95, 1,301.31)	3.2	0.02
Year 3	23,366.19	19,835.34	24,516.45	20,204.62	780.98 (−62.12, 1,624.09)	3.3	0.13
Year 4	23,366.19	19,835.34	25,137.29	20,228.66	1,377.79 (455.49, 2,300.08)	5.9	0.01
Year 5	23,366.19	19,835.34	24,604.36	19,247.76	1,825.75 (811.54, 2,839.97)	7.8	0.003
Overall	23,366.19	19,835.34	24,517.92	20,103.30	883.69 (549.89, 1,217.49)	3.8	<0.001
Total pre-admission and post-discharge window payments, all payment components							
Year 1	8,848.22	8,580.16	9,103.46	8,970.75	−135.36 (−307.40, 36.68)	−1.5	0.20
Year 2	8,848.22	8,580.16	9,273.69	8,986.14	19.48 (−246.77, 285.73)	0.2	0.90
Year 3	8,848.22	8,580.16	9,475.51	9,175.41	32.03 (−349.19, 413.26)	0.4	0.89
Year 4	8,848.22	8,580.16	9,560.01	9,180.43	111.51 (−321.70, 544.73)	1.3	0.67
Year 5	8,848.22	8,580.16	8,649.87	8,172.18	209.63 (−305.34, 724.60)	2.4	0.50
Overall	8,848.22	8,580.16	9,273.29	8,977.58	27.58 (−127.89, 183.05)	0.3	0.77

(continued)

Table I-24 (continued)
Difference in the pre-post change in Medicare payments for inpatient episodes of care for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

CI = confidence interval; D-in-D = difference-in-differences.

Methods: A weighted least squares model was used to obtain estimates of the differences in Medicare payments for inpatient episodes of care. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), hospital-level variables (resident-to-bed ratio, number of short-term acute beds, area wage index, and disproportionate share hospital percentage), and case-mix severity (DRG weight) for the admission.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N is 2,237,756.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-25
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by hospital TPR system participation status and year

Participated in TPR	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Case-mix-adjusted payment per discharge ($)									
No (weighted N=2,589,832)	Year 1	10,338.31	6,631.01	10,864.09	6,850.27	306.52 (15.68, 597.37)	3.0	0.08	—
	Year 2	10,338.31	6,631.01	11,375.95	6,793.08	875.58 (503.74, 1,247.42)	8.5	<0.001	—
	Year 3	10,338.31	6,631.01	11,440.42	6,751.48	981.64 (368.25, 1,595.03)	9.5	0.01	—
	Year 4	10,338.31	6,631.01	11,953.92	6,718.71	1,527.91 (902.13, 2,153.70)	14.8	<0.001	—
	Year 5	10,338.31	6,631.01	12,281.68	6,769.10	1,805.28 (1,165.67, 2,444.90)	17.5	<0.001	—
	Overall	10,338.31	6,631.01	11,492.80	6,778.45	1,006.89 (777.38, 1,236.39)	9.7	<0.001	—
Yes (weighted N=485,261)	Year 1	9,467.28	5,870.12	9,674.90	5,896.23	181.51 (–226.12, 589.13)	1.9	0.46	0.70
	Year 2	9,467.28	5,870.12	9,234.35	5,723.67	–86.47 (–759.26, 586.32)	–0.9	0.83	0.05
	Year 3	9,467.28	5,870.12	8,719.08	5,641.82	–519.90 (–1,359.53, 319.74)	–5.5	0.31	0.03
	Year 4	9,467.28	5,870.12	8,783.57	5,693.35	–506.94 (–1,657.00, 643.12)	–5.4	0.47	0.01
	Year 5	9,467.28	5,870.12	8,757.72	5,731.73	–571.17 (–1,863.08, 720.74)	–6.0	0.47	0.01
	Overall	9,467.28	5,870.12	9,073.42	5,739.24	–263.00 (–645.82, 119.82)	–2.8	0.26	<0.001

(continued)

Table I-25 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by hospital TPR system participation status and year

Participated in TPR	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
DRG weight per admission									
No (weighted N=2,589,832)	Year 1	1.578	1.586	1.630	1.644	–0.004 (–0.035, 0.026)	–0.3	0.81	—
	Year 2	1.578	1.586	1.677	1.655	0.031 (–0.011, 0.073)	2.0	0.23	—
	Year 3	1.578	1.586	1.736	1.709	0.036 (–0.027, 0.100)	2.3	0.35	—
	Year 4	1.578	1.586	1.783	1.732	0.060 (–0.026, 0.146)	3.8	0.25	—
	Year 5	1.578	1.586	1.842	1.766	0.085 (–0.007, 0.176)	5.4	0.13	—
	Overall	1.578	1.586	1.720	1.693	0.036 (0.008, 0.064)	2.3	0.03	—
Yes (weighted N=485,261)	Year 1	1.497	1.461	1.528	1.515	–0.023 (–0.079, 0.032)	–1.6	0.49	0.62
	Year 2	1.497	1.461	1.587	1.537	0.013 (–0.056, 0.082)	0.9	0.75	0.72
	Year 3	1.497	1.461	1.663	1.580	0.047 (–0.045, 0.139)	3.1	0.40	0.88
	Year 4	1.497	1.461	1.702	1.569	0.096 (–0.013, 0.205)	6.4	0.15	0.67
	Year 5	1.497	1.461	1.775	1.572	0.167 (0.031, 0.302)	11.1	0.04	0.41
	Overall	1.497	1.461	1.635	1.552	0.047 (0.007, 0.086)	3.1	0.05	0.72

(continued)

Table I-25 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by hospital TPR system participation status and year

Participated in TPR	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
No (weighted N=2,589,832)	Year 1	168.7	164.6	161.6	155.3	2.3 (–3.4, 8.0)	1.3	0.51	—
	Year 2	168.7	164.6	156.9	154.9	–1.9 (–9.9, 6.2)	–1.1	0.70	—
	Year 3	168.7	164.6	158.4	152.6	1.9 (–8.4, 12.1)	1.1	0.77	—
	Year 4	168.7	164.6	152.0	152.1	–3.7 (–17.1, 9.7)	–2.2	0.65	—
	Year 5	168.7	164.6	159.0	153.9	1.2 (–15.2, 17.6)	0.7	0.91	—
	Overall	168.7	164.6	157.5	153.8	–0.2 (–4.8, 4.4)	–0.1	0.95	—
Yes (weighted N=485,261)	Year 1	149.3	161.9	140.8	151.1	1.6 (–7.0, 10.2)	1.1	0.76	0.91
	Year 2	149.3	161.9	136.4	152.2	–3.9 (–14.3, 6.5)	–2.6	0.54	0.80
	Year 3	149.3	161.9	140.4	143.3	8.5 (–5.6, 22.7)	5.7	0.32	0.53
	Year 4	149.3	161.9	137.2	146.7	2.1 (–12.8, 17.0)	1.4	0.82	0.64
	Year 5	149.3	161.9	133.0	154.8	–9.7 (–33.2, 13.9)	–6.5	0.50	0.53
	Overall	149.3	161.9	138.1	149.0	0.9 (–5.1, 6.8)	0.6	0.81	0.80

(continued)

Table I-25 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by hospital TPR system participation status and year

Participated in TPR	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
No (weighted N=2,589,832)	Year 1	67.9	70.7	66.8	71.3	–1.7 (–3.2, –0.1)	–2.4	0.07	—
	Year 2	67.9	70.7	68.3	71.7	–0.6 (–2.5, 1.4)	–0.9	0.62	—
	Year 3	67.9	70.7	70.6	73.4	0.0 (–2.2, 2.1)	–0.1	0.98	—
	Year 4	67.9	70.7	72.1	73.9	0.9 (–1.4, 3.3)	1.4	0.51	—
	Year 5	67.9	70.7	72.8	74.4	1.1 (–1.6, 3.7)	1.5	0.52	—
	Overall	67.9	70.7	69.7	72.7	–0.2 (–1.2, 0.7)	–0.3	0.69	—
Yes (weighted N=485,261)	Year 1	63.8	68.0	62.9	68.6	–1.4 (–3.6, 0.8)	–2.2	0.30	0.87
	Year 2	63.8	68.0	64.5	69.1	–0.4 (–3.8, 3.0)	–0.6	0.85	0.94
	Year 3	63.8	68.0	66.3	71.1	–0.7 (–4.9, 3.5)	–1.1	0.79	0.83
	Year 4	63.8	68.0	65.6	73.0	–3.1 (–8.2, 1.9)	–4.9	0.31	0.23
	Year 5	63.8	68.0	66.8	73.9	–2.8 (–8.8, 3.2)	–4.3	0.45	0.34
	Overall	63.8	68.0	65.0	70.7	–1.5 (–3.3, 0.3)	–2.4	0.17	0.31

(continued)

Table I-25 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by hospital TPR system participation status and year

CI = confidence interval; D-in-D = difference-in-differences; DRG= diagnosis-related group; TPR = Total Patient Revenue.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-26
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group hospitals during the first 4.5 years of Maryland All-Payer Model implementation, by teaching hospital status and year

Teaching hospital status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Case-mix-adjusted payment per discharge ($)									
Non-teaching (weighted N=1,851,577)	Year 1	8,986.52	5,687.49	9,427.23	5,822.25	305.95 (62.11, 549.80)	3.4	0.04	—
	Year 2	8,986.52	5,687.49	9,738.34	5,733.01	706.31 (320.75, 1,091.87)	7.9	0.003	—
	Year 3	8,986.52	5,687.49	9,792.47	5,660.81	832.64 (355.06, 1,310.22)	9.3	0.004	—
	Year 4	8,986.52	5,687.49	10,098.48	5,656.44	1,143.01 (578.26, 1,707.76)	12.7	<0.001	—
	Year 5	8,986.52	5,687.49	10,438.63	5,725.47	1,414.13 (738.85, 2,089.42)	15.7	<0.001	—
	Overall	8,986.52	5,687.49	9,831.68	5,719.77	812.50 (607.65, 1,017.35)	9.0	<0.001	—
Teaching (weighted N=1,093,924)	Year 1	12,318.30	7,475.08	12,797.37	7,737.40	216.75 (–330.18, 763.67)	1.8	0.51	0.81
	Year 2	12,318.30	7,475.08	13,210.58	7,625.20	742.15 (80.16, 1,404.15)	6.0	0.07	0.94
	Year 3	12,318.30	7,475.08	13,074.19	7,620.66	610.30 (–645.90, 1,866.49)	5.0	0.42	0.79
	Year 4	12,318.30	7,475.08	13,739.36	7,582.60	1,313.53 (–4.36, 2,631.42)	10.7	0.10	0.85
	Year 5	12,318.30	7,475.08	13,831.90	7,615.47	1,373.20 (153.34, 2,593.06)	11.1	0.06	0.96
	Overall	12,318.30	7,475.08	13,263.40	7,640.29	779.88 (321.33, 1,238.44)	6.3	0.005	0.92

(continued)

Table I-26 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group hospitals during the first 4.5 years of Maryland All-Payer Model implementation, by teaching hospital status and year

Teaching hospital status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
DRG weight per admission									
Non-teaching (weighted N=1,851,577)	Year 1	1.489	1.480	1.548	1.531	0.008 (–0.022, 0.039)	0.6	0.65	—
	Year 2	1.489	1.480	1.594	1.548	0.037 (–0.006, 0.079)	2.5	0.16	—
	Year 3	1.489	1.480	1.652	1.586	0.057 (–0.009, 0.123)	3.8	0.16	—
	Year 4	1.489	1.480	1.711	1.604	0.097 (0.011, 0.183)	6.5	0.06	—
	Year 5	1.489	1.480	1.778	1.626	0.143 (0.047, 0.240)	9.6	0.01	—
	Overall	1.489	1.480	1.641	1.573	0.059 (0.031, 0.087)	4.0	<0.001	—
Teaching (weighted N=1,093,924)	Year 1	1.688	1.702	1.719	1.766	–0.033 (–0.077, 0.012)	–1.9	0.23	0.20
	Year 2	1.688	1.702	1.775	1.774	0.015 (–0.048, 0.077)	0.9	0.70	0.63
	Year 3	1.688	1.702	1.843	1.844	0.014 (–0.081, 0.108)	0.8	0.81	0.54
	Year 4	1.688	1.702	1.864	1.860	0.019 (–0.116, 0.155)	1.1	0.82	0.42
	Year 5	1.688	1.702	1.914	1.901	0.027 (–0.105, 0.159)	1.6	0.73	0.24
	Overall	1.688	1.702	1.811	1.819	0.006 (–0.036, 0.048)	0.3	0.82	0.08

(continued)

Table I-26 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group hospitals during the first 4.5 years of Maryland All-Payer Model implementation, by teaching hospital status and year

Teaching hospital status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-teaching (weighted N=1,285,756)	Year 1	156.9	158.8	145.3	152.0	–5.0 (–11.3, 1.3)	–3.2	0.19	—
	Year 2	156.9	158.8	138.9	150.5	–10.1 (–19.4, –0.9)	–6.5	0.07	—
	Year 3	156.9	158.8	136.3	148.4	–10.7 (–22.3, 0.9)	–6.8	0.13	—
	Year 4	156.9	158.8	130.5	148.7	–17.2 (–32.6, –1.8)	–11.0	0.07	—
	Year 5	156.9	158.8	130.9	151.1	–19.4 (–38.8, 0.1)	–12.3	0.10	—
	Overall	156.9	158.8	137.3	150.0	–11.5 (–16.8, –6.2)	–7.3	<0.001	—
Teaching (weighted N=649,953)	Year 1	180.8	171.6	180.6	159.2	11.4 (5.3, 17.6)	6.3	0.002	0.002
	Year 2	180.8	171.6	178.9	159.8	9.1 (0.7, 17.5)	5.0	0.07	0.01
	Year 3	180.8	171.6	190.4	154.4	23.1 (12.4, 33.9)	12.8	<0.001	<0.001
	Year 4	180.8	171.6	183.1	155.1	16.0 (0.7, 31.3)	8.9	0.08	0.01
	Year 5	180.8	171.6	198.8	157.4	26.1 (7.5, 44.7)	14.4	0.02	0.01
	Overall	180.8	171.6	184.6	157.2	15.9 (10.8, 21.0)	8.8	<0.001	<0.001

(continued)

Table I-26 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group hospitals during the first 4.5 years of Maryland All-Payer Model implementation, by teaching hospital status and year

Teaching hospital status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-teaching (weighted N=1,385,752)	Year 1	68.9	70.9	69.5	71.9	–0.4 (–1.7, 1.0)	–0.6	0.64	—
	Year 2	68.9	70.9	71.3	72.1	1.2 (–0.6, 3.0)	1.7	0.27	—
	Year 3	68.9	70.9	73.7	74.4	1.3 (–1.0, 3.5)	1.9	0.35	—
	Year 4	68.9	70.9	75.1	75.2	1.8 (–0.8, 4.3)	2.6	0.26	—
	Year 5	68.9	70.9	76.0	76.2	1.6 (–1.3, 4.5)	2.3	0.36	—
	Overall	68.9	70.9	72.7	73.7	1.0 (0.1, 2.0)	1.5	0.08	—
Teaching (weighted N=775,048)	Year 1	63.6	68.9	59.7	68.8	–3.7 (–6.2, –1.2)	–5.8	0.02	0.05
	Year 2	63.6	68.9	60.6	69.4	–3.4 (–6.6, –0.1)	–5.3	0.09	0.04
	Year 3	63.6	68.9	62.4	70.2	–2.4 (–5.8, 0.9)	–3.8	0.23	0.12
	Year 4	63.6	68.9	63.2	70.8	–2.3 (–6.0, 1.3)	–3.6	0.30	0.13
	Year 5	63.6	68.9	63.6	70.4	–1.6 (–5.8, 2.7)	–2.4	0.55	0.32
	Overall	63.6	68.9	61.7	69.8	–2.8 (–4.3, –1.3)	–4.5	0.002	<0.001

(continued)

Table I-26 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group hospitals during the first 4.5 years of Maryland All-Payer Model implementation, by teaching hospital status and year

CI = confidence interval; D-in-D = difference-in-differences; DRG= diagnosis-related group.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-27

Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by disproportionate share hospital percentage and year

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Case-mix-adjusted payment per discharge ($)									
Low/medium (weighted N=2,368,414)	Year 1	9,289.75	6,066.15	9,810.00	6,288.57	297.82 (86.77, 508.87)	3.2	0.02	—
	Year 2	9,289.75	6,066.15	10,111.56	6,220.26	667.69 (335.60, 999.78)	7.2	<0.001	—
	Year 3	9,289.75	6,066.15	10,182.87	6,229.69	729.57 (291.55, 1,167.60)	7.9	0.01	—
	Year 4	9,289.75	6,066.15	10,540.51	6,265.77	1,051.13 (492.66, 1,609.61)	11.3	0.002	—
	Year 5	9,289.75	6,066.15	10,895.05	6,361.67	1,309.77 (685.80, 1,933.74)	14.1	<0.001	—
	Overall	9,289.75	6,066.15	10,235.18	6,263.12	748.59 (557.91, 939.26)	8.1	<0.001	—
High (weighted N=817,340)	Year 1	12,552.87	7,671.64	12,824.07	7,923.36	19.48 (–641.39, 680.35)	0.2	0.96	0.50
	Year 2	12,552.87	7,671.64	13,320.00	7,830.59	608.18 (–246.61, 1,462.96)	4.8	0.24	0.91
	Year 3	12,552.87	7,671.64	13,269.18	7,648.59	739.36 (–886.57, 2,365.30)	5.9	0.45	0.99
	Year 4	12,552.87	7,671.64	14,074.08	7,610.92	1,581.92 (11.06, 3,152.79)	12.6	0.10	0.61
	Year 5	12,552.87	7,671.64	14,088.66	7,621.24	1,586.19 (165.36, 3,007.01)	12.6	0.07	0.77
	Overall	12,552.87	7,671.64	13,432.73	7,743.83	807.47 (240.66, 1,374.27)	6.4	0.02	0.86

(continued)

Table I-27 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by disproportionate share hospital percentage and year

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
DRG weight per admission									
Low/medium (weighted N=2,368,414)	Year 1	1.548	1.557	1.597	1.621	–0.015 (–0.045, 0.014)	–1.0	0.39	—
	Year 2	1.548	1.557	1.630	1.631	0.008 (–0.030, 0.046)	0.5	0.74	—
	Year 3	1.548	1.557	1.680	1.690	–0.001 (–0.057, 0.054)	–0.1	0.97	—
	Year 4	1.548	1.557	1.724	1.713	0.020 (–0.055, 0.095)	1.3	0.66	—
	Year 5	1.548	1.557	1.788	1.742	0.055 (–0.029, 0.138)	3.5	0.28	—
	Overall	1.548	1.557	1.671	1.672	0.008 (–0.017, 0.033)	0.5	0.59	—
High (weighted N=817,340)	Year 1	1.613	1.599	1.672	1.626	0.033 (–0.015, 0.080)	2.0	0.26	0.15
	Year 2	1.613	1.599	1.767	1.650	0.103 (0.028, 0.178)	6.4	0.02	0.06
	Year 3	1.613	1.599	1.874	1.683	0.177 (0.062, 0.292)	11.0	0.01	0.02
	Year 4	1.613	1.599	1.932	1.685	0.234 (0.076, 0.391)	14.5	0.01	0.04
	Year 5	1.613	1.599	1.989	1.715	0.260 (0.104, 0.417)	16.1	0.01	0.05
	Overall	1.613	1.599	1.826	1.666	0.147 (0.098, 0.196)	9.1	<0.001	<0.001

(continued)

Table I-27 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by disproportionate share hospital percentage and year

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Low/medium (weighted N=1,558,564)	Year 1	162.6	161.2	153.6	152.3	–0.04 (–5.6, 5.6)	–0.02	0.99	—
	Year 2	162.6	161.2	149.2	152.8	–4.8 (–12.8, 3.3)	–2.9	0.33	—
	Year 3	162.6	161.2	150.5	147.5	1.6 (–8.3, 11.6)	1.0	0.79	—
	Year 4	162.6	161.2	145.9	148.5	–3.7 (–16.8, 9.4)	–2.3	0.64	—
	Year 5	162.6	161.2	150.1	150.8	–1.8 (–18.5, 15.0)	–1.1	0.86	—
	Overall	162.6	161.2	149.9	150.4	–1.7 (–6.3, 2.9)	–1.1	0.54	—
High (weighted N=450,327)	Year 1	178.5	171.7	178.8	159.8	12.0 (–2.0, 26.0)	6.7	0.16	0.19
	Year 2	178.5	171.7	174.3	156.2	11.2 (–4.1, 26.4)	6.3	0.23	0.13
	Year 3	178.5	171.7	179.1	157.2	14.2 (–8.1, 36.5)	8.0	0.29	0.40
	Year 4	178.5	171.7	168.7	158.3	3.7 (–25.1, 32.4)	2.1	0.83	0.70
	Year 5	178.5	171.7	177.9	159.2	10.9 (–18.1, 40.0)	6.1	0.54	0.53
	Overall	178.5	171.7	175.6	158.0	10.4 (0.7, 20.1)	5.8	0.08	0.07

(continued)

Table I-27 (continued)

Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by disproportionate share hospital percentage and year

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Low/medium (weighted N=1,672,536)	Year 1	67.9	71.4	67.9	71.9	–0.6 (–1.9, 0.7)	–0.9	0.43	—
	Year 2	67.9	71.4	69.6	72.3	0.8 (–1.0, 2.6)	1.1	0.48	—
	Year 3	67.9	71.4	72.0	74.1	1.2 (–1.0, 3.4)	1.7	0.37	—
	Year 4	67.9	71.4	73.3	74.9	1.7 (–0.8, 4.2)	2.5	0.27	—
	Year 5	67.9	71.4	74.2	75.7	1.7 (–1.3, 4.6)	2.4	0.35	—
	Overall	67.9	71.4	71.0	73.5	0.8 (–0.1, 1.8)	1.2	0.15	—
High (weighted N=560,326)	Year 1	63.1	66.0	59.1	66.9	–4.7 (–8.0, –1.5)	–7.5	0.02	0.05
	Year 2	63.1	66.0	59.8	67.4	–4.5 (–8.3, –0.8)	–7.2	0.05	0.03
	Year 3	63.1	66.0	62.0	68.9	–3.9 (–8.2, 0.4)	–6.2	0.14	0.08
	Year 4	63.1	66.0	63.0	69.8	–3.9 (–8.4, 0.6)	–6.1	0.16	0.08
	Year 5	63.1	66.0	63.2	68.7	–2.5 (–7.9, 2.8)	–4.0	0.44	0.26
	Overall	63.1	66.0	61.1	68.2	–4.1 (–6.0, –2.3)	–6.5	<0.001	<0.001

(continued)

Table I-27 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by disproportionate share hospital percentage and year

CI = confidence interval; D-in-D = difference-in-differences; DRG= diagnosis-related group.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-28

Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by accountable care organization alignment status and year

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Case-mix-adjusted payment per discharge ($)									
Non-aligned (weighted N=1,261,543)	Year 1	10,332.12	6,605.97	10,702.89	6,842.90	133.84 (–213.29, 480.97)	1.3	0.53	—
	Year 2	10,332.12	6,605.97	11,078.30	6,684.54	667.61 (134.52, 1,200.70)	6.5	0.04	—
	Year 3	10,332.12	6,605.97	11,078.96	6,603.09	749.72 (57.80, 1,441.64)	7.3	0.07	—
	Year 4	10,332.12	6,605.97	11,476.22	6,653.26	1,096.81 (239.13, 1,954.50)	10.6	0.04	—
	Year 5	10,332.12	6,605.97	11,683.06	6,712.03	1,244.88 (192.87, 2,296.89)	12.0	0.05	—
	Overall	10,332.12	6,605.97	11,138.25	6,698.77	712.41 (412.52, 1,012.30)	6.9	<0.001	—
Aligned (weighted N=1,801,191)	Year 1	10,094.36	6,486.02	10,634.57	6,639.59	386.63 (25.56, 747.71)	3.8	0.08	0.42
	Year 2	10,094.36	6,486.02	10,992.19	6,638.04	745.81 (295.03, 1,196.59)	7.4	0.01	0.86
	Year 3	10,094.36	6,486.02	10,944.09	6,618.20	717.54 (–54.56, 1,489.64)	7.1	0.13	0.96
	Year 4	10,094.36	6,486.02	11,420.34	6,539.67	1,272.33 (512.13, 2,032.53)	12.6	0.01	0.81
	Year 5	10,094.36	6,486.02	11,733.75	6,584.77	1,540.64 (819.11, 2,262.16)	15.3	<0.001	0.71
	Overall	10,094.36	6,486.02	11,073.01	6,607.43	857.63 (576.08, 1,139.19)	8.5	<0.001	0.59

(continued)

Table I-28 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by accountable care organization alignment status and year

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
DRG weight per admission									
Non-aligned (weighted N=,1261,543)	Year 1	1.586	1.592	1.656	1.641	0.021 (–0.023, 0.064)	1.3	0.43	—
	Year 2	1.586	1.592	1.715	1.652	0.069 (0.015, 0.123)	4.3	0.03	—
	Year 3	1.586	1.592	1.787	1.706	0.087 (0.000, 0.174)	5.5	0.10	—
	Year 4	1.586	1.592	1.864	1.712	0.158 (0.047, 0.269)	10.0	0.02	—
	Year 5	1.586	1.592	1.924	1.751	0.179 (0.066, 0.292)	11.3	0.01	—
	Overall	1.586	1.592	1.771	1.685	0.092 (0.056, 0.128)	5.8	<0.001	—
Aligned (weighted N=1,801,191)	Year 1	1.549	1.552	1.583	1.613	–0.027 (–0.059, 0.006)	–1.7	0.18	0.15
	Year 2	1.549	1.552	1.626	1.629	–0.0005 (–0.048, 0.047)	–0.03	0.99	0.11
	Year 3	1.549	1.552	1.680	1.679	0.004 (–0.065, 0.074)	0.3	0.92	0.22
	Year 4	1.549	1.552	1.707	1.707	0.003 (–0.091, 0.097)	0.2	0.96	0.08
	Year 5	1.549	1.552	1.770	1.731	0.042 (–0.062, 0.146)	2.7	0.50	0.14
	Overall	1.549	1.552	1.661	1.664	0.0001 (–0.031, 0.031)	0.005	1.00	0.001

(continued)

Table I-28 (continued)

Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by accountable care organization alignment status and year

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-aligned (weighted N=782,129)	Year 1	173.1	161.5	168.4	154.7	2.4 (–5.6, 10.4)	1.4	0.62	—
	Year 2	173.1	161.5	166.2	153.4	1.6 (–7.8, 11.0)	0.9	0.78	—
	Year 3	173.1	161.5	167.6	151.2	4.9 (–8.3, 18.2)	2.9	0.54	—
	Year 4	173.1	161.5	159.1	153.3	–4.8 (–19.8, 10.3)	–2.8	0.60	—
	Year 5	173.1	161.5	166.0	157.6	–2.6 (–21.5, 16.3)	–1.5	0.82	—
	Overall	173.1	161.5	165.5	153.6	0.8 (–4.7, 6.3)	0.5	0.81	—
Aligned (weighted N=1,198,693)	Year 1	160.9	166.0	151.8	155.1	1.5 (–5.1, 8.0)	0.9	0.71	0.88
	Year 2	160.9	166.0	145.5	155.4	–5.0 (–14.5, 4.6)	–3.1	0.39	0.42
	Year 3	160.9	166.0	147.8	151.0	1.5 (–10.4, 13.4)	1.0	0.83	0.75
	Year 4	160.9	166.0	143.4	150.6	–2.3 (–18.5, 13.8)	–1.5	0.81	0.86
	Year 5	160.9	166.0	147.4	151.5	0.6 (–19.4, 20.6)	0.4	0.96	0.85
	Overall	160.9	166.0	147.2	152.9	–0.9 (–6.5, 4.6)	–0.6	0.79	0.73

(continued)

Table I-28 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by accountable care organization alignment status and year

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-aligned (weighted N=880,061)	Year 1	66.5	69.3	66.6	69.8	–0.5 (–2.2, 1.1)	–0.8	0.61	—
	Year 2	66.5	69.3	68.4	69.3	1.8 (–0.3, 4.0)	2.8	0.15	—
	Year 3	66.5	69.3	70.3	71.5	1.4 (–1.3, 4.1)	2.1	0.39	—
	Year 4	66.5	69.3	71.8	72.3	2.1 (–0.9, 5.1)	3.1	0.25	—
	Year 5	66.5	69.3	72.0	73.5	1.1 (–2.8, 5.0)	1.7	0.64	—
	Overall	66.5	69.3	69.4	71.0	1.2 (0.0, 2.3)	1.8	0.09	—
Aligned (weighted N=1,315,340)	Year 1	67.6	71.0	65.8	71.6	–2.3 (–4.2, –0.5)	–3.4	0.04	0.22
	Year 2	67.6	71.0	67.1	72.6	–2.1 (–4.4, 0.3)	–3.0	0.15	0.04
	Year 3	67.6	71.0	69.6	74.0	–1.2 (–3.8, 1.4)	–1.8	0.45	0.25
	Year 4	67.6	71.0	70.5	74.8	–1.0 (–3.9, 1.8)	–1.5	0.55	0.22
	Year 5	67.6	71.0	71.5	74.8	–0.1 (–3.1, 3.0)	–0.1	0.97	0.70
	Overall	67.6	71.0	68.5	73.4	–1.5 (–2.7, –0.4)	–2.2	0.03	0.01

(continued)

Table I-28 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by accountable care organization alignment status and year

CI = confidence interval; D-in-D = difference-in-differences; DRG= diagnosis-related group.

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-29
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	847.76	781.67	850.60	798.54	–14.03 (–24.88, –3.18)	–1.7	0.03	—
	Year 2	847.76	781.67	851.54	796.14	–10.68 (–29.07, 7.71)	–1.3	0.34	—
	Year 3	847.76	781.67	895.59	852.02	–22.52 (–45.77, 0.72)	–2.7	0.11	—
	Year 4	847.76	781.67	928.91	879.69	–16.87 (–45.89, 12.16)	–2.0	0.34	—
	Year 5	847.76	781.67	981.19	939.25	–24.15 (–63.27, 14.97)	–2.8	0.31	—
	Overall	847.76	781.67	893.27	843.88	–16.98 (–27.53, –6.42)	–2.0	0.01	—
Dual (weighted N=1,693,796)	Year 1	1,446.54	1,425.23	1,371.01	1,392.88	–43.18 (–70.18, –16.19)	–3.0	0.01	0.12
	Year 2	1,446.54	1,425.23	1,344.81	1,357.58	–34.09 (–71.19, 3.02)	–2.4	0.13	0.37
	Year 3	1,446.54	1,425.23	1,429.84	1,499.88	–91.35 (–147.76, –34.93)	–6.3	0.01	0.05
	Year 4	1,446.54	1,425.23	1,354.37	1,416.76	–83.70 (–156.87, –10.53)	–5.8	0.06	0.13
	Year 5	1,446.54	1,425.23	1,401.67	1,473.48	–93.13 (–184.99, –1.26)	–6.4	0.10	0.21
	Overall	1,446.54	1,425.23	1,378.06	1,423.10	–66.93 (–92.44, –41.42)	–4.6	<0.001	0.002

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total hospital PBPM ($)*									
Medicare only (weighted N=8,551,964)	Year 1	461.37	379.36	467.46	395.04	–9.59 (–17.34, –1.85)	–2.1	0.04	—
	Year 2	461.37	379.36	462.70	392.64	–11.94 (–26.03, 2.14)	–2.6	0.16	—
	Year 3	461.37	379.36	487.82	428.71	–22.91 (–40.71, –5.10)	–5.0	0.03	—
	Year 4	461.37	379.36	508.92	447.91	–21.01 (–42.65, 0.63)	–4.6	0.11	—
	Year 5	461.37	379.36	550.40	491.65	–23.26 (–52.33, 5.82)	–5.0	0.19	—
	Overall	461.37	379.36	489.67	424.69	–17.21 (–25.14, –9.28)	–3.7	<0.001	—
Dual (weighted N=1,693,796)	Year 1	857.95	715.12	823.97	702.03	–20.89 (–42.92, 1.14)	–2.4	0.12	0.45
	Year 2	857.95	715.12	813.23	682.50	–12.10 (–42.07, 17.87)	–1.4	0.51	0.99
	Year 3	857.95	715.12	862.72	784.27	–64.38 (–108.01, –20.76)	–7.5	0.02	0.12
	Year 4	857.95	715.12	831.95	742.43	–53.30 (–112.00, 5.40)	–6.2	0.14	0.35
	Year 5	857.95	715.12	881.59	786.49	–47.73 (–123.08, 27.63)	–5.6	0.30	0.57
	Overall	857.95	715.12	838.56	734.25	–39.22 (–59.61, –18.83)	–4.6	0.002	0.08

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Inpatient facility PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	341.32	280.83	342.03	280.26	1.28 (–5.49, 8.05)	0.4	0.76	—
	Year 2	341.32	280.83	338.65	273.18	4.98 (–7.19, 17.14)	1.5	0.50	—
	Year 3	341.32	280.83	360.69	298.03	2.16 (–13.22, 17.54)	0.6	0.82	—
	Year 4	341.32	280.83	377.60	305.97	11.13 (–8.67, 30.93)	3.3	0.36	—
	Year 5	341.32	280.83	416.42	337.81	18.11 (–10.61, 46.83)	5.3	0.30	—
	Overall	341.32	280.83	361.88	294.88	6.42 (–0.77, 13.60)	1.9	0.14	—
Dual (weighted N=1,693,796)	Year 1	670.27	586.10	632.59	556.49	–8.07 (–28.09, 11.94)	–1.2	0.51	0.47
	Year 2	670.27	586.10	627.40	532.55	10.68 (–17.25, 38.60)	1.6	0.53	0.75
	Year 3	670.27	586.10	671.73	608.50	–20.95 (–64.44, 22.55)	–3.1	0.43	0.37
	Year 4	670.27	586.10	650.86	566.09	0.61 (–57.82, 59.03)	0.1	0.99	0.74
	Year 5	670.27	586.10	702.94	598.80	19.97 (–55.73, 95.67)	3.0	0.66	0.96
	Overall	670.27	586.10	652.28	569.57	–1.74 (–21.85, 18.38)	–0.3	0.89	0.48

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	19.48	15.99	20.84	20.59	–3.24 (–4.32, –2.16)	–16.6	<0.001	—
	Year 2	19.48	15.99	20.15	20.46	–3.80 (–5.44, –2.17)	–19.5	<0.001	—
	Year 3	19.48	15.99	19.48	22.48	–6.49 (–8.74, –4.23)	–33.3	<0.001	—
	Year 4	19.48	15.99	20.43	23.92	–6.99 (–9.92, –4.05)	–35.9	<0.001	—
	Year 5	19.48	15.99	19.33	25.19	–9.35 (–12.96, –5.74)	–48.0	<0.001	—
	Overall	19.48	15.99	20.12	22.24	–5.63 (–6.65, –4.61)	–28.9	<0.001	—
Dual (weighted N=1,693,796)	Year 1	50.45	34.13	51.17	41.68	–6.83 (–9.27, –4.39)	–13.5	<0.001	<0.001
	Year 2	50.45	34.13	47.90	42.89	–11.30 (–15.51, –7.09)	–22.4	<0.001	<0.001
	Year 3	50.45	34.13	44.81	48.58	–20.09 (–27.91, –12.26)	–39.8	<0.001	<0.001
	Year 4	50.45	34.13	40.92	49.35	–24.75 (–34.73, –14.76)	–49.1	<0.001	<0.001
	Year 5	50.45	34.13	36.22	51.50	–31.60 (–44.42, –18.78)	–62.6	<0.001	<0.001
	Overall	50.45	34.13	44.99	46.26	–17.69 (–21.09, –14.28)	–35.1	<0.001	<0.001

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Other hospital outpatient department PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	100.57	82.54	104.58	94.19	–7.63 (–10.58, –4.68)	–7.6	<0.001	—
	Year 2	100.57	82.54	103.91	99.00	–13.12 (–17.88, –8.35)	–13.0	<0.001	—
	Year 3	100.57	82.54	107.65	108.20	–18.58 (–24.36, –12.80)	–18.5	<0.001	—
	Year 4	100.57	82.54	110.89	118.02	–25.15 (–32.93, –17.37)	–25.0	<0.001	—
	Year 5	100.57	82.54	114.65	128.65	–32.02 (–42.30, –21.74)	–31.8	<0.001	—
	Overall	100.57	82.54	107.68	107.57	–18.00 (–20.76, –15.24)	–17.9	<0.001	—
Dual (weighted N=1,693,796)	Year 1	137.23	94.89	140.21	103.86	–5.99 (–10.80, –1.18)	–4.4	0.04	0.67
	Year 2	137.23	94.89	137.93	107.07	–11.47 (–17.91, –5.03)	–8.4	0.003	0.74
	Year 3	137.23	94.89	146.18	127.19	–23.35 (–31.76, –14.94)	–17.0	<0.001	0.41
	Year 4	137.23	94.89	140.17	126.99	–29.16 (–40.30, –18.02)	–21.2	<0.001	0.62
	Year 5	137.23	94.89	142.42	136.18	–36.10 (–49.67, –22.53)	–26.3	<0.001	0.69
	Overall	137.23	94.89	141.29	118.42	–19.80 (–23.74, –15.86)	–14.4	<0.001	0.55

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
All-cause acute inpatient admissions per 1,000 population									
Medicare only (weighted N=8,551,964)	Year 1	276.1	282.7	252.0	261.2	–3.2 (–8.4, 2.0)	–1.2	0.31	—
	Year 2	276.1	282.7	237.3	252.4	–9.7 (–17.6, –1.7)	–3.5	0.04	—
	Year 3	276.1	282.7	236.5	256.5	–14.0 (–24.6, –3.3)	–5.1	0.03	—
	Year 4	276.1	282.7	228.2	259.3	–24.8 (–39.1, –10.4)	–9.0	0.004	—
	Year 5	276.1	282.7	242.6	279.6	–29.5 (–46.7, –12.3)	–10.7	0.005	—
	Overall	276.1	282.7	238.8	259.9	–14.9 (–19.8, –9.9)	–5.4	<0.001	—
Dual (weighted N=1,693,796)	Year 1	572.6	557.8	487.5	492.1	–18.6 (–34.9, –2.2)	–3.2	0.06	0.10
	Year 2	572.6	557.8	441.4	472.5	–47.6 (–71.1, –24.0)	–8.3	<0.001	0.005
	Year 3	572.6	557.8	450.6	495.9	–58.4 (–84.3, –32.4)	–10.2	<0.001	0.003
	Year 4	572.6	557.8	393.4	458.6	–85.2 (–121.1, –49.3)	–14.9	<0.001	0.005
	Year 5	572.6	557.8	409.3	479.0	–89.9 (–134.2, –45.6)	–15.7	<0.001	0.03
	Overall	572.6	557.8	438.6	479.8	–57.2 (–70.1, –44.3)	–10.0	<0.001	<0.001

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits per 1,000 population									
Medicare only (weighted N=8,551,964)	Year 1	337.8	311.9	362.2	328.6	6.0 (–0.9, 12.9)	1.8	0.15	—
	Year 2	337.8	311.9	373.8	333.9	11.7 (1.8, 21.7)	3.5	0.05	—
	Year 3	337.8	311.9	375.8	343.4	3.6 (–10.0, 17.2)	1.1	0.66	—
	Year 4	337.8	311.9	386.2	347.4	9.2 (–7.8, 26.1)	2.7	0.37	—
	Year 5	337.8	311.9	390.0	345.6	14.3 (–5.8, 34.4)	4.2	0.24	—
	Overall	337.8	311.9	376.4	339.2	8.4 (2.4, 14.4)	2.5	0.02	—
Dual (weighted N=1,693,796)	Year 1	1042.5	962.1	1065.1	947.1	38.1 (15.5, 60.7)	3.7	0.006	0.01
	Year 2	1042.5	962.1	1049.9	966.9	2.2 (–40.4, 44.8)	0.2	0.93	0.70
	Year 3	1042.5	962.1	1050.1	1009.8	–41.0 (–93.2, 11.2)	–3.9	0.20	0.13
	Year 4	1042.5	962.1	1012.2	951.3	–18.1 (–84.5, 48.2)	–1.7	0.65	0.46
	Year 5	1042.5	962.1	991.0	938.7	–25.4 (–99.8, 48.9)	–2.4	0.57	0.33
	Overall	1042.5	962.1	1038.0	965.6	–7.7 (–31.2, 15.8)	–0.7	0.59	0.23

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Medicare only (weighted N=1,597,380)	Year 1	156.1	154.3	149.3	146.7	0.9 (–4.8, 6.5)	0.6	0.80	—
	Year 2	156.1	154.3	144.8	146.7	–3.5 (–10.6, 3.5)	–2.3	0.41	—
	Year 3	156.1	154.3	146.7	142.3	2.6 (–7.1, 12.3)	1.7	0.66	—
	Year 4	156.1	154.3	143.1	145.3	–3.7 (–16.5, 9.0)	–2.4	0.63	—
	Year 5	156.1	154.3	148.3	146.8	–0.2 (–15.9, 15.4)	–0.2	0.98	—
	Overall	156.1	154.3	146.2	145.4	–0.9 (–5.2, 3.5)	–0.6	0.74	—
Dual (weighted N=382,067)	Year 1	204.4	204.0	194.2	189.2	4.5 (–8.8, 17.8)	2.2	0.58	0.69
	Year 2	204.4	204.0	188.4	186.7	1.3 (–15.5, 18.2)	0.7	0.90	0.64
	Year 3	204.4	204.0	190.4	186.9	3.0 (–17.6, 23.6)	1.5	0.81	0.98
	Year 4	204.4	204.0	175.0	178.9	–4.1 (–26.9, 18.7)	–2.0	0.77	0.98
	Year 5	204.4	204.0	179.3	184.7	–5.5 (–36.3, 25.4)	–2.7	0.77	0.80
	Overall	204.4	204.0	186.4	185.4	0.6 (–8.3, 9.5)	0.3	0.91	0.80

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Medicare only (weighted N= 1,565,592)	Year 1	68.8	72.2	67.9	72.5	–1.2 (–2.7, 0.3)	–1.8	0.18	—
	Year 2	68.8	72.2	69.7	72.5	0.5 (–1.4, 2.4)	0.8	0.66	—
	Year 3	68.8	72.2	71.8	74.3	0.7 (–1.5, 2.9)	1.0	0.59	—
	Year 4	68.8	72.2	73.5	75.2	1.6 (–0.9, 4.0)	2.3	0.29	—
	Year 5	68.8	72.2	74.6	75.9	1.9 (–0.9, 4.8)	2.8	0.27	—
	Overall	68.8	72.2	71.0	73.8	0.5 (–0.4, 1.5)	0.7	0.38	—
Dual (weighted N=629,810)	Year 1	63.3	65.3	62.0	66.7	–2.5 (–3.9, –1.1)	–4.0	0.003	0.12
	Year 2	63.3	65.3	62.9	67.8	–2.8 (–4.8, –0.8)	–4.4	0.02	0.007
	Year 3	63.3	65.3	65.4	69.5	–2.1 (–4.2, 0.1)	–3.3	0.11	0.04
	Year 4	63.3	65.3	65.1	70.2	–2.9 (–5.3, –0.5)	–4.6	0.05	0.004
	Year 5	63.3	65.3	64.8	70.0	–3.0 (–5.9, –0.1)	–4.7	0.09	0.01
	Overall	63.3	65.3	63.9	68.6	–2.6 (–3.6, –1.7)	–4.1	<0.001	<0.001

(continued)

Table I-29 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by Medicare-Medicaid dual eligibility status and year

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-30
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	851.76	815.59	837.66	820.05	–18.56 (–28.91, –8.21)	–2.2	0.003	—
	Year 2	851.76	815.59	840.41	822.95	–18.70 (–36.86, –0.54)	–2.2	0.09	—
	Year 3	851.76	815.59	871.23	862.17	–27.11 (–50.73, –3.49)	–3.2	0.06	—
	Year 4	851.76	815.59	893.17	880.20	–23.21 (–55.18, 8.76)	–2.7	0.23	—
	Year 5	851.76	815.59	941.38	937.19	–31.98 (–72.22, 8.27)	–3.8	0.19	—
	Overall	851.76	815.59	870.07	856.72	–23.08 (–34.13, –12.03)	–2.7	<0.001	—
Disabled (weighted N=2,160,303)	Year 1	1,290.82	1,146.61	1,295.02	1,170.54	–19.73 (–42.36, 2.90)	–1.5	0.15	0.94
	Year 2	1,290.82	1,146.61	1,268.49	1,133.87	–9.59 (–35.63, 16.45)	–0.7	0.54	0.62
	Year 3	1,290.82	1,146.61	1,395.89	1,299.30	–47.62 (–95.89, 0.65)	–3.7	0.10	0.47
	Year 4	1,290.82	1,146.61	1,381.02	1,276.25	–39.44 (–90.70, 11.82)	–3.1	0.21	0.60
	Year 5	1,290.82	1,146.61	1,446.25	1,351.86	–49.82 (–121.64, 22.00)	–3.9	0.25	0.65
	Overall	1,290.82	1,146.61	1,348.01	1,234.67	–31.54 (–50.84, –12.23)	–2.4	0.01	0.47

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total hospital PBPM ($)*									
Aged (weighted N=8,121,678)	Year 1	454.50	385.07	451.78	394.71	–12.35 (–19.82, –4.88)	–2.7	0.01	—
	Year 2	454.50	385.07	449.47	395.62	–15.57 (–29.67, –1.47)	–3.4	0.07	—
	Year 3	454.50	385.07	466.88	422.02	–24.58 (–42.96, –6.20)	–5.4	0.03	—
	Year 4	454.50	385.07	482.32	435.28	–22.39 (–45.78, 1.01)	–4.9	0.12	—
	Year 5	454.50	385.07	522.73	478.69	–25.39 (–54.78, 4.00)	–5.6	0.16	—
	Overall	454.50	385.07	469.58	419.53	–19.55 (–27.81, –11.29)	–4.3	<0.001	—
Disabled (weighted N=2,160,303)	Year 1	784.76	607.55	792.82	624.46	–8.85 (–25.88, 8.17)	–1.1	0.39	0.76
	Year 2	784.76	607.55	775.40	604.89	–6.70 (–26.54, 13.15)	–0.9	0.58	0.49
	Year 3	784.76	607.55	849.02	710.94	–39.13 (–73.92, –4.34)	–5.0	0.06	0.49
	Year 4	784.76	607.55	848.70	702.58	–31.09 (–71.12, 8.94)	–4.0	0.20	0.71
	Year 5	784.76	607.55	900.41	754.93	–31.73 (–88.66, 25.19)	–4.0	0.36	0.83
	Overall	784.76	607.55	826.15	671.18	–22.74 (–37.43, –8.05)	–2.9	0.01	0.71

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Inpatient facility PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	339.60	290.25	333.15	285.18	–1.38 (–8.39, 5.63)	–0.4	0.75	—
	Year 2	339.60	290.25	331.91	281.58	0.99 (–11.37, 13.35)	0.3	0.89	—
	Year 3	339.60	290.25	347.10	297.70	0.06 (–15.62, 15.74)	0.02	0.99	—
	Year 4	339.60	290.25	358.51	302.00	7.16 (–13.86, 28.19)	2.1	0.58	—
	Year 5	339.60	290.25	395.19	333.53	12.31 (–15.35, 39.97)	3.6	0.46	—
	Overall	339.60	290.25	348.75	296.38	2.95 (–4.43, 10.33)	0.9	0.51	—
Disabled (weighted N=2,160,303)	Year 1	597.94	471.28	595.03	466.29	2.08 (–13.71, 17.88)	0.3	0.83	0.74
	Year 2	597.94	471.28	583.41	440.74	16.02 (–2.55, 34.60)	2.7	0.16	0.20
	Year 3	597.94	471.28	648.18	523.06	–1.53 (–34.85, 31.79)	–0.3	0.94	0.93
	Year 4	597.94	471.28	654.56	503.46	24.45 (–17.66, 66.55)	4.1	0.34	0.44
	Year 5	597.94	471.28	712.16	543.60	41.91 (–21.40, 105.21)	7.0	0.28	0.33
	Overall	597.94	471.28	630.85	490.10	13.85 (–1.13, 28.83)	2.3	0.13	0.18

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	19.33	15.96	20.36	20.33	–3.34 (–4.49, –2.19)	–17.3	<0.001	—
	Year 2	19.33	15.96	19.92	20.47	–3.92 (–5.63, –2.21)	–20.3	<0.001	—
	Year 3	19.33	15.96	19.31	22.35	–6.42 (–8.73, –4.10)	–33.2	<0.001	—
	Year 4	19.33	15.96	19.95	23.65	–7.07 (–9.99, –4.15)	–36.6	<0.001	—
	Year 5	19.33	15.96	18.85	24.98	–9.51 (–13.17, –5.84)	–49.2	<0.001	—
	Overall	19.33	15.96	19.76	22.08	–5.70 (–6.74, –4.66)	–29.5	<0.001	—
Disabled (weighted N=2,160,303)	Year 1	43.96	31.59	46.13	39.17	–5.41 (–7.85, –2.97)	–12.3	<0.001	0.09
	Year 2	43.96	31.59	42.41	39.26	–9.22 (–12.92, –5.52)	–21.0	<0.001	0.01
	Year 3	43.96	31.59	39.69	43.72	–16.40 (–23.02, –9.78)	–37.3	<0.001	0.002
	Year 4	43.96	31.59	37.91	44.66	–19.12 (–28.17, –10.08)	–43.5	<0.001	0.01
	Year 5	43.96	31.59	33.54	46.58	–25.41 (–36.60, –14.21)	–57.8	<0.001	0.003
	Overall	43.96	31.59	40.60	42.24	–14.05 (–17.03, –11.07)	–32.0	<0.001	<0.001

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Other hospital outpatient department PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	95.58	78.87	98.27	89.19	–7.63 (–10.09, –5.18)	–8.0	<0.001	—
	Year 2	95.58	78.87	97.64	93.57	–12.65 (–16.81, –8.48)	–13.2	<0.001	—
	Year 3	95.58	78.87	100.47	101.97	–18.22 (–23.44, –13.00)	–19.1	<0.001	—
	Year 4	95.58	78.87	103.85	109.62	–22.48 (–29.22, –15.74)	–23.5	<0.001	—
	Year 5	95.58	78.87	108.70	120.18	–28.20 (–36.89, –19.50)	–29.5	<0.001	—
	Overall	95.58	78.87	101.06	101.06	–16.80 (–19.20, –14.39)	–17.6	<0.001	—
Disabled (weighted N=2,160,303)	Year 1	142.86	104.68	151.67	119.01	–5.52 (–9.64, –1.41)	–3.9	0.03	0.38
	Year 2	142.86	104.68	149.58	124.89	–13.50 (–19.82, –7.18)	–9.4	<0.001	0.81
	Year 3	142.86	104.68	161.15	144.17	–21.20 (–30.73, –11.66)	–14.8	<0.001	0.58
	Year 4	142.86	104.68	156.22	154.45	–36.41 (–48.25, –24.57)	–25.5	<0.001	0.03
	Year 5	142.86	104.68	154.71	164.76	–48.24 (–62.47, –34.00)	–33.8	<0.001	0.01
	Overall	142.86	104.68	154.70	138.84	–22.54 (–26.66, –18.42)	–15.8	<0.001	0.01

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
All-cause acute inpatient admissions per 1,000 population									
Aged (weighted N=8,121,678)	Year 1	279.8	295.4	250.2	270.9	–6.6 (–12.2, –1.0)	–2.3	0.05	—
	Year 2	279.8	295.4	235.0	263.2	–15.2 (–23.3, –7.1)	–5.4	0.002	—
	Year 3	279.8	295.4	231.5	264.8	–19.8 (–30.8, –8.8)	–7.1	0.003	—
	Year 4	279.8	295.4	220.9	265.5	–31.8 (–46.1, –17.5)	–11.4	<0.001	—
	Year 5	279.8	295.4	233.2	285.6	–38.0 (–55.4, –20.6)	–13.6	<0.001	—
	Overall	279.8	295.4	234.1	268.3	–20.7 (–25.7, –15.7)	–7.4	<0.001	—
Disabled (weighted N=2,160,303)	Year 1	492.9	447.8	444.5	404.5	–0.8 (–14.6, 13.0)	–0.2	0.92	0.48
	Year 2	492.9	447.8	405.5	386.0	–21.2 (–40.0, –2.3)	–4.3	0.06	0.56
	Year 3	492.9	447.8	424.1	412.0	–28.5 (–50.7, –6.3)	–5.8	0.03	0.47
	Year 4	492.9	447.8	385.4	395.9	–51.8 (–81.2, –22.5)	–10.5	0.004	0.19
	Year 5	492.9	447.8	408.2	423.8	–58.7 (–92.5, –24.8)	–11.9	0.004	0.26
	Overall	492.9	447.8	413.9	402.3	–29.5 (–40.0, –19.1)	–6.0	<0.001	0.12

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits per 1,000 population									
Aged (weighted N=8,121,678)	Year 1	328.0	307.9	350.1	322.3	6.6 (–0.1, 13.4)	2.0	0.11	—
	Year 2	328.0	307.9	360.9	330.6	8.5 (–1.3, 18.3)	2.6	0.15	—
	Year 3	328.0	307.9	362.0	338.3	1.5 (–12.1, 15.2)	0.5	0.85	—
	Year 4	328.0	307.9	370.5	341.3	6.6 (–10.4, 23.5)	2.0	0.52	—
	Year 5	328.0	307.9	371.4	339.9	8.7 (–11.1, 28.6)	2.7	0.47	—
	Overall	328.0	307.9	362.2	334.0	6.1 (0.1, 12.1)	1.9	0.09	—
Disabled (weighted N=2,160,303)	Year 1	957.1	826.5	991.5	831.5	27.9 (10.9, 44.9)	2.9	0.007	0.02
	Year 2	957.1	826.5	985.1	830.2	23.5 (–8.4, 55.5)	2.5	0.23	0.40
	Year 3	957.1	826.5	988.4	864.4	–11.6 (–52.3, 29.1)	–1.2	0.64	0.54
	Year 4	957.1	826.5	967.6	834.0	1.7 (–54.5, 57.8)	0.2	0.96	0.87
	Year 5	957.1	826.5	969.3	827.5	10.2 (–55.3, 75.7)	1.1	0.80	0.97
	Overall	957.1	826.5	981.5	838.7	10.2 (–8.8, 29.2)	1.1	0.38	0.69

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Aged (weighted N=1,715,191)	Year 1	160.1	158.4	153.7	149.5	2.6 (–2.6, 7.7)	1.6	0.41	—
	Year 2	160.1	158.4	150.0	148.9	–0.5 (–7.7, 6.8)	–0.3	0.91	—
	Year 3	160.1	158.4	151.0	144.1	5.0 (–4.6, 14.5)	3.1	0.40	—
	Year 4	160.1	158.4	145.4	146.4	–2.3 (–14.1, 9.4)	–1.5	0.74	—
	Year 5	160.1	158.4	151.0	149.2	0.2 (–14.6, 15.0)	0.1	0.98	—
	Overall	160.1	158.4	150.2	147.4	1.1 (–3.0, 5.3)	0.7	0.66	—
Disabled (weighted N=265,630)	Year 1	201.4	200.7	186.2	189.5	–4.1 (–18.1, 10.0)	–2.0	0.64	0.45
	Year 2	201.4	200.7	174.9	190.4	–16.9 (–34.0, 0.1)	–8.4	0.10	0.13
	Year 3	201.4	200.7	181.3	194.9	–14.6 (–38.6, 9.4)	–7.3	0.32	0.22
	Year 4	201.4	200.7	172.3	185.4	–14.5 (–42.3, 13.4)	–7.2	0.39	0.48
	Year 5	201.4	200.7	173.7	184.9	–12.4 (–44.6, 19.8)	–6.2	0.53	0.53
	Overall	201.4	200.7	178.2	189.6	–12.6 (–22.8, –2.4)	–6.2	0.04	0.03

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Aged (weighted N=1,511,984)	Year 1	70.8	73.3	70.2	73.7	–1.1 (–2.4, 0.3)	–1.5	0.20	—
	Year 2	70.8	73.3	72.0	74.2	0.2 (–1.6, 2.0)	0.3	0.87	—
	Year 3	70.8	73.3	74.2	76.0	0.5 (–1.6, 2.5)	0.7	0.71	—
	Year 4	70.8	73.3	75.9	76.6	1.6 (–0.6, 3.9)	2.3	0.24	—
	Year 5	70.8	73.3	76.8	77.2	2.0 (–0.6, 4.6)	2.8	0.21	—
	Overall	70.8	73.3	73.4	75.3	0.4 (–0.5, 1.3)	0.6	0.42	—
Disabled (weighted N=683,417)	Year 1	59.0	63.4	57.1	64.4	–2.8 (–4.5, –1.1)	–4.7	0.006	0.04
	Year 2	59.0	63.4	58.1	64.6	–2.0 (–4.3, 0.3)	–3.4	0.15	0.09
	Year 3	59.0	63.4	60.2	66.2	–1.6 (–4.1, 0.9)	–2.7	0.28	0.14
	Year 4	59.0	63.4	60.1	67.5	–2.9 (–5.8, 0.0)	–4.9	0.10	0.009
	Year 5	59.0	63.4	60.2	67.7	–3.0 (–6.6, 0.6)	–5.0	0.18	0.03
	Overall	59.0	63.4	59.0	65.8	–2.4 (–3.5, –1.3)	–4.0	<0.001	<0.001

(continued)

Table I-30 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by original reason for Medicare entitlement and year

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

[*] Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-31
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	321.74	284.63	327.28	299.30	–9.14 (–24.39, 6.12)	–2.8	0.32	—
	Year 2	321.74	284.63	327.46	294.45	–4.11 (–25.27, 17.06)	–1.3	0.75	—
	Year 3	321.74	284.63	348.02	316.14	–5.23 (–32.87, 22.41)	–1.6	0.76	—
	Year 4	321.74	284.63	373.79	338.08	–1.41 (–36.45, 33.63)	–0.4	0.95	—
	Year 5	321.74	284.63	325.32	299.91	–11.70 (–51.04, 27.63)	–3.6	0.62	—
	Overall	321.74	284.63	342.11	310.58	–5.68 (–17.98, 6.63)	–1.8	0.45	—
MCC (weighted N=8,837,507)	Year 1	1,044.79	984.89	1,030.38	990.86	–20.37 (–30.71, –10.03)	–1.9	0.001	0.26
	Year 2	1,044.79	984.89	1,026.31	985.30	–18.88 (–35.83, –1.93)	–1.8	0.07	0.25
	Year 3	1,044.79	984.89	1,081.52	1,058.29	–36.66 (–64.24, –9.09)	–3.5	0.03	0.09
	Year 4	1,044.79	984.89	1,093.19	1,065.15	–31.85 (–65.98, 2.28)	–3.0	0.12	0.18
	Year 5	1,044.79	984.89	1,159.05	1,140.13	–40.97 (–87.44, 5.49)	–3.9	0.15	0.29
	Overall	1,044.79	984.89	1,069.80	1,038.21	–28.64 (–40.67, –16.61)	–2.7	<0.001	0.005

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total hospital PBPM ($)*									
Non-MCC (weighted N=1,444,474)	Year 1	190.30	157.14	192.28	165.88	–6.76 (–18.24, 4.72)	–3.6	0.33	—
	Year 2	190.30	157.14	191.19	163.15	–5.12 (–21.44, 11.20)	–2.7	0.61	—
	Year 3	190.30	157.14	203.57	178.48	–8.07 (–28.81, 12.67)	–4.2	0.52	—
	Year 4	190.30	157.14	218.63	193.41	–7.94 (–34.90, 19.03)	–4.2	0.63	—
	Year 5	190.30	157.14	193.50	173.75	–13.42 (–44.48, 17.65)	–7.0	0.48	—
	Overall	190.30	157.14	200.56	174.97	–7.66 (–17.08, 1.77)	–4.0	0.18	—
MCC (weighted N=8,837,507)	Year 1	576.50	477.60	574.46	488.28	–12.73 (–20.14, –5.31)	–2.2	0.005	0.42
	Year 2	576.50	477.60	567.73	484.78	–15.95 (–29.82, –2.08)	–2.8	0.06	0.30
	Year 3	576.50	477.60	598.85	532.86	–32.92 (–53.82, –12.01)	–5.7	0.01	0.09
	Year 4	576.50	477.60	609.74	540.43	–29.60 (–55.03, –4.16)	–5.1	0.06	0.20
	Year 5	576.50	477.60	661.99	595.57	–32.49 (–66.97, 1.99)	–5.6	0.12	0.32
	Overall	576.50	477.60	596.38	521.27	–24.04 (–33.11, –14.96)	–4.2	<0.001	0.01

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Inpatient facility PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	130.75	108.32	129.24	110.28	–3.47 (–14.53, 7.58)	–2.7	0.61	—
	Year 2	130.75	108.32	128.28	106.86	–1.00 (–17.26, 15.25)	–0.8	0.92	—
	Year 3	130.75	108.32	141.60	116.54	2.63 (–16.78, 22.05)	2.0	0.82	—
	Year 4	130.75	108.32	152.57	124.42	5.72 (–20.30, 31.75)	4.4	0.72	—
	Year 5	130.75	108.32	139.97	108.69	8.86 (–22.31, 40.02)	6.8	0.64	—
	Overall	130.75	108.32	138.14	113.86	1.83 (–7.29, 10.95)	1.4	0.74	—
MCC (weighted N=8,837,507)	Year 1	435.78	365.14	428.34	358.04	–0.34 (–7.43, 6.74)	–0.1	0.94	0.66
	Year 2	435.78	365.14	424.20	349.01	4.56 (–7.93, 17.04)	1.0	0.55	0.58
	Year 3	435.78	365.14	451.09	382.45	–1.99 (–21.05, 17.07)	–0.5	0.86	0.72
	Year 4	435.78	365.14	460.78	380.09	10.06 (–15.10, 35.21)	2.3	0.51	0.78
	Year 5	435.78	365.14	509.24	420.54	18.06 (–18.13, 54.26)	4.1	0.41	0.62
	Overall	435.78	365.14	449.07	373.51	4.81 (–3.99, 13.62)	1.1	0.37	0.61

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	10.52	8.32	11.20	10.37	–1.37 (–2.19, –0.55)	–13.0	0.01	—
	Year 2	10.52	8.32	11.37	10.52	–1.35 (–2.51, –0.18)	–12.8	0.06	—
	Year 3	10.52	8.32	10.82	11.31	–2.69 (–4.36, –1.01)	–25.5	0.01	—
	Year 4	10.52	8.32	11.26	12.28	–3.22 (–5.09, –1.34)	–30.6	0.005	—
	Year 5	10.52	8.32	9.02	11.60	–4.78 (–7.17, –2.38)	–45.4	0.001	—
	Overall	10.52	8.32	10.93	11.16	–2.44 (–3.13, –1.74)	–23.2	<0.001	—
MCC (weighted N=8,837,507)	Year 1	26.62	21.17	27.89	26.59	–4.14 (–5.54, –2.74)	–15.6	<0.001	<0.001
	Year 2	26.62	21.17	26.53	26.72	–5.64 (–7.69, –3.59)	–21.2	<0.001	<0.001
	Year 3	26.62	21.17	25.30	29.43	–9.58 (–12.96, –6.19)	–36.0	<0.001	<0.001
	Year 4	26.62	21.17	25.32	30.69	–10.82 (–15.39, –6.25)	–40.6	<0.001	<0.001
	Year 5	26.62	21.17	23.42	32.48	–14.51 (–20.29, –8.73)	–54.5	<0.001	<0.001
	Overall	26.62	21.17	25.92	28.84	–8.38 (–9.92, –6.84)	–31.5	<0.001	<0.001

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Other hospital outpatient department PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	49.04	40.50	51.84	45.22	–1.92 (–5.55, 1.72)	–3.9	0.39	—
	Year 2	49.04	40.50	51.54	45.77	–2.77 (–8.00, 2.46)	–5.6	0.38	—
	Year 3	49.04	40.50	51.14	50.62	–8.01 (–15.19, –0.84)	–16.3	0.07	—
	Year 4	49.04	40.50	54.80	56.71	–10.44 (–18.92, –1.97)	–21.3	0.04	—
	Year 5	49.04	40.50	44.50	53.46	–17.50 (–27.91, –7.08)	–35.7	0.01	—
	Overall	49.04	40.50	51.49	49.95	–7.05 (–10.12, –3.98)	–14.4	<0.001	—
MCC (weighted N=8,837,507)	Year 1	114.10	91.28	118.23	103.65	–8.24 (–10.81, –5.68)	–7.2	<0.001	0.01
	Year 2	114.10	91.28	117.00	109.05	–14.87 (–19.31, –10.43)	–13.0	<0.001	<0.001
	Year 3	114.10	91.28	122.45	120.98	–21.35 (–27.11, –15.59)	–18.7	<0.001	0.01
	Year 4	114.10	91.28	123.64	129.65	–28.83 (–36.54, –21.12)	–25.3	<0.001	0.003
	Year 5	114.10	91.28	129.33	142.55	–36.04 (–45.92, –26.17)	–31.6	<0.001	0.005
	Overall	114.10	91.28	121.39	118.92	–20.47 (–23.15, –17.78)	–17.9	<0.001	<0.001

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
All-cause acute inpatient admissions per 1,000 population									
Non-MCC (weighted N=1,444,474)	Year 1	95.8	94.9	85.0	89.2	–5.6 (–11.7, 0.5)	–5.8	0.13	—
	Year 2	95.8	94.9	77.0	84.8	–9.7 (–18.3, –1.1)	–10.1	0.06	—
	Year 3	95.8	94.9	79.2	87.2	–9.5 (–20.0, 1.0)	–9.9	0.14	—
	Year 4	95.8	94.9	74.8	89.5	–16.2 (–29.1, –3.4)	–17.0	0.04	—
	Year 5	95.8	94.9	65.7	77.8	–14.1 (–26.7, –1.5)	–14.7	0.07	—
	Overall	95.8	94.9	77.5	86.6	–10.7 (–15.3, –6.1)	–11.2	<0.001	—
MCC (weighted N=8,837,507)	Year 1	358.5	366.8	321.4	334.3	–5.5 (–11.9, 0.9)	–1.5	0.15	0.99
	Year 2	358.5	366.8	300.1	323.8	–17.8 (–27.5, –8.1)	–5.0	0.003	0.21
	Year 3	358.5	366.8	299.5	330.4	–23.8 (–36.3, –11.4)	–6.6	0.002	0.07
	Year 4	358.5	366.8	281.9	327.1	–39.6 (–56.5, –22.7)	–11.0	<0.001	0.02
	Year 5	358.5	366.8	301.6	356.7	–47.7 (–68.1, –27.3)	–13.3	<0.001	0.005
	Overall	358.5	366.8	300.6	332.0	–24.9 (–30.7, –19.0)	–6.9	<0.001	<0.001

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits per 1,000 population									
Non-MCC (weighted N=1,444,474)	Year 1	231.6	213.3	234.0	212.0	3.7 (–5.3, 12.8)	1.6	0.50	—
	Year 2	231.6	213.3	236.2	212.3	5.4 (–6.9, 17.7)	2.3	0.47	—
	Year 3	231.6	213.3	228.4	212.7	–2.5 (–18.9, 14.0)	–1.1	0.81	—
	Year 4	231.6	213.3	228.1	211.8	–1.8 (–21.3, 17.7)	–0.8	0.88	—
	Year 5	231.6	213.3	214.9	198.3	–0.4 (–22.2, 21.5)	–0.2	0.98	—
	Overall	231.6	213.3	229.9	210.7	1.1 (–6.0, 8.1)	0.5	0.81	—
MCC (weighted N=8,837,507)	Year 1	488.9	448.7	520.1	466.6	11.5 (2.4, 20.5)	2.4	0.04	0.24
	Year 2	488.9	448.7	530.7	475.8	12.2 (–1.7, 26.2)	2.5	0.15	0.52
	Year 3	488.9	448.7	534.6	491.1	–0.4 (–19.9, 19.1)	–0.1	0.98	0.88
	Year 4	488.9	448.7	540.9	489.5	7.3 (–17.4, 31.9)	1.5	0.63	0.56
	Year 5	488.9	448.7	545.4	490.3	10.5 (–18.9, 39.9)	2.1	0.56	0.57
	Overall	488.9	448.7	533.3	481.9	7.9 (–0.7, 16.6)	1.6	0.13	0.24

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-MCC (weighted N=67,507)	Year 1	102.7	103.7	99.7	104.8	–4.1 (–30.2, 22.1)	–4.0	0.80	—
	Year 2	102.7	103.7	89.8	86.7	4.0 (–23.2, 31.2)	3.9	0.81	—
	Year 3	102.7	103.7	94.1	91.0	4.1 (–32.6, 40.8)	4.0	0.85	—
	Year 4	102.7	103.7	97.2	88.5	9.8 (–36.7, 56.4)	9.6	0.73	—
	Year 5	102.7	103.7	95.1	90.8	5.4 (–50.8, 61.7)	5.3	0.87	—
	Overall	102.7	103.7	95.1	92.6	3.5 (–13.0, 20.0)	3.4	0.73	—
MCC (weighted N=1,910,564)	Year 1	168.0	166.4	160.2	156.7	2.0 (–3.1, 7.1)	1.2	0.53	0.71
	Year 2	168.0	166.4	155.6	157.0	–2.8 (–9.9, 4.3)	–1.7	0.52	0.69
	Year 3	168.0	166.4	157.4	153.1	2.6 (–6.5, 11.8)	1.6	0.64	0.95
	Year 4	168.0	166.4	151.0	153.9	–4.1 (–15.9, 7.6)	–2.5	0.56	0.63
	Year 5	168.0	166.4	156.3	156.1	–1.3 (–15.7, 13.1)	–0.8	0.88	0.84
	Overall	168.0	166.4	156.1	155.3	–0.6 (–4.7, 3.5)	–0.4	0.80	0.68

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-MCC (weighted N= 98,931)	Year 1	49.8	56.8	47.4	57.5	–3.0 (–6.0, 0.0)	–6.1	0.10	—
	Year 2	49.8	56.8	47.8	57.0	–2.2 (–6.6, 2.3)	–4.4	0.42	—
	Year 3	49.8	56.8	51.0	57.5	0.5 (–4.4, 5.4)	0.9	0.87	—
	Year 4	49.8	56.8	50.6	58.1	–0.5 (–6.6, 5.6)	–1.1	0.89	—
	Year 5	49.8	56.8	50.5	58.7	–1.3 (–7.7, 5.1)	–2.6	0.74	—
	Overall	49.8	56.8	49.2	57.6	–1.4 (–3.6, 0.8)	–2.7	0.30	—
MCC (weighted N= 2,093,487)	Year 1	68.0	70.9	67.1	71.5	–1.5 (–2.9, –0.2)	–2.3	0.06	0.35
	Year 2	68.0	70.9	68.6	71.9	–0.4 (–2.1, 1.3)	–0.6	0.69	0.47
	Year 3	68.0	70.9	70.8	73.7	–0.2 (–2.1, 1.7)	–0.3	0.88	0.81
	Year 4	68.0	70.9	72.1	74.5	0.3 (–1.9, 2.4)	0.4	0.84	0.82
	Year 5	68.0	70.9	72.8	75.0	0.5 (–2.0, 2.9)	0.7	0.75	0.63
	Overall	68.0	70.9	69.9	73.1	–0.4 (–1.2, 0.4)	–0.6	0.44	0.44

(continued)

Table I-31 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by multiple chronic condition status and year

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MCC = multiple chronic conditions; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

[*] Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-32
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	1,007.33	925.06	1,008.66	930.19	–3.80 (–22.37, 14.77)	–0.4	0.74	—
	Year 2	1,007.33	925.06	994.53	906.10	6.16 (–17.12, 29.45)	0.6	0.66	—
	Year 3	1,007.33	925.06	1,095.39	1,023.48	–10.35 (–46.07, 25.36)	–1.0	0.63	—
	Year 4	1,007.33	925.06	1,085.67	1,005.56	–2.16 (–48.95, 44.64)	–0.2	0.94	—
	Year 5	1,007.33	925.06	1,136.99	1,072.09	–17.37 (–92.47, 57.73)	–1.7	0.70	—
	Overall	1,007.33	925.06	1,058.05	979.56	–4.31 (–21.65, 13.02)	–0.4	0.68	—
White (weighted N=7,254,735)	Year 1	917.67	866.88	902.28	877.24	–25.75 (–35.54, –15.96)	–2.8	<0.001	0.09
	Year 2	917.67	866.88	903.40	879.67	–27.06 (–44.96, –9.16)	–2.9	0.01	0.04
	Year 3	917.67	866.88	931.42	924.64	–44.01 (–67.69, –20.33)	–4.8	0.002	0.17
	Year 4	917.67	866.88	956.11	945.77	–40.46 (–71.71, –9.20)	–4.4	0.03	0.19
	Year 5	917.67	866.88	1,007.44	1,004.34	–47.69 (–86.02, –9.37)	–5.2	0.04	0.50
	Overall	917.67	866.88	932.71	917.55	–35.84 (–46.57, –25.11)	–3.9	<0.001	0.004

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total hospital PBPM ($)*									
Non-white (weighted N=3,027,246)	Year 1	587.68	453.15	597.46	463.75	–0.82 (–13.08, 11.44)	–0.1	0.91	—
	Year 2	587.68	453.15	590.19	452.07	3.59 (–10.95, 18.13)	0.6	0.68	—
	Year 3	587.68	453.15	651.21	528.88	–12.20 (–34.79, 10.38)	–2.1	0.37	—
	Year 4	587.68	453.15	655.38	522.16	–1.32 (–32.53, 29.89)	–0.2	0.94	—
	Year 5	587.68	453.15	698.94	571.70	–7.29 (–58.14, 43.57)	–1.2	0.81	—
	Overall	587.68	453.15	633.32	501.67	–3.31 (–14.72, 8.11)	–0.6	0.63	—
White (weighted N=7,254,735)	Year 1	498.29	420.97	493.68	432.88	–16.52 (–23.89, –9.15)	–3.3	<0.001	0.07
	Year 2	498.29	420.97	489.06	433.16	–21.42 (–36.10, –6.74)	–4.3	0.02	0.02
	Year 3	498.29	420.97	503.76	462.92	–36.47 (–55.09, –17.86)	–7.3	0.001	0.13
	Year 4	498.29	420.97	519.43	478.34	–36.23 (–58.75, –13.71)	–7.3	0.01	0.06
	Year 5	498.29	420.97	561.69	522.00	–37.64 (–66.15, –9.13)	–7.6	0.03	0.30
	Overall	498.29	420.97	508.19	459.54	–28.81 (–36.93, –20.70)	–5.8	<0.001	<0.001

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Inpatient facility PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	451.83	354.34	452.97	347.41	8.09 (–2.07, 18.24)	1.8	0.19	—
	Year 2	451.83	354.34	449.90	332.06	20.36 (7.75, 32.98)	4.5	0.01	—
	Year 3	451.83	354.34	504.25	389.68	17.09 (–2.73, 36.90)	3.8	0.16	—
	Year 4	451.83	354.34	509.41	374.92	37.00 (4.34, 69.66)	8.2	0.06	—
	Year 5	451.83	354.34	556.41	414.37	44.56 (–11.34, 100.47)	9.9	0.19	—
	Overall	451.83	354.34	489.08	367.61	23.77 (12.28, 35.26)	5.3	<0.001	—
White (weighted N=7,254,735)	Year 1	370.22	316.34	361.68	312.31	–4.51 (–11.66, 2.63)	–1.2	0.30	0.09
	Year 2	370.22	316.34	358.27	307.14	–2.76 (–15.74, 10.23)	–0.7	0.73	0.01
	Year 3	370.22	316.34	370.90	326.12	–9.09 (–25.98, 7.79)	–2.5	0.38	0.04
	Year 4	370.22	316.34	383.67	331.43	–1.64 (–22.62, 19.33)	–0.4	0.90	0.02
	Year 5	370.22	316.34	421.91	362.24	5.79 (–21.04, 32.62)	1.6	0.72	0.17
	Overall	370.22	316.34	374.57	323.99	–3.36 (–10.84, 4.11)	–0.9	0.46	<0.001

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	28.79	21.07	30.53	27.04	–4.23 (–5.94, –2.51)	–14.7	<0.001	—
	Year 2	28.79	21.07	28.03	27.47	–7.16 (–10.22, –4.10)	–24.9	<0.001	—
	Year 3	28.79	21.07	25.96	31.25	–13.02 (–18.28, –7.76)	–45.2	<0.001	—
	Year 4	28.79	21.07	23.83	32.59	–16.48 (–24.17, –8.78)	–57.2	<0.001	—
	Year 5	28.79	21.07	20.86	33.91	–20.78 (–30.60, –10.95)	–72.2	<0.001	—
	Overall	28.79	21.07	26.27	30.14	–11.63 (–14.18, –9.08)	–40.4	<0.001	—
White (weighted N=7,254,735)	Year 1	22.85	18.14	23.95	22.93	–3.69 (–5.01, –2.37)	–16.1	<0.001	0.56
	Year 2	22.85	18.14	23.35	22.98	–4.34 (–6.26, –2.41)	–19.0	<0.001	0.13
	Year 3	22.85	18.14	22.65	24.91	–6.96 (–9.70, –4.22)	–30.5	<0.001	0.02
	Year 4	22.85	18.14	23.73	26.11	–7.09 (–10.28, –3.89)	–31.0	<0.001	0.01
	Year 5	22.85	18.14	22.37	27.66	–9.99 (–13.98, –6.01)	–43.7	<0.001	0.03
	Overall	22.85	18.14	23.30	24.61	–6.02 (–7.18, –4.86)	–26.4	<0.001	<0.001

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Other hospital outpatient department PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	107.07	77.74	113.96	89.31	–4.68 (–8.82, –0.54)	–4.4	0.06	—
	Year 2	107.07	77.74	112.26	92.55	–9.61 (–15.97, –3.26)	–9.0	0.01	—
	Year 3	107.07	77.74	121.00	107.95	–16.27 (–24.85, –7.70)	–15.2	0.002	—
	Year 4	107.07	77.74	122.14	114.65	–21.84 (–31.70, –11.98)	–20.4	<0.001	—
	Year 5	107.07	77.74	121.67	123.41	–31.08 (–44.47, –17.68)	–29.0	<0.001	—
	Overall	107.07	77.74	117.98	103.92	–15.44 (–19.20, –11.69)	–14.4	<0.001	—
White (weighted N=7,254,735)	Year 1	105.22	86.49	108.05	97.64	–8.32 (–10.95, –5.69)	–7.9	<0.001	0.18
	Year 2	105.22	86.49	107.44	103.04	–14.33 (–18.52, –10.13)	–13.6	<0.001	0.20
	Year 3	105.22	86.49	110.21	111.89	–20.42 (–25.95, –14.89)	–19.4	<0.001	0.44
	Year 4	105.22	86.49	112.03	120.80	–27.50 (–35.41, –19.59)	–26.1	<0.001	0.39
	Year 5	105.22	86.49	117.40	132.10	–33.43 (–43.35, –23.52)	–31.8	<0.001	0.77
	Overall	105.22	86.49	110.32	110.94	–19.43 (–22.08, –16.77)	–18.5	<0.001	0.07

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
All-cause acute inpatient admissions per 1,000 population									
Non-white (weighted N=3,027,246)	Year 1	366.6	340.9	321.6	307.7	–9.8 (–21.4, 1.7)	–2.7	0.16	—
	Year 2	366.6	340.9	294.2	293.5	–23.3 (–36.7, –9.8)	–6.3	0.004	—
	Year 3	366.6	340.9	301.7	308.0	–28.3 (–44.9, –11.8)	–7.7	0.005	—
	Year 4	366.6	340.9	275.0	298.2	–46.1 (–68.1, –24.1)	–12.6	<0.001	—
	Year 5	366.6	340.9	292.7	321.6	–52.0 (–80.0, –24.0)	–14.2	0.002	—
	Overall	366.6	340.9	296.9	304.1	–30.3 (–38.4, –22.2)	–8.3	<0.001	—
White (weighted N=7,254,735)	Year 1	306.2	322.1	276.9	295.6	–4.3 (–9.8, 1.3)	–1.4	0.20	0.42
	Year 2	306.2	322.1	260.2	287.6	–14.0 (–23.1, –5.0)	–4.6	0.01	0.25
	Year 3	306.2	322.1	257.5	290.5	–19.3 (–31.2, –7.4)	–6.3	0.008	0.33
	Year 4	306.2	322.1	246.3	291.2	–32.1 (–48.5, –15.6)	–10.5	0.001	0.29
	Year 5	306.2	322.1	259.3	312.7	–39.0 (–59.4, –18.6)	–12.7	0.002	0.48
	Overall	306.2	322.1	260.1	293.6	–19.9 (–25.5, –14.3)	–6.5	<0.001	0.04

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits per 1,000 population									
Non-white (weighted N=3,027,246)	Year 1	600.2	528.1	631.8	538.5	20.2 (6.4, 34.0)	3.4	0.02	—
	Year 2	600.2	528.1	631.4	543.6	14.2 (–6.8, 35.2)	2.4	0.27	—
	Year 3	600.2	528.1	629.8	567.1	–13.9 (–41.1, 13.3)	–2.3	0.40	—
	Year 4	600.2	528.1	615.1	557.6	–18.3 (–56.8, 20.2)	–3.1	0.43	—
	Year 5	600.2	528.1	609.7	556.6	–22.2 (–68.9, 24.6)	–3.7	0.44	—
	Overall	600.2	528.1	624.8	552.5	–2.7 (–16.0, 10.6)	–0.5	0.74	—
White (weighted N=7,254,735)	Year 1	395.7	367.2	419.4	382.8	6.5 (–1.5, 14.6)	1.7	0.18	0.10
	Year 2	395.7	367.2	431.8	391.2	9.7 (–2.2, 21.5)	2.4	0.18	0.72
	Year 3	395.7	367.2	434.1	400.1	2.7 (–14.2, 19.5)	0.7	0.79	0.30
	Year 4	395.7	367.2	446.7	401.4	13.0 (–7.2, 33.2)	3.3	0.29	0.14
	Year 5	395.7	367.2	450.3	399.1	18.2 (–5.5, 41.8)	4.6	0.21	0.13
	Overall	395.7	367.2	434.9	394.5	9.1 (1.9, 16.3)	2.3	0.04	0.13

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-white (weighted N=546,784)	Year 1	187.9	181.9	181.8	167.6	8.2 (–3.5, 20.0)	4.4	0.25	—
	Year 2	187.9	181.9	179.2	167.0	6.3 (–7.3, 20.0)	3.4	0.45	—
	Year 3	187.9	181.9	184.2	164.9	12.6 (–5.1, 30.2)	6.7	0.24	—
	Year 4	187.9	181.9	170.8	166.0	–0.8 (–22.9, 21.4)	–0.4	0.95	—
	Year 5	187.9	181.9	176.4	166.3	4.0 (–22.7, 30.6)	2.1	0.81	—
	Overall	187.9	181.9	178.8	166.4	6.4 (–1.6, 14.4)	3.4	0.19	—
White (weighted N=1,434,038)	Year 1	157.4	157.1	149.4	149.8	–0.6 (–5.7, 4.5)	–0.4	0.84	0.26
	Year 2	157.4	157.1	143.9	149.6	–5.8 (–13.4, 1.7)	–3.7	0.20	0.20
	Year 3	157.4	157.1	144.6	145.5	–1.1 (–10.9, 8.6)	–0.7	0.85	0.26
	Year 4	157.4	157.1	141.5	145.9	–4.6 (–17.2, 8.1)	–2.9	0.55	0.80
	Year 5	157.4	157.1	146.3	149.1	–2.9 (–19.0, 13.2)	–1.8	0.77	0.71
	Overall	157.4	157.1	145.0	147.9	–3.0 (–7.4, 1.4)	–1.9	0.26	0.08

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-white (weighted N= 709,327)	Year 1	61.3	65.1	59.0	65.6	–2.8 (–4.8, –0.8)	–4.6	0.02	—
	Year 2	61.3	65.1	60.5	66.4	–2.1 (–4.8, 0.7)	–3.4	0.22	—
	Year 3	61.3	65.1	63.0	68.8	–2.0 (–5.1, 1.0)	–3.3	0.27	—
	Year 4	61.3	65.1	63.5	68.9	–1.6 (–5.2, 2.0)	–2.6	0.46	—
	Year 5	61.3	65.1	63.6	68.4	–1.2 (–5.4, 3.1)	–1.9	0.66	—
	Overall	61.3	65.1	61.7	67.5	–2.0 (–3.4, –0.7)	–3.3	0.01	—
White (weighted N= 1,486,075)	Year 1	70.0	72.7	69.6	73.3	–1.0 (–2.4, 0.3)	–1.5	0.21	0.11
	Year 2	70.0	72.7	71.1	73.5	0.3 (–1.5, 2.0)	0.4	0.80	0.17
	Year 3	70.0	72.7	73.2	75.0	0.8 (–1.3, 2.9)	1.1	0.53	0.14
	Year 4	70.0	72.7	74.7	76.1	1.1 (–1.2, 3.4)	1.6	0.44	0.25
	Year 5	70.0	72.7	75.7	77.1	1.1 (–1.6, 3.8)	1.6	0.51	0.44
	Overall	70.0	72.7	72.4	74.7	0.3 (–0.6, 1.2)	0.5	0.53	0.006

(continued)

Table I-32 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by race and year

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table I-33
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total PBPM ($)									
Rural (weighted N=460;143)	Year 1	878.73	777.60	891.77	777.45	13.18 (–16.87, 43.22)	1.5	0.47	—
	Year 2	878.73	777.60	857.16	779.80	–23.77 (–77.02, 29.47)	–2.7	0.46	—
	Year 3	878.73	777.60	869.79	822.62	–53.96 (–98.20, –9.72)	–6.1	0.04	—
	Year 4	878.73	777.60	860.90	819.20	–59.43 (–134.57, 15.70)	–6.8	0.19	—
	Year 5	878.73	777.60	911.68	872.27	–61.73 (–150.67, 27.22)	–7.0	0.25	—
	Overall	878.73	777.60	874.48	808.22	–34.60 (–60.31, –8.89)	–3.9	0.03	—
Urban (weighted N=9;814;131)	Year 1	944.45	890.86	932.87	899.53	–20.25 (–30.29, –10.21)	–2.1	<0.001	0.08
	Year 2	944.45	890.86	930.86	893.69	–16.42 (–32.66, –0.18)	–1.7	0.10	0.83
	Year 3	944.45	890.86	983.49	960.51	–30.61 (–56.37, –4.84)	–3.2	0.05	0.45
	Year 4	944.45	890.86	998.64	970.75	–25.70 (–57.23, 5.83)	–2.7	0.18	0.49
	Year 5	944.45	890.86	1,050.08	1,031.54	–35.05 (–78.29, 8.19)	–3.7	0.18	0.66
	Overall	944.45	890.86	971.87	942.56	–24.63 (–35.83, –13.42)	–2.6	<0.001	0.55

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total hospital PBPM ($)*									
Rural (weighted N=460;143)	Year 1	493.47	397.90	499.80	398.47	5.75 (–21.26, 32.76)	1.2	0.73	—
	Year 2	493.47	397.90	451.28	399.38	–43.67 (–88.98, 1.63)	–8.8	0.11	—
	Year 3	493.47	397.90	442.43	423.90	–77.04 (–121.21, –32.88)	–15.6	0.004	—
	Year 4	493.47	397.90	432.77	425.43	–88.24 (–160.83, –15.65)	–17.9	0.05	—
	Year 5	493.47	397.90	465.56	463.32	–93.34 (–179.12, –7.56)	–18.9	0.07	—
	Overall	493.47	397.90	457.40	417.78	–55.78 (–80.02, –31.53)	–11.3	<0.001	—
Urban (weighted N=9;814;131)	Year 1	523.07	434.11	522.06	445.45	–12.35 (–19.52, –5.18)	–2.4	0.005	0.29
	Year 2	523.07	434.11	518.47	441.94	–12.43 (–25.11, 0.26)	–2.4	0.11	0.28
	Year 3	523.07	434.11	549.22	485.99	–25.73 (–44.45, –7.00)	–4.9	0.02	0.08
	Year 4	523.07	434.11	562.19	495.24	–22.01 (–44.85, 0.82)	–4.2	0.11	0.15
	Year 5	523.07	434.11	605.07	540.66	–24.55 (–56.21, 7.11)	–4.7	0.20	0.22
	Overall	523.07	434.11	545.79	475.51	–18.93 (–27.13, –10.73)	–3.6	<0.001	0.02

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Inpatient facility PBPM ($)									
Rural (weighted N=460;143)	Year 1	364.03	300.63	364.55	289.99	11.16 (–18.42, 40.74)	3.1	0.53	—
	Year 2	364.03	300.63	327.89	288.66	–24.17 (–76.82, 28.47)	–6.6	0.45	—
	Year 3	364.03	300.63	321.32	301.49	–43.57 (–96.56, 9.42)	–12.0	0.18	—
	Year 4	364.03	300.63	317.96	297.64	–43.08 (–123.53, 37.37)	–11.8	0.38	—
	Year 5	364.03	300.63	349.52	326.53	–40.42 (–135.70, 54.86)	–11.1	0.49	—
	Overall	364.03	300.63	334.66	298.15	–26.79 (–54.26, 0.68)	–7.4	0.11	—
Urban (weighted N=9;814;131)	Year 1	393.64	329.94	387.43	324.96	–1.22 (–7.93, 5.48)	–0.3	0.76	0.50
	Year 2	393.64	329.94	385.44	316.44	5.30 (–6.02, 16.61)	1.3	0.44	0.37
	Year 3	393.64	329.94	412.31	347.30	1.31 (–15.71, 18.33)	0.3	0.90	0.19
	Year 4	393.64	329.94	423.12	346.84	12.57 (–10.22, 35.37)	3.2	0.36	0.27
	Year 5	393.64	329.94	464.30	380.22	20.38 (–13.29, 54.04)	5.2	0.32	0.32
	Overall	393.64	329.94	409.31	339.15	6.34 (–1.65, 14.34)	1.6	0.19	0.06

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits PBPM ($)									
Rural (weighted N=460,143)	Year 1	25.25	21.22	26.30	25.84	–3.57 (–5.93, –1.22)	–14.2	0.01	—
	Year 2	25.25	21.22	25.34	24.86	–3.55 (–8.63, 1.53)	–14.1	0.25	—
	Year 3	25.25	21.22	25.08	27.13	–6.08 (–12.93, 0.76)	–24.1	0.14	—
	Year 4	25.25	21.22	26.45	28.11	–5.68 (–14.65, 3.29)	–22.5	0.30	—
	Year 5	25.25	21.22	23.37	28.79	–9.46 (–18.14, –0.78)	–37.5	0.07	—
	Overall	25.25	21.22	25.52	26.76	–5.26 (–8.23, –2.29)	–20.8	0.004	—
Urban (weighted N=9,814,131)	Year 1	24.28	19.19	25.55	24.22	–3.77 (–5.10, –2.44)	–15.5	<0.001	0.90
	Year 2	24.28	19.19	24.41	24.43	–5.11 (–7.05, –3.18)	–21.1	<0.001	0.63
	Year 3	24.28	19.19	23.30	26.87	–8.66 (–11.87, –5.46)	–35.7	<0.001	0.57
	Year 4	24.28	19.19	23.37	28.12	–9.85 (–14.10, –5.59)	–40.6	<0.001	0.48
	Year 5	24.28	19.19	21.61	29.62	–13.11 (–18.52, –7.69)	–54.0	<0.001	0.55
	Overall	24.28	19.19	23.86	26.33	–7.59 (–9.03, –6.15)	–31.3	<0.001	0.24

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Other hospital outpatient department PBPM ($)									
Rural (weighted N=460,143)	Year 1	104.19	76.05	108.95	82.64	–1.84 (–8.09, 4.41)	–1.8	0.63	—
	Year 2	104.19	76.05	98.05	85.86	–15.95 (–21.88, –10.02)	–15.3	<0.001	—
	Year 3	104.19	76.05	96.02	95.28	–27.39 (–40.88, –13.91)	–26.3	<0.001	—
	Year 4	104.19	76.05	88.35	99.69	–39.48 (–54.30, –24.66)	–37.9	<0.001	—
	Year 5	104.19	76.05	92.68	108.00	–43.46 (–64.30, –22.62)	–41.7	<0.001	—
	Overall	104.19	76.05	97.22	92.88	–23.73 (–29.11, –18.34)	–22.8	<0.001	—
Urban (weighted N=9,814,131)	Year 1	105.15	84.98	109.08	96.27	–7.35 (–9.80, –4.91)	–7.0	<0.001	0.18
	Year 2	105.15	84.98	108.62	101.07	–12.61 (–16.90, –8.32)	–12.0	<0.001	0.46
	Year 3	105.15	84.98	113.61	111.82	–18.38 (–23.91, –12.85)	–17.5	<0.001	0.32
	Year 4	105.15	84.98	115.70	120.27	–24.74 (–32.02, –17.46)	–23.5	<0.001	0.15
	Year 5	105.15	84.98	119.17	130.82	–31.82 (–41.38, –22.26)	–30.3	<0.001	0.41
	Overall	105.15	84.98	112.63	110.03	–17.68 (–20.25, –15.11)	–16.8	<0.001	0.09

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
All-cause acute inpatient admissions per 1,000 population									
Rural (weighted N=460,143)	Year 1	312.9	336.0	296.2	298.9	17.5 (–1.1, 36.1)	5.6	0.12	—
	Year 2	312.9	336.0	281.2	288.8	12.5 (–20.1, 45.1)	4.0	0.53	—
	Year 3	312.9	336.0	275.4	297.7	–1.8 (–44.1, 40.6)	–0.6	0.95	—
	Year 4	312.9	336.0	260.3	293.4	–12.9 (–68.5, 42.6)	–4.1	0.70	—
	Year 5	312.9	336.0	258.1	312.7	–32.0 (–96.0, 31.9)	–10.2	0.41	—
	Overall	312.9	336.0	276.0	296.7	–0.2 (–19.3, 18.8)	–0.1	0.98	—
Urban (weighted N=9,814,131)	Year 1	322.1	328.1	288.0	299.9	–6.9 (–12.7, –1.1)	–2.1	0.05	0.04
	Year 2	322.1	328.1	268.1	290.3	–18.4 (–27.3, –9.5)	–5.7	<0.001	0.13
	Year 3	322.1	328.1	268.4	296.1	–22.7 (–34.4, –11.1)	–7.1	0.001	0.43
	Year 4	322.1	328.1	252.7	294.0	–37.7 (–53.4, –22.0)	–11.7	<0.001	0.47
	Year 5	322.1	328.1	267.6	315.9	–43.6 (–62.3, –24.9)	–13.5	<0.001	0.77
	Overall	322.1	328.1	268.9	297.4	–24.1 (–29.5, –18.7)	–7.5	<0.001	0.05

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
ED visits per 1,000 population									
Rural (weighted N=460,143)	Year 1	512.2	481.8	516.4	515.6	–31.6 (–61.3, –1.9)	–6.2	0.08	—
	Year 2	512.2	481.8	539.0	525.7	–20.3 (–66.6, 26.1)	–4.0	0.47	—
	Year 3	512.2	481.8	523.4	545.5	–56.8 (–105.9, –7.8)	–11.1	0.06	—
	Year 4	512.2	481.8	521.4	545.2	–60.4 (–126.7, 6.0)	–11.8	0.13	—
	Year 5	512.2	481.8	534.6	523.1	–22.4 (–91.2, 46.5)	–4.4	0.59	—
	Overall	512.2	481.8	526.2	532.0	–40.1 (–63.5, –16.7)	–7.8	0.005	—
Urban (weighted N=9,814,131)	Year 1	449.9	412.4	477.5	426.0	12.4 (4.1, 20.7)	2.8	0.01	0.02
	Year 2	449.9	412.4	486.4	433.8	12.8 (0.3, 25.3)	2.8	0.09	0.25
	Year 3	449.9	412.4	488.9	445.9	2.2 (–15.6, 20.1)	0.5	0.84	0.06
	Year 4	449.9	412.4	494.6	444.5	9.1 (–13.9, 32.2)	2.0	0.52	0.10
	Year 5	449.9	412.4	495.3	443.3	10.9 (–16.1, 37.9)	2.4	0.51	0.45
	Overall	449.9	412.4	487.9	438.2	9.3 (1.3, 17.3)	2.1	0.05	<0.001

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Rural (weighted N=86,391)	Year 1	146.0	166.8	151.0	162.5	8.6 (–6.5, 23.7)	5.9	0.35	—
	Year 2	146.0	166.8	143.6	162.7	1.3 (–13.9, 16.5)	0.9	0.89	—
	Year 3	146.0	166.8	138.4	156.1	1.9 (–21.7, 25.5)	1.3	0.89	—
	Year 4	146.0	166.8	131.7	155.9	–4.2 (–30.6, 22.2)	–2.9	0.79	—
	Year 5	146.0	166.8	132.1	166.3	–12.4 (–40.7, 16.0)	–8.5	0.47	—
	Overall	146.0	166.8	140.8	160.1	0.9 (–8.6, 10.5)	0.6	0.87	—
Urban (weighted N=1,893,319)	Year 1	166.8	163.7	159.0	154.1	1.9 (–3.3, 7.0)	1.1	0.55	0.49
	Year 2	166.8	163.7	154.5	153.8	–2.2 (–9.4, 5.0)	–1.3	0.62	0.74
	Year 3	166.8	163.7	156.8	150.3	3.5 (–5.8, 12.8)	2.1	0.54	0.92
	Year 4	166.8	163.7	151.0	151.0	–2.8 (–14.8, 9.2)	–1.7	0.70	0.94
	Year 5	166.8	163.7	156.3	152.8	0.6 (–14.3, 15.4)	0.3	0.95	0.51
	Overall	166.8	163.7	155.5	152.4	0.2 (–4.0, 4.3)	0.1	0.95	0.94

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Percentage of discharges with a follow-up visit within 14 days of discharge									
Rural (weighted N= 93,092)	Year 1	65.8	66.6	66.7	68.0	–0.4 (–3.4, 2.5)	–0.7	0.80	—
	Year 2	65.8	66.6	69.3	67.0	3.2 (–1.8, 8.2)	4.9	0.29	—
	Year 3	65.8	66.6	70.9	70.5	1.2 (–4.3, 6.8)	1.9	0.72	—
	Year 4	65.8	66.6	72.5	73.1	0.2 (–5.8, 6.2)	0.3	0.95	—
	Year 5	65.8	66.6	74.4	72.1	3.2 (–4.6, 11.0)	4.9	0.50	—
	Overall	65.8	66.6	70.1	69.8	1.2 (–1.1, 3.6)	1.9	0.38	—
Urban (weighted N= 2,101,200)	Year 1	67.2	70.4	66.1	71.0	–1.7 (–3.0, –0.3)	–2.5	0.04	0.51
	Year 2	67.2	70.4	67.5	71.4	–0.7 (–2.4, 1.0)	–1.1	0.50	0.20
	Year 3	67.2	70.4	69.8	73.1	–0.2 (–2.2, 1.7)	–0.4	0.84	0.67
	Year 4	67.2	70.4	70.9	73.8	0.2 (–2.0, 2.3)	0.2	0.91	0.99
	Year 5	67.2	70.4	71.6	74.4	0.2 (–2.3, 2.7)	0.3	0.88	0.54
	Overall	67.2	70.4	68.8	72.5	–0.6 (–1.4, 0.3)	–0.8	0.29	0.22

(continued)

Table I-33 (continued)
Difference in the pre-post change in outcomes for Medicare beneficiaries in Maryland and the comparison group during the first 4.5 years of Maryland All-Payer Model implementation, by residency status and year

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

[*] Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

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APPENDIX J:
SENSITIVITY ANALYSIS

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J.1 Sensitivity Analysis for Overall Population

J.1.1 Overall Population Baseline Trend Analysis

As detailed in ***Appendix A***, we tested the assumption that Maryland and the comparison group had similar baseline trends by estimating a model for the baseline period only and by including a set of interactions between I_j (the Maryland indicator) and the indicators for the baseline years on the right-hand side of the model, as shown in ***Equation J.1***. Statistically significant interaction coefficients indicate whether the outcome difference between Maryland and the comparison group increased or decreased in particular baseline years. To test whether Maryland and the comparison group had similar trends over the 3 baseline years, we conducted a joint significance test of the interactions between the Maryland indicator and the baseline years 2012 and 2013, with the first baseline year (2011) omitted.

$$O = \alpha_0 + \alpha_1 I + \Sigma\beta_n Y_{n,b} + \Sigma\varphi_t Y_{n,b} \bullet I + \lambda X + \varepsilon, \qquad (J.1)$$

where

O	=	a performance measure (e.g., total per beneficiary per month [PBPM] cost per year) for the *i*-th beneficiary in the *j*-th group (Maryland or comparison), in period t (i,j,t subscripts suppressed).
I	=	a 0,1 indicator (0 = comparison group, 1 = Maryland).
X	=	a vector of patient, county, and hospital characteristics.
$Y_{n,b}$, $Y_{t,p}$	=	0,1 indicator of the *n*-th or *t*-th year; in the baseline (b) or post (p) period (*n* starts counting at first baseline period year, while *t* starts with first All-Payer Model period year).
ε	=	error term.

For the sensitivity analysis, the parameters of ***Equation J.1*** were estimated for 12 core outcomes, as well as all other outcomes, using weighted least squares, count, or logit regression models depending on the outcome. The weights are a function of the eligibility fraction and propensity scores. For each outcome, we report estimates and standard errors of the difference between the baseline trend in Maryland and the comparison groups (λ).

J.1.2 Medicare Baseline Trend Results

Tables J-1 through ***J-4*** show estimates of the baseline trend differences for each of the Medicare expenditure and utilization, quality of care, service mix, and spillover outcomes. Core outcomes are shown in shaded rows and bolded in the tables.

As shown in ***Table J-1***, baseline trends did not differ between Maryland and the comparison group for total expenditures or total hospital expenditures. However, several spending categories showed evidence of differing baseline trends. Inpatient facility spending decreased more in the Maryland than in the comparison group during baseline period. Emergency department (ED) visit spending, other hospital outpatient department spending, professional spending, professional spending in unregulated settings, total post-acute care (PAC) spending, and home health PAC spending increased relatively more in Maryland than in the comparison group during the baseline period. Baseline trends did not differ between Maryland and the comparison group for professional spending in regulated settings, PAC spending in skilled nursing facilities, PAC spending in long-term care hospitals, PAC spending in rehabilitation hospitals, and other spending.

In addition, payment per inpatient admission declined relatively more in Maryland than in the comparison group, and payment per ED visit increased relatively more in Maryland than in the comparison group during the baseline period.

Four out of five Medicare cost sharing outcomes increased in Maryland relative to the comparison group during the baseline period: total cost sharing, ED cost sharing, other hospital outpatient department cost sharing, and professional cost sharing. Changes in baseline trends did not differ between Maryland and the comparison group for inpatient facility cost sharing.

Baseline trends in inpatient admissions were parallel between Maryland and the comparison group. Baseline trends for ED visits differed between Maryland and the comparison group during the baseline period.

Table J-1
Differences in expenditure and utilization outcomes during the baseline period, Maryland and comparison group Medicare beneficiaries

Outcome	Maryland–CG Medicare trend difference in 2012 (SE)	Maryland–CG Medicare trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Total PBPM ($)	5.06 (4.77)	12.59* (6.81)	0.19
Total hospital PBPM ($)	−1.85 (3.79)	2.57 (4.69)	0.49
All-cause acute inpatient admissions per 1,000 population	1.1 (2.3)	6.2* (3.2)	0.13
Inpatient facility PBPM ($)	−11.30*** (3.68)	−10.41* (5.48)	0.01
Payment per inpatient admission ($)	−265.13** (107.77)	−247.77 (226.80)	0.04
Acute inpatient length of stay	0.04 (0.04)	0.1 (0.09)	0.47
ED visits per 1,000 population	3.8 (3.2)	−3.9 (4.6)	0.03

(continued)

Table J-1 (continued)
Differences in expenditure and utilization outcomes during the baseline period, Maryland and comparison group Medicare beneficiaries

Outcome	Maryland–CG Medicare trend difference in 2012 (SE)	Maryland–CG Medicare trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
ED visits PBPM ($)	5.24*** (0.85)	6.08*** (1.18)	<0.001
Other hospital outpatient department PBPM ($)	4.20* (2.35)	6.90** (2.85)	0.04
Payment per ED visit ($)	124.85*** (18.34)	160.61*** (25.11)	<0.001
Professional PBPM ($)	4.35** (1.81)	7.26*** (1.94)	0.001
Professional PBPM—regulated settings ($)	0.57 (0.43)	0.99* (0.53)	0.17
Professional PBPM—unregulated settings ($)	3.79** (1.88)	6.26*** (1.85)	0.002
Post-acute care PBPM—total ($)	3.60** (1.63)	5.86** (2.71)	0.07
Post-acute care PBPM—skilled nursing facilities ($)	0.90 (1.02)	1.66 (1.61)	0.58
Post-acute care PBPM—long-term care hospitals ($)	0.51 (0.62)	0.31 (0.85)	0.63
Post-acute care PBPM—rehabilitation hospitals ($)	−0.14 (0.54)	−0.44 (0.66)	0.78
Post-acute care PBPM—home health ($)	2.34* (1.36)	4.33** (2.13)	0.06
Other PBPM ($)	−1.04 (1.15)	−3.10* (1.69)	0.17
Beneficiary cost sharing—total PBPM ($)	3.27*** (0.90)	5.32*** (0.96)	<0.001
Beneficiary cost sharing—inpatient facility PBPM ($)	−0.03 (0.23)	0.37 (0.28)	0.17
Beneficiary cost sharing—ED visits PBPM ($)	1.06*** (0.19)	1.46*** (0.29)	<0.001
Beneficiary cost sharing—other hospital outpatient department PBPM ($)	1.19** (0.56)	2.36*** (0.71)	0.001
Beneficiary cost sharing—professional PBPM ($)	1.02** (0.48)	1.76*** (0.48)	<0.001

NOTES: CG = comparison group; ED = outpatient emergency department; PBPM = per beneficiary per month; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. Core outcomes are shown in shaded rows and bolded. *p<0.10; **p<0.05; ***p<0.01.

Table J-2 shows baseline trend differences for quality of care outcomes. In 2013, hospital admissions for ambulatory care sensitive conditions (ACSCs) increased relatively more in Maryland than in the comparison group. In addition, ED visits for bacterial pneumonia declined in Maryland relative to the comparison group during the baseline period. Unplanned readmissions within 30 days of discharge, ED visit within 30 days of discharge, ED visits for bacterial pneumonia, ED visits for heart failure, ED visits for COPD and asthma, and discharges with a follow-up visit within 14 days of discharge had baseline parallel trends.

Table J-2
Differences in quality of care outcomes during the baseline period, Maryland and comparison group Medicare beneficiaries

Outcome	Maryland–CG Medicare trend difference in 2012 (SE)	Maryland–CG Medicare trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Unplanned readmissions within 30 days of discharge per 1,000 discharges	−1.0 (2.5)	−3.1 (2.9)	0.57
Hospital admissions for ACSCs per 1,000 population	−0.2 (0.6)	1.4** (0.7)	0.02
Percentage of discharges with an ED visit within 30 days of discharge	0.02 (0.2)	−0.1 (0.2)	0.86
ED visits for bacterial pneumonia per 1,000 population	−0.3** (0.1)	−0.1 (0.2)	0.04
ED visits for heart failure per 1,000 population	0.4 (0.4)	−0.2 (0.6)	0.27
ED visits for COPD and asthma per 1,000 population	0.5 (0.7)	0.2 (0.9)	0.77
Percentage of discharges with a follow-up visit within 14 days of discharge	−0.3 (0.4)	0.2 (0.5)	0.54

NOTES: ACSC = ambulatory care sensitive condition; CG = comparison group; COPD = chronic obstructive pulmonary disease; ED = emergency department; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. Core outcomes are shown in shaded rows and bolded. *p<0.10; **p<0.05; ***p<0.01.

Table J-3 shows baseline trend differences for service mix outcomes. Diagnosis-related group (DRG) weight per admission, percentage of admissions through the ED, and case-mix-adjusted payment per discharge decreased relatively more in Maryland than in the comparison group during the baseline period. Baseline trends in Maryland and the comparison group were parallel for the percentage of admissions with major or extreme severity or risk of mortality, the percentage of ED visits that resulted in an admission, the rate of unplanned admissions, and percentage of acute admissions with an intensive care unit (ICU) stay.

Table J-3
Differences in service mix outcomes during the baseline period, Maryland and comparison group Medicare beneficiaries

Outcome	Maryland–CG Medicare trend difference in 2012 (SE)	Maryland–CG Medicare trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
DRG weight per admission	−0.004 (0.01)	−0.03** (0.01)	0.02
Percentage of acute admissions with a 3M APR DRG major/extreme severity or risk of mortality	−0.08 (0.3)	−0.2 (0.5)	0.91
Percentage of admissions through the ED	−1.0 (0.9)	−2.4** (1.1)	0.08
Percentage of ED visits that resulted in an admission	−0.3 (0.5)	0.04 (1.3)	0.82
Rate of unplanned admissions per 1,000 discharges	−0.6 (3.2)	1.6 (3.8)	0.78
Case-mix-adjusted payment per discharge ($)	−246.67*** (77.35)	−300.80** (122.78)	0.005
Percentage of acute admissions with an ICU stay	−0.6 (1.1)	−0.8 (2.4)	0.86

NOTES: APR = All Patient Refined; CG = comparison group; DRG = diagnosis-related group; ED = emergency department; ICU = intensive care unit; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. *p<0.10; **p<0.05; ***p<0.01.

Table J-4 shows baseline trend differences for spillover outcomes. The percentage of admissions resulting in a PAC transfer decreased relatively more in Maryland than in the comparison group over the baseline period. Baseline trends between Maryland and the comparison group were parallel for all other spillover outcomes.

Table J-4
Differences in spillover outcomes during the baseline period, Maryland and comparison group Medicare beneficiaries

Outcome	Maryland–CG Medicare trend difference in 2012 (SE)	Maryland–CG Medicare trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Percentage of admissions resulting in STAC transfer	0.002 (0.05)	−0.01 (0.08)	0.97
Percentage of STAC transfers classified as major or extreme severity	−1.9 (2.1)	−0.5 (2.2)	0.63
Percentage of admissions resulting in PAC transfer	−0.1* (0.1)	−0.2** (0.09)	0.07
Length of stay for admissions resulting in a PAC transfer	−0.1 (0.06)	−0.1 (0.08)	0.18
Percentage of PAC transfers classified as major or extreme severity	−2.4* (1.4)	−3.6* (1.8)	0.10
Percent of beneficiaries with a medical exam visit to a hospital outpatient department	−0.5 (0.5)	0.2 (0.6)	0.22
Percent of beneficiaries with a medical exam visit at a physician office	0.03 (0.07)	0.1 (0.1)	0.52
Percent of beneficiaries with a medical exam visit at an FQHC or RHC	0.05 (0.1)	0.006 (0.2)	0.64
Total number of outpatient medical exam visits at all sites of care combined	0.008 (0.03)	0.07* (0.04)	0.12
Total episode, all payment windows and payment components	91.76 (149.59)	144.65 (236.49)	0.79
Total pre-admission and post-discharge window payments, all payment components	129.60 (96.48)	132.17 (123.65)	0.40

NOTES: CG = comparison group; FQHC = federally qualified health center; PAC = post-acute care; RHC = rural health clinic; SE = standard error; STAC = short-term, acute care. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. *p<0.10; **p<0.05; ***p<0.01.

In summary, baseline trends differed for 7 of the 12 core outcomes for Medicare beneficiaries. Because more than half of the core Medicare outcomes showed evidence of differential baseline trends, we used Medicare models that assumed differing baseline trends between Maryland and the comparison group for our main analysis. We used the same model for all outcomes because the interpretation of findings for outcomes is interconnected. For example, even though the baseline trends for total expenditures were parallel, the baseline trends for most of the components of total expenditures were not parallel. We could not draw conclusions about how individual components impacted the total expenditure finding if we used different models for each outcome. Moreover, the model that includes the linear time trend does not produce biased results when the baseline trends are parallel.

Table J-5 shows the Medicare outcomes that failed the baseline parallel trends test at p<0.05 and p<0.10 and, therefore, were assumed to have differential baseline parallel trends.

Table J-5
Number of outcomes for the Medicare population that failed the baseline parallel trends test

Outcome category	Number of outcomes	Number of outcomes that failed baseline parallel trends test at p<0.05	Number of outcomes that failed baseline parallel trends test at p<0.10 level
Utilization and expenditures	24	12	2
Quality of care	7	2	0
Service mix	7	2	1
Spillover	11	0	1
Total	49	16	4

J.1.3 Commercial Insurance Baseline Trend Results

Tables J-6 through *J-9* show estimates of the baseline trend differences for each of the commercial insurance expenditure and utilization, quality of care, service mix, and spillover outcomes. Core outcomes are shown in shaded rows and bolded in the tables.

As shown in *Table J-6*, baseline trends did not differ between commercial plan members in Maryland and the comparison group for total expenditures or total hospital expenditures. This overall result masks differences in subcategories, however; inpatient facility expenditures and payment per admission declined in Maryland relative to the comparison group, while ED expenditures increased relative to the comparison group during the 3-year baseline period. The change in ED visits in Maryland differed from the comparison group during the baseline period, as did the trend for acute length of stay (LOS). Baseline trends for acute inpatient admissions, other hospital outpatient expenditures, payment per ED visit, professional expenditures, and other expenditures were parallel for Maryland and the comparison group.

Table J-6
Differences in expenditure and utilization outcomes during the baseline period, Maryland and comparison group commercial plan members

Outcome	Maryland–CG commercial trend difference in 2012 (SE)	Maryland–CG commercial trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Total PMPM ($)	1.29 (3.42)	−2.52 (6.49)	0.82
Total hospital PMPM ($)	−0.44 (2.65)	−2.33 (4.70)	0.88
All-cause acute inpatient admissions per 1,000 population	0.2 (0.7)	1.4 (0.9)	0.26
Inpatient facility PMPM ($)	−0.19 (1.96)	−5.67** (2.78)	0.08
Payment per inpatient admission ($)	−281.23 (330.20)	−1,172.90** (508.56)	0.07
Acute inpatient length of stay	0.1* (0.1)	−0.1 (0.1)	0.04
ED visits per 1,000 population	2.7 (1.3)	−0.4** (2.3)	0.07
ED visits PMPM ($)	0.32 (0.30)	1.46** (0.63)	0.06
Other hospital outpatient department PMPM ($)	−0.57 (1.37)	1.91 (2.59)	0.71
Payment per ED visit ($)	−8.51 (18.94)	72.43* (39.57)	0.10
Professional PMPM ($)	1.03 (0.85)	−0.83 (2.61)	0.43
Other PMPM ($)	0.70 (0.72)	0.63 (1.18)	0.59

NOTES: CG = comparison group; ED = outpatient emergency department; PMPM = per member per month, SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. Core outcomes are shown in shaded rows and bolded. *p<0.10; **p<0.05; ***p<0.01.

Table J-7 shows baseline trend differences for quality of care outcomes for commercial plan members. Baseline trends for 30-day readmission, the probability of an ACSC admission, and follow-up visit within 14 days after an acute inpatient discharge did not differ for Maryland and the comparison group. Relative to the comparison group, the trend for the percentage of discharges with an ED visit within 30 days for commercial plan members increased in Maryland during the baseline period.

Table J-7
Differences in quality of care outcomes during the baseline period, Maryland and comparison group commercial plan members

Outcome	Maryland–CG commercial trend difference in 2012 (SE)	Maryland–CG commercial trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Unplanned readmissions within 30 days of discharge per 1,000 discharges	−1.2 (4.5)	−1.4 (3.1)	0.89
Hospital admissions for ACSCs per 1,000 population	0.03 (0.1)	−0.1 (0.2)	0.77
Percentage of discharges with an ED visit within 30 days of discharge	0.3 (0.3)	0.7** (0.3)	0.05
Percentage of discharges with a follow-up visit within 14 days of discharge	−7.9 (7.0)	−3.3 (7.8)	0.52

NOTES: ACSC = ambulatory care sensitive condition; CG = comparison group; ED = emergency department; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. Core outcomes are shown in shaded rows and bolded. *p<0.10; **p<0.05; ***p<0.01.

As shown in ***Table J-8***, baseline trends for the DRG weight per admission and case-mix adjusted payment per discharge did not differ for Maryland and comparison group commercial plan members. The rate of unplanned admissions per 1,000 discharges decreased for commercial plan members in Maryland relative to the comparison group during the baseline period, while the percentage of admissions through the ED, and percentage of ED visits that resulted in an admission, and the percentage of acute admissions with an ICU stay increased in Maryland relative to the comparison group.

The baseline trend for the percentage of commercial plan members with a medical exam visit to a hospital outpatient department was parallel for Maryland and the comparison group (***Table J-9***). However, the percentage of commercial plan members with a medical exam visit at a physician office and the total number of outpatient medical exam visits at all sites of care combined declined in Maryland relative to the comparison group during the baseline period.

Table J-8
Differences in service mix outcomes during the baseline period, Maryland and comparison group commercial plan members

Outcome	Maryland–CG commercial trend difference in 2012 (SE)	Maryland–CG commercial trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
DRG weight per admission	0.009 (0.02)	−0.006 (0.02)	0.62
Rate of unplanned admissions per 1,000 discharges	−5.7 (5.0)	−15.1** (6.1)	0.04
Percentage of admissions through the ED	0.02** (0.007)	0.02** (0.008)	0.01
Percentage of ED visits that resulted in an admission	0.6** (0.3)	1.0** (0.4)	0.01
Case-mix-adjusted payment per discharge ($)	−245.13 (197.08)	−957.08 (455.49)	0.12
Percentage of acute admissions with an ICU stay	0.6 (0.5)	1.8** (0.8)	0.06

NOTES: CG = comparison group; DRG = diagnosis-related group; ED = emergency department; ICU = intensive care unit; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. *p<0.10; **p<0.05; ***p<0.01.

Table J-9
Differences in spillover outcomes during the baseline period, Maryland and comparison group commercial plan members

Outcome	Maryland–CG commercial trend difference in 2012 (SE)	Maryland–CG commercial trend difference in 2013 (SE)	p-value of joint test for 2012 and 2013 trend differences
Percent of commercial plan members with a medical exam visit to a hospital outpatient department	−0.2 (0.3)	0.4 (1.0)	0.58
Percent of commercial plan members with a medical exam visit at a physician office	−4.4*** (0.7)	−4.7*** (0.9)	<0.001
Total number of outpatient medical exam visits at all sites of care combined	−0.2*** (0.03)	−0.2*** (0.05)	<0.001

NOTES: CG = comparison group; SE = standard error. Baseline is the period January 2011–December 2013. The trend (slope) is the change in the outcome relative to the first baseline year (2011). Standard errors are shown in parentheses. *p<0.10; **p<0.05; ***p<0.01.

In summary, baseline trends for 1 of the 12 core measures assessed were not parallel for commercial plan members at p<0.05 and 4 core outcomes were not parallel at p<0.10. In addition, baseline trends generally appeared similar based on visual inspection. Because the baseline trends for more than half of the core outcomes for commercial plan members were parallel in Maryland and the comparison group, we concluded that we could assume that Maryland and the comparison group were on the same trajectory before the implementation of the All-Payer Model and we used the D-in-D model that assumed parallel baseline trends in the main analysis. However, as shown in ***Table J-10***, not all outcomes we assessed had parallel trends in the baseline period.

Table J-10
Number of outcomes for the commercially insured population that failed the baseline parallel trends test

Outcome category	Number of outcomes	Number of outcomes that failed baseline parallel trends test at p<0.05	Number of outcomes that failed baseline parallel trends test at p<0.10 level
Utilization and expenditures	12	1	4
Quality of care	4	0	1
Service mix	6	3	1
Spillover	3	0	2
Total	25	4	8

As noted in the Medicare section above, we used the same model for all outcomes due to the interconnected interpretation of the outcomes. For the sensitivity analysis presented in this appendix, we used the model that adjusted for differential trends by including an interaction term between the Maryland indicator and a linear time trend in the final model.

J.2 Sensitivity Analysis Results

The following sections describe the results of sensitivity analyses for the Medicare and commercial insurance populations. Results are organized by the four claims-based outcome domains: Medicare expenditures and utilization (***Section 4*** of the main report), quality of care (***Section 5***), service mix (***Section 6***), and spillover (***Section 7***). Within each domain, we discuss sensitivity analysis results in the same order that we present the main analysis results in the main report sections, first discussing results for Medicare beneficiaries and then for commercial plan members.

J.2.1 Service Utilization and Expenditures

J.2.1.1 Total Expenditures and Total Hospital Expenditures

J.2.1.1.1 Medicare

Table J-11 presents the results of the D-in-D regression analyses for total PMPM and total hospital PMPM expenditures for the model that assumed parallel trends (the sensitivity analysis) for Medicare beneficiaries. For comparison, we also show the D-in-D estimates from the model that assumed differential trends (the main analysis).

Table J-11
Difference in the pre-post change in total expenditures and total hospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Total PBPM ($)						
Year 1	955.71	885.16	957.91	893.76	−6.42 (−15.49, 2.66)	−19.24*** (−28.90, −9.59)
Year 2	955.71	885.16	960.76	888.25	1.94 (−10.20, 14.08)	−17.35* (−33.42, −1.29)
Year 3	955.71	885.16	1,017.86	954.55	−7.25 (−21.17, 6.66)	−33.02** (−58.74, −7.30)
Year 4	955.71	885.16	1,038.27	963.81	3.90 (−13.12, 20.92)	−28.34 (−60.38, 3.70)
Year 5	955.71	885.16	1,095.97	1,024.77	0.63 (−20.12, 21.38)	−38.08 (−81.41, 5.25)
Overall	955.71	885.16	1,005.70	936.45	−1.63 (−8.04, 4.78)	−26.10*** (−37.34, −14.85)
Total hospital PBPM ($)[a]						
Year 1	525.37	431.98	527.22	443.04	−9.21** (−16.26, −2.16)	−11.94*** (−18.88, −4.99)
Year 2	525.37	431.98	522.86	439.64	−10.16* (−19.32, −0.99)	−14.26* (−27.22, −1.30)
Year 3	525.37	431.98	553.06	483.18	−23.49*** (−33.62, −13.37)	−28.97** (−48.30, −9.64)
Year 4	525.37	431.98	566.29	491.82	−18.92** (−31.76, −6.08)	−25.77* (−49.88, −1.66)
Year 5	525.37	431.98	609.95	537.25	−20.68* (−38.46, −2.90)	−28.91 (−61.65, 3.83)
Overall	525.37	431.98	550.20	472.70	−16.11*** (−21.01, −11.21)	−21.31*** (−29.83, −12.79)

(continued)

Table J-11 (continued)
Difference in the pre-post change in total expenditures and total hospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 10,281,981.

The sensitivity analysis findings are shown in the shaded column.

[a] Total hospital expenditures PBPM includes payments for inpatient facility services, emergency department visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

- In the sensitivity analysis, the change in total expenditures in Maryland was not statistically significantly different from the comparison group in any individual year or during the first 4.5 years overall.

- Similar to the main analysis, we found that total hospital expenditures increased by $16.11 PBPM less in Maryland than in the comparison group (p<0.001) in the sensitivity analysis. Although the magnitude of the difference was slightly lower than the main analysis, the magnitude similarly grew over time.

J.2.1.1.2 Commercial Insurance

Table J-12 presents the results of the D-in-D regression analyses for total PMPM and total hospital PMPM expenditures for the model that assumed differential trends (the sensitivity analysis) for the commercially insured population. We also show the D-in-D estimates from the model that assumed parallel trends (the main analysis).

- Although we found total hospital savings in the main analysis, the change in total PMPM and total hospital PMPM expenditures in Maryland were not statistically significantly different from the comparison group in any individual year or during the first 4 years overall in the sensitivity analysis.

Table J-12
Difference in the pre-post change in total expenditures and total hospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Total PMPM ($)						
Year 1	223.70	290.29	235.68	300.39	1.88 (−6.44, 10.19)	−0.42 (−8.38, 7.53)
Year 2	223.70	290.29	248.36	311.67	3.28 (−10.28, 16.84)	−0.15 (−10.43, 10.13)
Year 3	223.70	290.29	254.55	321.87	−0.74 (−17.89, 16.42)	−5.28 (−14.82, 4.25)
Year 4	223.70	290.29	261.61	337.46	−9.27 (−32.80, 14.25)	−14.95** (−26.30, −3.59)
Overall	223.70	290.29	248.78	316.19	−0.82 (−8.53, 6.89)	−4.65 (−9.46, 0.16)
Total hospital PMPM ($)[a]						
Year 1	115.93	156.76	123.97	164.68	0.13 (−6.01, 6.26)	−2.16 (−8.31, 4.00)
Year 2	115.93	156.76	132.83	174.08	−0.42 (−9.53, 8.69)	−3.81 (−11.70, 4.09)
Year 3	115.93	156.76	134.38	178.14	−2.92 (−15.02, 9.19)	−7.41* (−14.45, −0.37)
Year 4	115.93	156.76	139.83	191.73	−11.07 (−26.35, 4.21)	−16.66** (−26.46, −6.86)
Overall	115.93	156.76	131.97	175.96	−3.15 (−8.39, 2.09)	−6.93*** (−10.73, −3.14)

(continued)

Table J-12 (continued)
Difference in the pre-post change in total expenditures and total hospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; PMPM = per member per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age category, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial insurance plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The adjusted means shown are for the model assuming parallel trends. The adjusted means for the model assuming differential trends can be found in the main body of the report. The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PMPM models is 3,824,639.

The sensitivity analysis findings are shown in the shaded column.

[a] Total hospital PMPM includes payments for inpatient facility services, emergency department visits, observation stays, and other hospital outpatient department services.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.1.2 Hospital Inpatient Utilization and Expenditures

J.2.1.2.1 Medicare

Table J-13 shows the results of the D-in-D regression analyses for models assuming parallel trends (sensitivity analysis) and differential trends (main analysis) for the annual rate of inpatient use per 1,000 Medicare beneficiaries, inpatient LOS, inpatient expenditures, and payment per inpatient admission for Medicare beneficiaries in Maryland relative to the comparison group.

- For both the main analysis and the sensitivity analysis, the annual inpatient admission rate decreased from the baseline period in Maryland and the comparison group during the first 4.5 years of the All-Payer Model implementation, but it decreased more in Maryland. In the sensitivity analysis, the difference in the change was statistically significant for the second through the fifth year of the implementation period, and the magnitude of the difference was smaller than the magnitude of the difference for the main analysis. During the first 4.5 years of the All-Payer Model implementation period overall, the annual inpatient admission rate decreased by 11.8 admissions per 1,000 Medicare beneficiaries more in Maryland than in the comparison group ($p<0.01$) using the model that assumed parallel trends.

- Although the increase in average inpatient LOS in Maryland was not statistically significantly different from the increase in the comparison group for the main analysis, LOS was 0.3 days longer for Maryland Medicare admissions than for the comparison group in the sensitivity analysis ($p<0.01$).

- Similarly, although the change in Maryland inpatient facility expenditures did not differ from the comparison group for the main analysis, inpatient spending increased by $14.73 in Maryland relative to the comparison group in the sensitivity analysis ($p<0.01$).

- Under both models, the increase from the baseline period in the payment per inpatient admission was larger in Maryland than in the comparison group in the first 4.5 years after implementation of the All-Payer Model, although the magnitude was lower in the sensitivity analysis.

Table J-13
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
All-cause acute inpatient admissions per 1,000 population						
Year 1	328.5	328.8	300.2	300.1	0.3 (−4.8, 5.4)	−5.8* (−11.6, −0.1)
Year 2	328.5	328.8	282.5	290.3	−7.9** (−14.2, −1.6)	−17.0*** (−25.9, −8.1)
Year 3	328.5	328.8	285.4	296.4	−10.4*** (−16.8, −4.0)	−22.0*** (−33.5, −10.5)
Year 4	328.5	328.8	271.3	294.1	−22.0*** (−29.9, −14.1)	−36.8*** (−52.2, −21.4)
Year 5	328.5	328.8	289.3	316.2	−25.2*** (−33.2, −17.1)	−43.6*** (−62.0, −25.3)
Overall	328.5	328.8	285.2	297.6	−11.8*** (−14.9, −8.8)	−23.2*** (−28.5, −17.8)
Acute inpatient length of stay						
Year 1	6.6	6.2	6.8	6.2	0.19 (0.0, 0.4)	0.09 (0.0, 0.2)
Year 2	6.6	6.2	6.8	6.2	0.2* (0.0, 0.5)	0.1 (−0.1, 0.2)
Year 3	6.6	6.2	6.9	6.2	0.3** (0.1, 0.5)	0.1 (−0.1, 0.3)
Year 4	6.6	6.2	6.8	6.2	0.3* (0.0, 0.5)	0.01 (−0.3, 0.3)
Year 5	6.6	6.2	7.0	6.3	0.3** (0.1, 0.6)	0.01 (−0.3, 0.4)
Overall	6.6	6.2	6.9	6.2	0.3*** (0.2, 0.4)	0.1 (0.0, 0.2)

(continued)

Table J-13 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Inpatient facility PBPM ($)†						
Year 1	382.52	328.29	366.62	323.27	−10.93** (−18.17, −3.69)	−0.96 (−7.54, 5.63)
Year 2	382.52	328.29	357.94	315.00	−11.35** (−19.13, −3.57)	3.66 (−8.10, 15.42)
Year 3	382.52	328.29	378.17	345.35	−21.46*** (−28.71, −14.22)	−1.42 (−19.27, 16.42)
Year 4	382.52	328.29	383.22	344.56	−15.62*** (−22.98, −8.25)	9.45 (−14.49, 33.39)
Year 5	382.52	328.29	418.82	377.99	−13.45** (−24.11, −2.78)	16.66 (−17.85, 51.16)
Overall	382.52	328.29	376.92	337.26	−14.73*** (−18.23, −11.23)	4.30 (−4.02, 12.61)
Payment per inpatient admission ($)†						
Year 1	14,050.38	11,059.56	14,707.12	11,642.46	73.80 (−215.45, 363.04)	323.76* (30.93, 616.59)
Year 2	14,050.38	11,059.56	15,227.16	11,799.44	436.86 (−3.20, 876.92)	810.76*** (400.75, 1,220.76)
Year 3	14,050.38	11,059.56	15,548.97	12,341.26	216.86 (−265.81, 699.53)	714.69* (70.33, 1,359.04)
Year 4	14,050.38	11,059.56	16,467.93	12,542.17	934.91** (251.83, 1,617.98)	1,556.67*** (794.23, 2,319.11)
Year 5	14,050.38	11,059.56	17,287.92	13,052.86	1,244.20** (416.79, 2,071.62)	1,989.90*** (1,152.52, 2,827.28)
Overall	14,050.38	11,059.56	15,671.48	12,180.23	500.54*** (265.12, 735.97)	967.49*** (705.46, 1,229.52)

(continued)

Table J-13 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; LOS = length of stay; PBPM = per beneficiary per month.

Methods: A negative binomial regression model was used to obtain estimates of the differences in the number of acute inpatient admissions and the number of days in LOS. Number of admissions estimates were multiplied by 1,000 to obtain a rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the inpatient admission rate and PBPM models is 10,281,981. The total weighted N for the acute inpatient LOS and payment per admission models is 3,143,370.

The sensitivity analysis findings are shown in the shaded column.

† Inpatient facility PBPM and payment per inpatient admission did not have parallel baseline trends at p<0.05.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.1.2.2 Commercial Insurance

Table J-14 shows the results of the D-in-D regression analyses for the annual rate of inpatient admissions per 1,000 commercial plan members, inpatient LOS, inpatient expenditures, and payment per inpatient admission for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the commercially insured population for Maryland relative to the comparison group.

- Although the decline in inpatient admissions did not differ between Maryland and the comparison group in the main analysis, the inpatient admission rate decreased statistically significantly more in Maryland than the comparison group in Years 2, 3, and 4 and the first 4 years of the All-Payer Model implementation period overall in the sensitivity analysis. During the first 4 years, the inpatient admission rate decreased by 2.5 admissions per 1,000 commercial plan members more in Maryland than in the comparison group ($p<0.01$).

- The change in average inpatient LOS was not statistically significantly different for Maryland and the comparison group in any of the first 4 years of the All-Payer Model implementation or overall for either model.

- In contrast to the main findings, the increase in inpatient facility PMPM expenditures did not differ for Maryland and the comparison group in any individual year or in the first 4 years overall after implementation of the All-Payer Model in the sensitivity analysis.

- Payment per admission declined for Maryland commercial admissions relative to the comparison group in the main analysis but increased relative to the comparison group in the sensitivity analysis. In the sensitivity analysis, the increase from the baseline period in the payment per inpatient admission was \$933 larger in Maryland for the first 4 years overall ($p<0.05$).

Table J-14
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
All-cause acute inpatient admissions per 1,000 population						
Year 1	39.2	42.0	35.6	38.8	−0.6 (−1.8, 0.6)	0.49 (−0.47, 1.44)
Year 2	39.2	42.0	34.1	39.3	−2.8** (−4.8, −0.8)	−1.12 (−2.61, 0.36)
Year 3	39.2	42.0	34.0	39.6	−3.1* (−5.8, −0.4)	−0.88 (−2.33, 0.58)
Year 4	39.2	42.0	32.5	38.8	−4.1** (−7.1, −1.1)	−1.31 (−2.74, 0.12)
Overall	39.2	42.0	34.2	39.1	−2.5*** (−3.6, −1.4)	−0.61 (−1.26, 0.05)
Acute inpatient length of stay†						
Year 1	5.0	5.3	5.2	5.4	0.01 (−0.2, 0.2)	−0.049 (−0.22, 0.12)
Year 2	5.0	5.3	5.3	5.4	0.1 (−0.2, 0.4)	0.05 (−0.15, 0.24)
Year 3	5.0	5.3	5.4	5.5	0.1 (−0.2, 0.4)	0.03 (−0.13, 0.18)
Year 4	5.0	5.3	5.6	5.5	0.3 (−0.1, 0.7)	0.16** (0.03, 0.30)
Overall	5.0	5.3	5.3	5.5	0.1 (−0.02, 0.3)	0.03 (−0.05, 0.12)

(continued)

Table J-14 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Inpatient facility PMPM ($)†						
Year 1	67.26	73.12	71.42	75.66	1.62 (−3.79, 7.04)	−4.02 (−8.11, 0.08)
Year 2	67.26	73.12	77.17	78.63	4.41 (−3.02, 11.84)	−3.98 (−9.26, 1.30)
Year 3	67.26	73.12	79.51	82.39	2.98 (−4.69, 10.65)	−8.16** (−14.17, −2.15)
Year 4	67.26	73.12	86.77	86.22	6.42 (−3.62, 16.45)	−7.47* (−14.46, −0.49)
Overall	67.26	73.12	78.02	80.25	3.64 (−0.09, 7.37)	−5.74*** (−8.48, −3.00)
Payment per inpatient admission ($)†						
Year 1	14,391.56	15,093.28	16,421.40	17,348.61	−225.49 (−1,286.27, 835.29)	−1415.34*** (−2187.54, −643.13)
Year 2	14,391.56	15,093.28	18,586.76	17,817.42	1,471.06* (4.53, 2,937.58)	−291.08 (−1099.75, 517.60)
Year 3	14,391.56	15,093.28	18,782.91	18,796.94	687.68 (−881.85, 2,257.21)	−1646.75*** (−2543.94, −749.55)
Year 4	14,391.56	15,093.28	21,256.72	19,547.43	2,411.00* (370.06, 4,451.94)	−495.73 (−1675.80, 684.35)
Overall	14,391.56	15,093.28	18,489.34	18,257.51	933.41** (191.00, 1,675.83)	−1017.96*** (−1467.54, −568.39)

(continued)

Table J-14 (continued)
Difference in the pre-post change in inpatient utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; LOS = length of stay; PMPM = per member per month.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of an acute inpatient admission. Probability of any admission estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 members. A negative binomial regression model was used to obtain estimates of the differences in the number of days in LOS. A weighted least squares model was used to obtain estimates of the difference expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the inpatient admission rate model is 4,045,874. The total weighted Ns for the acute inpatient LOS is 212,870 and for payment per admission models is 200,870. The total weighted N for the PMPM model is 3,824,639. The expenditure outcomes exclude commercial plan members with capitated payments.

The sensitivity analysis findings are shown in the shaded column.

[†] Acute inpatient length of stay did not have parallel baseline trends at p<0.05. Inpatient facility PMPM and payment per inpatient admission did not have parallel baseline trends at p<0.10.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.1.3 Outpatient Hospital Utilization and Expenditures

J.2.1.3.1 Medicare

Table J-15 shows the results of the D-in-D regression analyses for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for the annual rate of ED visits per 1,000 Medicare beneficiaries; expenditures for ED visits and for other hospital outpatient department services; and payment per ED visit, for Maryland relative to the comparison group.

- We did not find a significant difference in the overall change in the rate of ED visits in the main analysis or the sensitivity analysis. However, we found that the number of ED visits increased less in Maryland relative to the comparison group in Year 3 in the sensitivity analysis.

- In the main analysis, we found that expenditures for ED visits declined slightly in Maryland over the 4.5 years of implementation but increased steadily in the comparison group in each year of the All-Payer Model implementation period. However, in the sensitivity analysis, we found that expenditures for ED visits increased more for Maryland relative to the comparison group. As a result, there was an overall $3.87 increase in ED visit expenditures in Maryland relative to the comparison group during the first 4.5 years of the All-Payer Model.

- Other hospital outpatient department expenditures increased less in Maryland than in the comparison group in both the main analysis and the sensitivity analysis. However, the magnitude of the relative decline was smaller in the sensitivity analysis. Overall, other hospital outpatient department expenditures increased by $5.25 less in Maryland than in the comparison group in the sensitivity analysis.

- We found that the average payment per ED visit declined in Maryland but increased in the comparison group in each year of the All-Payer Model implementation period in the main analysis. In contrast, we found that the payment per ED visit increased more for Maryland than for the comparison group in the sensitivity analysis. Overall, payment per ED visit increased by $76 in Maryland relative to the comparison group ($p<0.01$).

Table J-15
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
ED visits per 1,000 population†						
Year 1	448.7	417.0	468.7	431.2	4.7 (−3.1, 12.4)	10.3** (2.2, 18.5)
Year 2	448.7	417.0	474.9	438.9	2.6 (−6.5, 11.8)	11.4 (−0.7, 23.5)
Year 3	448.7	417.0	473.5	451.6	−12.1** (−21.3, −2.9)	−0.5 (−17.7, 16.6)
Year 4	448.7	417.0	475.6	450.0	−8.6 (−18.6, 1.4)	6.1 (−16.1, 28.2)
Year 5	448.7	417.0	473.7	448.0	−8.2 (−19.5, 3.1)	9.1 (−17.0, 35.3)
Overall	448.7	417.0	473.3	443.6	−4.0 (−8.2, 0.2)	7.0 (−0.6, 14.7)
ED visits PBPM ($)†						
Year 1	30.52	19.30	37.69	24.31	2.18** (0.50, 3.85)	−3.768*** (−5.05, −2.49)
Year 2	30.52	19.30	39.57	24.45	3.92** (1.36, 6.48)	−5.03*** (−6.91, −3.15)
Year 3	30.52	19.30	41.51	26.90	3.41*** (1.45, 5.37)	−8.54*** (−11.63, −5.44)
Year 4	30.52	19.30	44.64	28.12	5.32*** (3.39, 7.25)	−9.63*** (−13.75, −5.51)
Year 5	30.52	19.30	45.83	29.60	5.03*** (3.02, 7.03)	−12.92*** (−18.13, −7.71)
Overall	30.52	19.30	41.45	26.36	3.87*** (2.93, 4.81)	−7.47*** (−8.86, −6.08)

(continued)

Table J-15 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Other hospital outpatient department PBPM ($)†						
Year 1	112.33	84.39	122.90	95.46	−0.46 (−3.99, 3.07)	−7.21*** (−9.57, −4.86)
Year 2	112.33	84.39	125.36	100.19	−2.73 (−7.70, 2.25)	−12.89*** (−16.94, −8.84)
Year 3	112.33	84.39	133.39	110.93	−5.44 (−12.19, 1.31)	−19.01*** (−24.24, −13.78)
Year 4	112.33	84.39	138.42	119.14	−8.62 (−17.60, 0.35)	−25.60*** (−32.52, −18.67)
Year 5	112.33	84.39	145.30	129.66	−12.26** (−21.00, −3.52)	−32.64*** (−41.65, −23.64)
Overall	112.33	84.39	131.83	109.08	−5.25*** (−8.28, −2.23)	−18.14*** (−20.57, −15.70)
Payment per ED visit ($)†						
Year 1	846.85	569.63	986.74	676.28	33.23 (−2.31, 68.76)	−122.60*** (−167.16, −78.03)
Year 2	846.85	569.63	1,025.40	677.82	70.36** (24.30, 116.42)	−164.94*** (−232.55, −97.32)
Year 3	846.85	569.63	1,072.83	717.57	78.03*** (28.90, 127.16)	−236.74*** (−330.78, −142.70)
Year 4	846.85	569.63	1,140.45	755.04	108.19*** (49.74, 166.64)	−286.06*** (−405.55, −166.57)
Year 5	846.85	569.63	1,171.00	796.25	97.53** (32.58, 162.47)	−376.19*** (−518.15, −234.24)
Overall	846.85	569.63	1,069.99	717.07	75.71*** (53.07, 98.35)	−222.88*** (−264.65, −181.11)

(continued)

Table J-15 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A negative binomial regression model was used to obtain estimates of the differences in the number of ED visits. Number of ED visits estimates were multiplied by 1,000 to obtain a rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models and the ED visit model is 10,281,981. The total weighted N for payment per ED visit is 4,760,964.

The sensitivity analysis findings are shown in the shaded column.

† ED visits PBPM and payment per ED visit did not have parallel baseline trends at p<0.01. ED visits per 1,000 population and other hospital outpatient PBPM did not have parallel baseline trends at p<0.05.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.1.3.2 Commercial Insurance

Table J-16 shows the results of the D-in-D regression analyses for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the annual rate of ED visits per 1,000 commercial plan members, ED visit expenditures, other hospital outpatient department expenditures, and payment per ED visit for Maryland relative to the comparison group.

- The finding for the change in the ED visit rate was nearly identical for the main analysis and the sensitivity analysis. Although the difference in the change in ED visits was not statistically significant in any individual implementation year, in the sensitivity analysis ED visits decreased by 3.4 visits per 1,000 commercial plan members more in Maryland than in the comparison group after the first 4 years overall of All-Payer Model implementation ($p<0.10$). The overall value was statistically significant because it is calculated for a larger number of observations and is, therefore, more precise than the estimates for the individual years.

- Although the difference in the change in ED visit PMPM expenditures was not statistically significant for the main analysis, ED visit PMPM expenditures grew more slowly in Maryland than in the comparison group in the sensitivity analysis. Overall, ED visit PMPM expenditures increased by $2.10 less in Maryland than in the comparison group during first 4 years of the All-Payer Model implementation period.

- In the main analysis, we found a greater increase in the payment per ED visit during the first 4 years overall. In contrast, we found a $60 smaller increase in the payment per ED visit in Maryland than in the comparison group during the first 4 years of the All-Payer Model overall ($p<0.05$) in the sensitivity analysis.

- In both the main analysis and sensitivity analysis, other hospital outpatient department expenditures increased less in Maryland than the comparison group during Year 4 of the model, while there was no difference in the change during the first three years of the All-Payer Model. However, we found that there was no overall significant difference in the main analysis while there was an overall difference in the sensitivity analysis. Other outpatient hospital expenditures increased by $4.70 less in Maryland than the comparison group during the first 4 years of the All-Payer Model implementation overall ($p<0.05$) using the model that assumed differential trends.

Table J-16
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
ED visits per 1,000 population†						
Year 1	128.5	122.5	123.9	120.6	−2.6 (−7.3, 2.1)	−2.6 (−7.1, 1.8)
Year 2	128.5	122.5	121.7	121.2	−5.4 (−11.1, 0.3)	−5.4* (−10.5, −0.3)
Year 3	128.5	122.5	121.6	118.1	−2.3 (−8.4, 3.9)	−2.3 (−6.7, 2.1)
Year 4	128.5	122.5	118.9	116.7	−3.5 (−11.5, 4.5)	−3.5 (−9.2, 2.1)
Overall	128.5	122.5	121.7	119.3	−3.4* (−6.4, −0.4)	−3.4** (−5.8, −1.0)
ED visits PMPM ($)†						
Year 1	7.65	16.85	8.34	18.35	−0.80 (−1.71, 0.12)	0.68 (−0.13, 1.48)
Year 2	7.65	16.85	7.99	19.10	−1.90*** (−3.08, −0.72)	0.29 (−0.71, 1.29)
Year 3	7.65	16.85	8.13	19.84	−2.51*** (−4.13, −0.89)	0.41 (−0.58, 1.40)
Year 4	7.65	16.85	7.74	20.68	−3.73*** (−5.72, −1.75)	−0.09 (−1.38, 1.19)
Overall	7.65	16.85	8.08	19.39	−2.10*** (−2.80, −1.40)	0.36 (−0.14, 0.86)

(continued)

Table J-16 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Other hospital outpatient department PMPM ($)						
Year 1	41.00	66.77	44.16	70.61	−0.69 (−3.58, 2.21)	1.23 (−2.62, 5.07)
Year 2	41.00	66.77	47.60	76.25	−2.87 (−7.09, 1.34)	−0.03 (−4.63, 4.58)
Year 3	41.00	66.77	46.67	75.89	−3.45 (−10.25, 3.34)	0.33 (−4.23, 4.90)
Year 4	41.00	66.77	45.23	84.82	−13.83*** (−22.90, −4.76)	−9.11** (−15.70, −2.51)
Overall	41.00	66.77	45.80	76.28	−4.70*** (−7.57, −1.83)	−1.51 (−3.93, 0.90)
Payment per ED visit ($)						
Year 1	503.90	1,166.21	568.71	1,241.26	−10.25 (−58.09, 37.59)	61.77*** (24.02, 99.52)
Year 2	503.90	1,166.21	575.52	1,274.69	−36.86 (−113.18, 39.46)	70.27** (13.19, 127.35)
Year 3	503.90	1,166.21	595.47	1,333.85	−76.08 (−175.70, 23.55)	66.17* (1.72, 130.61)
Year 4	503.90	1,166.21	608.08	1,413.06	−142.67* (−278.54, −6.80)	34.69 (−40.30, 109.69)
Overall	503.90	1,166.21	584.82	1,306.61	−59.57** (−103.26, −15.88)	59.25*** (30.91, 87.59)

(continued)

Table J-16 (continued)
Difference in the pre-post change in outpatient hospital utilization and expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

ED = emergency department; PMPM = per member per month.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of an ED visit. Probability of any ED visit estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the difference-in-differences (D-in-D) estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the ED visit rate model is 4,045,874. The total weighted N for all PMPM models is 3,824,639. The total weighted N for payment per ED visit is 723,071. The expenditure outcomes exclude commercial plan members with capitated payments.

The sensitivity analysis findings are shown in the shaded column.

† ED visits per 1,000 population and ED PMPM expenditures did not have parallel baseline trends at p<0.10.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.1.4 Nonhospital Expenditures

J.2.1.4.1 Medicare

Table J-17 presents the results of the D-in-D regression analyses for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for the nonhospital expenditure measures for Medicare beneficiaries in Maryland and the comparison group.

- Although we found a statistically significant smaller increase in professional expenditures in Maryland than the comparison group during the first 4.5 years of the All-Payer Model overall in the main analysis, we found a statistically significant greater increase in professional expenditures in Maryland than the comparison group in the sensitivity analysis. The greater increase was driven by spending for professional services in unregulated settings. In the regulated setting, expenditures for professional services declined in Maryland and increased in the comparison group, resulting in a \$0.81 PBPM decrease in Maryland relative to the comparison group during the first 4.5 years overall (p<0.05). In the unregulated setting, expenditures for professional services increased by \$10.10 PBPM more in Maryland than in the comparison group.

- In the main analysis, we found a statistically significant greater decrease in PAC expenditures in Maryland than the comparison group during the first 4.5 years of the All-Payer Model overall. In contrast, we found that PAC expenditures increased for Maryland while decreasing in the comparison group in the sensitivity analysis. As a result, PAC expenditures increased by \$5.02 PBPM in Maryland relative to the comparison group in the sensitivity analysis. The increase in PAC expenditures was primarily driven by relative increases in spending for PAC services in home health care. Home health PAC expenditures increased by \$7.10 PBPM more in Maryland than the comparison group (p<0.01) after 4.5 years of implementation. Rehabilitation PAC expenditures increased by \$0.88 PBPM less in Maryland than the comparison group (p<0.10) over the first 4.5 years of implementation, but the difference was not statistically significant in any individual year. Changes in expenditures for PAC services in long-term care or skilled nursing facilities did not differ for Maryland and the comparison group over the first 4.5 years of the All-Payer Model in the sensitivity analysis.

- Although expenditures for other nonhospital services (including hospice and other outpatient services, as well as durable medical equipment) increased in Maryland relative to the comparison group in the main analysis, we did not find a difference in the change in other expenditures in the sensitivity analysis.

Table J-17
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Professional PBPM ($)[†]						
Year 1	250.11	245.31	256.87	249.85	2.23* (0.19, 4.27)	−4.98*** (−7.48, −2.49)
Year 2	250.11	245.31	263.78	250.88	8.11*** (5.46, 10.76)	−2.74 (−6.80, 1.32)
Year 3	250.11	245.31	278.31	264.31	9.21*** (6.08, 12.35)	−5.27 (−10.57, 0.04)
Year 4	250.11	245.31	287.87	269.65	13.42*** (10.10, 16.74)	−4.70 (−12.35, 2.96)
Year 5	250.11	245.31	292.13	270.26	17.07*** (13.14, 21.01)	−4.68 (−13.10, 3.73)
Overall	250.11	245.31	274.19	260.02	9.30*** (7.96, 10.64)	−4.45*** (−6.98, −1.92)
Professional PBPM—regulated settings ($)						
Year 1	61.88	70.72	61.54	70.65	−0.28 (−0.98, 0.42)	−1.28*** (−2.10, −0.47)
Year 2	61.88	70.72	59.71	69.69	−1.16* (−2.11, −0.20)	−2.66*** (−4.04, −1.29)
Year 3	61.88	70.72	62.55	71.68	−0.31 (−1.66, 1.04)	−2.32* (−4.28, −0.36)
Year 4	61.88	70.72	62.04	71.93	−1.06 (−2.37, 0.24)	−3.58** (−6.09, −1.07)
Year 5	61.88	70.72	64.21	74.55	−1.52 (−3.14, 0.10)	−4.54** (−7.51, −1.57)
Overall	61.88	70.72	61.78	71.39	−0.80** (−1.33, −0.27)	−2.71*** (−3.57, −1.84)

(continued)

Table J-17 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Professional PBPM—unregulated settings ($)†						
Year 1	188.22	174.59	195.32	179.20	2.51** (0.51, 4.51)	−3.70*** (−5.99, −1.40)
Year 2	188.22	174.59	204.08	181.20	9.27*** (6.68, 11.85)	−0.07 (−3.95, 3.80)
Year 3	188.22	174.59	215.76	192.62	9.53*** (6.23, 12.82)	−2.95 (−8.02, 2.12)
Year 4	188.22	174.59	225.83	197.72	14.49*** (10.60, 18.38)	−1.12 (−8.27, 6.03)
Year 5	188.22	174.59	227.92	195.71	18.59*** (14.26, 22.93)	−0.14 (−8.40, 8.11)
Overall	188.22	174.59	212.41	188.63	10.10*** (8.66, 11.54)	−1.74 (−4.14, 0.65)
Post-acute care PBPM ($)†						
Year 1	113.99	163.76	111.64	161.59	−0.19 (−3.62, 3.23)	−6.14*** (−9.08, −3.21)
Year 2	113.99	163.76	112.24	158.46	3.52 (−1.22, 8.27)	−5.43** (−9.75, −1.10)
Year 3	113.99	163.76	119.79	162.41	7.13* (0.67, 13.59)	−4.82 (−10.86, 1.22)
Year 4	113.99	163.76	116.38	156.14	9.98** (1.94, 18.02)	−4.97 (−12.76, 2.82)
Year 5	113.99	163.76	120.97	166.90	3.82 (−2.91, 10.54)	−14.13** (−24.36, −3.91)
Overall	113.99	163.76	115.72	160.47	5.02*** (2.26, 7.78)	−6.32*** (−9.08, −3.57)

(continued)

Table J-17 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Post-acute care PBPM—skilled nursing facilities ($)						
Year 1	72.68	80.23	71.12	79.72	−1.08 (−3.39, 1.23)	−2.75** (−4.99, −0.51)
Year 2	72.68	80.23	70.96	78.73	−0.25 (−3.08, 2.59)	−2.75 (−6.01, 0.50)
Year 3	72.68	80.23	72.88	80.26	0.14 (−3.58, 3.86)	−3.20 (−7.95, 1.54)
Year 4	72.68	80.23	68.65	77.23	−1.05 (−5.06, 2.96)	−5.23 (−11.55, 1.09)
Year 5	72.68	80.23	70.08	81.90	−4.30 (−9.45, 0.85)	−9.32* (−17.09, −1.56)
Overall	72.68	80.23	70.80	79.31	−0.98 (−2.56, 0.60)	−4.15*** (−6.32, −1.99)
Post-acute care PBPM—long-term care ($)						
Year 1	4.11	10.46	2.40	10.59	−1.83* (−3.51, −0.16)	−2.12*** (−3.22, −1.02)
Year 2	4.11	10.46	2.40	8.76	−0.01 (−2.28, 2.26)	−0.44 (−1.92, 1.03)
Year 3	4.11	10.46	3.49	10.04	−0.20 (−2.54, 2.15)	−0.77 (−2.80, 1.26)
Year 4	4.11	10.46	3.34	8.69	1.01 (−1.15, 3.17)	0.29 (−1.96, 2.54)
Year 5	4.11	10.46	4.03	10.42	−0.03 (−2.54, 2.48)	−0.90 (−4.14, 2.34)
Overall	4.11	10.46	3.04	9.62	−0.22 (−1.21, 0.77)	−0.77 (−1.64, 0.11)

(continued)

Table J-17 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Post-acute care PBPM—rehabilitation ($)						
Year 1	5.39	20.18	5.77	21.16	−0.59 (−1.63, 0.46)	−0.16 (−1.24, 0.91)
Year 2	5.39	20.18	5.92	21.51	−0.79 (−2.29, 0.71)	−0.15 (−1.81, 1.50)
Year 3	5.39	20.18	6.79	22.46	−0.87 (−2.50, 0.75)	−0.02 (−2.15, 2.11)
Year 4	5.39	20.18	7.33	23.00	−0.88 (−2.82, 1.06)	0.19 (−2.67, 3.05)
Year 5	5.39	20.18	7.83	24.25	−1.63 (−3.69, 0.43)	−0.35 (−3.58, 2.89)
Overall	5.39	20.18	6.62	22.28	−0.88* (−1.62, −0.14)	−0.07 (−1.05, 0.91)
Post-acute care PBPM—home health ($)†						
Year 1	31.81	52.90	32.35	50.12	3.31** (0.72, 5.90)	−1.11 (−2.37, 0.15)
Year 2	31.81	52.90	32.96	49.47	4.57** (0.83, 8.32)	−2.08 (−4.20, 0.05)
Year 3	31.81	52.90	36.63	49.65	8.06** (1.82, 14.30)	−0.82 (−2.68, 1.03)
Year 4	31.81	52.90	37.05	47.23	10.90** (3.18, 18.63)	−0.21 (−2.48, 2.06)
Year 5	31.81	52.90	39.03	50.33	9.78** (2.20, 17.36)	−3.56 (−7.37, 0.24)
Overall	31.81	52.90	35.26	49.25	7.10*** (4.51, 9.69)	−1.33** (−2.29, −0.38)

(continued)

Table J-17 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Other PBPM ($)[a]						
Year 1	66.25	44.11	62.18	39.28	0.76 (−1.59, 3.11)	3.82** (1.35, 6.28)
Year 2	66.25	44.11	61.87	39.26	0.47 (−2.43, 3.37)	5.07** (1.11, 9.03)
Year 3	66.25	44.11	66.69	44.65	−0.10 (−3.85, 3.65)	6.04* (0.38, 11.69)
Year 4	66.25	44.11	67.74	46.19	−0.59 (−4.50, 3.33)	7.10 (−0.18, 14.38)
Year 5	66.25	44.11	72.91	50.36	0.42 (−4.15, 4.98)	9.64* (0.53, 18.76)
Overall	66.25	44.11	65.59	43.26	0.16 (−1.40, 1.72)	5.99*** (3.46, 8.52)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

(continued)

Table J-17 (continued)
Difference in the pre-post change in nonhospital expenditures for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 10,281,981.

The sensitivity analysis findings are shown in the shaded column.

[a] Other PBPM includes payments for noninpatient and other services, along with durable medical equipment payments.

[†]Professional spending PBPM and professional spending PBPM-unregulated settings did not have parallel baseline trends at p<0.01. Post-acute care spending PBPM-total and post-acute care PBPM-home health did not have parallel baseline trends at p<0.10.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.1.4.2 Commercial Insurance

Table J-18 presents the results of the D-in-D regression analyses for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the nonhospital expenditure measures for commercial plan members in Maryland and the comparison group.

- During the first 4 years of the All-Payer Model overall, professional PMPM expenditures increased more for Maryland commercial plan members than the comparison group for both the main analysis and the sensitivity analysis ($p<0.05$). The magnitude of the difference increased over time, but it was only statistically significant for the second year of the model in the sensitivity analysis.

- For both models, the change in PMPM expenditures for other nonhospital services in Maryland and the comparison group did not differ for the first 4 years of the All-Payer Model overall.

Table J-18
Difference in the pre-post change in nonhospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Professional PMPM ($)						
Year 1	96.84	120.42	100.79	123.12	1.24 (−2.04, 4.52)	0.55 (−3.12, 4.23)
Year 2	96.84	120.42	105.83	123.87	5.54* (0.16, 10.91)	4.51 (−0.58, 9.60)
Year 3	96.84	120.42	111.06	129.88	4.75 (−1.17, 10.68)	3.38 (−1.11, 7.87)
Year 4	96.84	120.42	113.22	131.56	5.24 (−5.40, 15.89)	3.52 (−0.75, 7.79)
Overall	96.84	120.42	107.11	126.73	3.96** (0.81, 7.11)	2.80** (0.63, 4.98)
Other PMPM ($)						
Year 1	10.94	13.11	10.93	12.59	0.51 (−1.16, 2.18)	1.18 (−0.25, 2.60)
Year 2	10.94	13.11	9.71	13.72	−1.84 (−4.60, 0.92)	−0.85 (−2.35, 0.66)
Year 3	10.94	13.11	9.11	13.85	−2.57 (−6.67, 1.53)	−1.26 (−2.72, 0.21)
Year 4	10.94	13.11	8.55	14.17	−3.45 (−8.60, 1.71)	−1.81* (−3.47, −0.14)
Overall	10.94	13.11	9.69	13.50	−1.63 (−3.33, 0.07)	−0.53 (−1.28, 0.23)

(continued)

Table J-18 (continued)
Difference in the pre-post change in nonhospital expenditures for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; PMPM = per member per month.

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditures. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all PBPM models is 3,824,639.

The sensitivity analysis findings are shown in the shaded column.

[*] Other PMPM includes payments for noninpatient and other services, including those made for other outpatient services.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.1.5 Medicare Beneficiary Cost-Sharing Liability

Table J-19 presents the results of the D-in-D regression analyses for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for the beneficiary cost-sharing measures.

- In the sensitivity analysis, during the first 4.5 years of All-Payer Model implementation, total beneficiary cost sharing increased in both Maryland and the comparison group, but total beneficiary cost sharing increased more in Maryland. There was a $3.68 greater increase in total beneficiary cost sharing in Maryland than the comparison group in the first 4.5 years of All-Payer Model implementation overall ($p<0.01$). In contrast, the increase was smaller in Maryland than in the comparison group in the main analysis.

- During the first 4.5 years of the All-Payer Model, beneficiary cost sharing for inpatient services did not change substantially in Maryland while it increased in the comparison group in the sensitivity analysis. As a result, beneficiary cost sharing for inpatient facility services in Maryland declined by $0.81 PBPM relative to the comparison group in during the 4.5-year implementation period overall ($p<0.01$). We found a similar relative reduction in the main analysis, although the magnitude was larger.

- In the sensitivity analysis, we found that beneficiary cost sharing for ED visits increased in Maryland and in the comparison group in the first 4.5 years after the implementation of the All-Payer Model overall, but it increased more in Maryland, resulting in a $1.18 PBPM increase in Maryland relative to the comparison group ($p<0.01$). In contrast, we found a relative decrease in beneficiary cost sharing for ED visits in the main analysis.

- Similarly, the sensitivity analysis findings showed that beneficiary cost sharing for other hospital outpatient department services increased more in Maryland than in the comparison group in the first 4.5 years of All-Payer Model implementation overall, increasing by $1.40 PBPM in Maryland relative to the comparison group ($p<0.05$). However, beneficiary cost sharing for other hospital outpatient services increased less in Maryland than in the comparison group in the main analysis.

- Beneficiary cost sharing for professional services in Maryland increased $2.38 more than in the comparison group in the first 4.5 years of implementation overall in the sensitivity analysis. In contrast, we found that that beneficiary cost sharing for professional services in Maryland increased less than in the comparison group in the main analysis.

Table J-19
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Total PBPM ($)†						
Year 1	156.26	147.04	161.66	151.68	0.78 (−0.49, 2.04)	−4.49*** (−5.81, −3.17)
Year 2	156.26	147.04	163.24	150.30	3.73*** (1.92, 5.53)	−4.20*** (−6.06, −2.34)
Year 3	156.26	147.04	173.80	160.24	4.35** (1.45, 7.24)	−6.23*** (−9.52, −2.95)
Year 4	156.26	147.04	176.91	162.30	5.40*** (2.42, 8.38)	−7.84*** (−11.56, −4.12)
Year 5	156.26	147.04	195.70	182.16	4.33* (0.51, 8.15)	−11.56*** (−15.96, −7.17)
Overall	156.26	147.04	172.02	159.07	3.68*** (2.54, 4.81)	−6.37*** (−7.69, −5.05)
Inpatient facility PBPM ($)						
Year 1	24.04	25.11	23.52	24.78	−0.20 (−0.68, 0.28)	−0.58* (−1.08, −0.08)
Year 2	24.04	25.11	23.26	24.75	−0.42 (−1.08, 0.23)	−1.00** (−1.69, −0.32)
Year 3	24.04	25.11	24.80	26.51	−0.65* (−1.19, −0.11)	−1.42** (−2.45, −0.39)
Year 4	24.04	25.11	24.24	26.64	−1.34*** (−2.01, −0.68)	−2.31*** (−3.55, −1.08)
Year 5	24.04	25.11	25.78	28.81	−1.96*** (−2.59, −1.33)	−3.13*** (−4.76, −1.49)
Overall	24.04	25.11	24.17	26.03	−0.81*** (−1.08, −0.53)	−1.54*** (−1.99, −1.09)

(continued)

Table J-19 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
ED visits PBPM ($)[†]						
Year 1	7.36	5.14	9.26	6.58	0.47* (0.06, 0.89)	−0.95*** (−1.26, −0.65)
Year 2	7.36	5.14	9.80	6.59	1.00** (0.33, 1.67)	−1.15*** (−1.56, −0.73)
Year 3	7.36	5.14	10.29	6.89	1.19*** (0.70, 1.68)	−1.68*** (−2.37, −1.00)
Year 4	7.36	5.14	10.95	6.96	1.77*** (1.29, 2.26)	−1.82*** (−2.73, −0.90)
Year 5	7.36	5.14	11.30	7.39	1.69*** (1.18, 2.20)	−2.62*** (−3.81, −1.43)
Overall	7.36	5.14	10.22	6.83	1.18*** (0.94, 1.42)	−1.54*** (−1.85, −1.23)
Other hospital outpatient department PBPM ($)[†]						
Year 1	27.54	21.17	30.53	23.42	0.74 (−0.22, 1.71)	−1.58*** (−2.10, −1.07)
Year 2	27.54	21.17	31.29	23.34	1.58* (0.21, 2.96)	−1.92*** (−2.84, −1.00)
Year 3	27.54	21.17	33.27	25.24	1.67 (−0.23, 3.57)	−3.01*** (−4.30, −1.71)
Year 4	27.54	21.17	34.29	26.19	1.73 (−0.66, 4.12)	−4.12*** (−5.78, −2.45)
Year 5	27.54	21.17	36.60	29.12	1.11 (−1.34, 3.56)	−5.91*** (−8.02, −3.80)
Overall	27.54	21.17	32.84	25.06	1.40** (0.57, 2.23)	−3.04*** (−3.62, −2.46)

(continued)

Table J-19 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Professional PBPM ($)†						
Year 1	68.16	67.15	70.15	68.65	0.49* (0.02, 0.97)	−1.27*** (−1.90, −0.63)
Year 2	68.16	67.15	71.02	68.14	1.87*** (1.29, 2.45)	−0.78 (−1.79, 0.23)
Year 3	68.16	67.15	76.16	72.81	2.34*** (1.59, 3.09)	−1.20 (−2.53, 0.14)
Year 4	68.16	67.15	79.41	74.77	3.63*** (2.78, 4.48)	−0.80 (−2.67, 1.08)
Year 5	68.16	67.15	91.50	85.92	4.57*** (3.44, 5.71)	−0.74 (−2.86, 1.38)
Overall	68.16	67.15	76.19	72.76	2.38*** (2.05, 2.71)	−0.98** (−1.60, −0.35)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

Methods: A weighted least squares model was used to obtain estimates of beneficiary cost sharing. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

(continued)

Table J-19 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for all models is 10,281,981.

The sensitivity analysis findings are shown in the shaded column.

† Total beneficiary cost-sharing PBPM, ED visits beneficiary cost-sharing PBPM, other hospital outpatient department beneficiary cost-sharing PBPM, and professional beneficiary cost-sharing PBPM do not have baseline parallel trends at $p<0.01$.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.2 Quality of Care

J.2.2.1 Avoidable and Reducible Utilization

J.2.2.1.1 Medicare

Table J-20 presents the results of the D-in-D regression analyses for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for measures of avoidable or reducible hospital utilization in inpatient and ED settings.

- We found no statistically significant differences between Maryland and the comparison group in the decrease in the rate of unplanned readmissions within 30 days of discharge for Medicare beneficiaries during the 4.5 years of the All-Payer Model overall or in any individual year in the main analysis. However, we found that the rate of unplanned readmissions declined by 5.7 more readmissions per 1,000 discharges in Maryland than in the comparison group in the sensitivity analysis.

- The ACSC admission rate among Medicare beneficiaries decreased by more in Maryland than in the comparison group during the 4.5 years of the All-Payer Model for both the main analysis and the sensitivity analysis. Overall, in the sensitivity analysis the yearly ACSC admission rate fell by an additional 0.7 admissions per 1,000 Medicare beneficiaries in Maryland relative to the comparison group ($p<0.05$). The magnitude of the relative reduction was larger in the main analysis.

- The change in the percentage of Medicare beneficiary hospital discharges that had an ED visit within 30 days did not differ between Maryland and the comparison group during the 4.5 years of the All-Payer Model overall in both the main analysis and the sensitivity analysis.

- Differences between Maryland and the comparison group in the change in the rate of ED visits for selected avoidable conditions among Medicare beneficiaries did not show a consistent pattern, although the findings were similar for the main analysis and the sensitivity analysis. In both models, the increase in the rate of ED visits for bacterial pneumonia did not differ between Maryland and the comparison group during the All-Payer Model period overall. However, for both models, the rate of ED visits for heart failure increased in Maryland, whereas the rate decreased slightly in the comparison group during the All-Payer Model implementation period (1.0 additional ED visits per 1,000 Medicare beneficiaries in the sensitivity analysis, $p<0.05$). The change of the rate of ED visits for chronic obstructive pulmonary disease or asthma did not differ for Maryland and the comparison group in the main analysis, but the rate decreased at a slower rate in Maryland in the sensitivity analysis. The rate of ED visits for uncontrolled diabetes declined more for Maryland in the main analysis but was not statistically significantly different than the comparison group for the sensitivity analysis.

Table J-20
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Unplanned readmissions within 30 days of discharge per 1,000 discharges						
Year 1	163.0	164.5	152.3	154.8	−1.1 (−5.4, 3.1)	1.8 (−3.3, 6.8)
Year 2	163.0	164.5	146.3	154.5	−6.8** (−11.2, −2.4)	−2.5 (−9.5, 4.4)
Year 3	163.0	164.5	146.7	151.0	−2.9 (−8.1, 2.4)	2.6 (−6.3, 11.6)
Year 4	163.0	164.5	139.6	151.6	−10.6*** (−16.4, −4.8)	−3.6 (−15.2, 8.0)
Year 5	163.0	164.5	143.1	153.9	−9.4** (−15.8, −3.0)	−1.1 (−15.4, 13.3)
Overall	163.0	164.5	146.0	153.1	−5.7*** (−8.0, −3.4)	−0.5 (−4.5, 3.6)
Hospital admissions for ACSCs per 1,000 population[†]						
Year 1	42.4	43.6	37.8	38.4	0.4 (−0.6, 1.5)	−0.7 (−1.9, 0.4)
Year 2	42.4	43.6	37.0	37.8	0.2 (−0.9, 1.3)	−1.6* (−3.0, −0.1)
Year 3	42.4	43.6	37.1	38.6	−0.5 (−1.6, 0.7)	−2.8** (−4.8, −0.8)
Year 4	42.4	43.6	34.8	38.1	−2.2*** (−3.5, −0.9)	−5.2*** (−7.8, −2.6)
Year 5	42.4	43.6	19.7	22.1	−1.8*** (−3.0, −0.7)	−4.0*** (−6.2, −1.9)
Overall	42.4	43.6	34.7	36.4	−0.7*** (−1.2, −0.2)	−2.8*** (−3.7, −1.9)

(continued)

Table J-20 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of discharges with an ED visit within 30 days of discharge						
Year 1	11.0	10.8	11.6	11.4	0.0 (−0.4, 0.4)	0.1 (−0.4, 0.6)
Year 2	11.0	10.8	11.8	11.8	−0.2 (−0.6, 0.3)	0.03 (−0.7, 0.7)
Year 3	11.0	10.8	11.8	12.1	−0.5 (−0.9, 0.0)	−0.2 (−1.1, 0.7)
Year 4	11.0	10.8	12.3	12.3	−0.2 (−0.7, 0.3)	0.1 (−1.0, 1.2)
Year 5	11.0	10.8	12.3	12.0	0.1 (−0.5, 0.8)	0.5 (−0.8, 1.8)
Overall	11.0	10.8	11.9	11.9	−0.2 (−0.4, 0.0)	0.1 (−0.3, 0.4)
ED visits for bacterial pneumonia per 1,000 population†						
Year 1	3.4	2.8	3.4	2.7	0.1 (−0.2, 0.3)	0.2 (−0.2, 0.6)
Year 2	3.4	2.8	3.6	3.1	−0.1 (−0.4, 0.2)	0.1 (−0.4, 0.7)
Year 3	3.4	2.8	3.6	3.1	−0.1 (−0.5, 0.2)	0.1 (−0.6, 0.9)
Year 4	3.4	2.8	3.8	3.2	−0.1 (−0.4, 0.2)	0.2 (−0.7, 1.2)
Year 5	3.4	2.8	2.1	1.9	−0.2 (−0.4, 0.01)	0.1 (−0.6, 0.7)
Overall	3.4	2.8	3.4	2.9	−0.1 (−0.2, 0.1)	0.2 (−0.2, 0.5)

(continued)

Table J-20 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
ED visits for heart failure per 1,000 population						
Year 1	11.2	10.1	11.0	9.9	−0.01 (−0.9, 0.9)	0.1 (−0.9, 1.1)
Year 2	11.2	10.1	12.1	9.8	1.2 (0.0, 2.3)	1.4 (−0.2, 3.0)
Year 3	11.2	10.1	13.1	10.5	1.3 (−0.2, 2.8)	1.6 (−0.8, 3.9)
Year 4	11.2	10.1	13.8	10.9	1.6 (−0.2, 3.4)	2.0 (−0.9, 4.9)
Year 5	11.2	10.1	8.4	6.8	0.8 (−0.3, 1.9)	1.1 (−0.9, 3.1)
Overall	11.2	10.1	12.1	9.9	1.0** (0.4, 1.6)	1.3** (0.3, 2.2)
ED visits for COPD and asthma per 1,000 population						
Year 1	25.8	22.1	26.7	22.6	0.3 (−1.6, 2.2)	0.2 (−1.6, 2.1)
Year 2	25.8	22.1	27.1	22.2	1.1 (−0.9, 3.2)	1.0 (−1.7, 3.7)
Year 3	25.8	22.1	21.2	17.2	1.1 (−0.7, 2.9)	1.0 (−2.0, 4.0)
Year 4	25.8	22.1	21.3	16.9	1.6 (−0.2, 3.3)	1.4 (−2.0, 4.8)
Year 5	25.8	22.1	13.0	10.5	0.7 (−0.6, 2.0)	0.6 (−2.0, 3.1)
Overall	25.8	22.1	22.8	18.7	1.0* (0.2, 1.9)	0.9 (−0.4, 2.1)

(continued)

Table J-20 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates for all outcomes. All models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). Admission-level models (unplanned readmissions and ED visit within 30 days of discharge) also adjusted for the hospital's resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for probability of an unplanned readmission is 1,980,821. The total weighted N for the number of ACSC admissions and ED visits by condition is 10,281,981. The total weighted N for probability of an ED visit within 30 days of discharge is 1,994,678.

The sensitivity analysis findings are shown in the shaded column.

† Hospital admissions for ACSCs and ED visits for bacterial pneumonia did not have baseline parallel trends at p<0.05.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.2.1.2 Commercial Insurance

Table J-21 presents the results of the D-in-D regression analyses for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the rates of unplanned readmissions and ACSC admissions, and the percentage of hospital discharges with an ED visit within 30 days.

- The reduction in the rate of unplanned readmissions within 30 days of discharge was similar among the commercially insured populations in Maryland and the comparison group in the first 4 years the All-Payer Model period in the main analysis and the sensitivity analysis.

- In the main analysis, we found that the ACSC admission rate declined more for Maryland than in the comparison group. However, the sensitivity analysis showed that the reduction in the ACSC admission rate for the commercially insured population did not differ between Maryland and the comparison group in any year or during the first 4 years of All-Payer Model implementation overall.

- In the first 4 years of All-Payer Model implementation overall, the percentage of commercially insured hospital discharges that had an ED visit within 30 days decreased in Maryland and increased in the comparison group in both the main analysis and the sensitivity analysis. In the sensitivity analysis, the 1.5 percent reduction in the ED visit rate in Maryland relative to the comparison group was statistically significant in the first 4 years overall ($p<0.01$), as well as in the first 3 years individually. We found a similar relative reduction in the main analysis, although the magnitude was smaller.

Table J-21
Difference in the pre-post change in rates of avoidable or reducible utilization for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Unplanned readmissions within 30 days of discharge per 1,000 discharges						
Year 1	64.2	59.6	63.0	56.6	1.8 (−5.3, 9.0)	0.4 (−4.5, 5.2)
Year 2	64.2	59.6	60.0	57.1	−1.5 (−12.2, 9.3)	−3.6 (−10.0, 2.8)
Year 3	64.2	59.6	63.9	58.2	1.1 (−11.0, 13.1)	−1.8 (−9.9, 6.4)
Year 4	64.2	59.6	65.6	58.5	2.3 (−9.9, 14.5)	−1.2 (−6.9, 4.6)
Overall	64.2	59.6	63.0	57.5	0.9 (−4.2, 6.1)	−1.4 (−4.6, 1.8)
Hospital admissions for ACSCs per 1,000 population						
Year 1	3.1	2.9	2.7	2.4	0.1 (−0.2, 0.4)	0.1 (−0.2, 0.3)
Year 2	3.1	2.9	2.4	2.4	−0.2 (−0.6, 0.3)	−0.2 (−0.5, 0.1)
Year 3	3.1	2.9	2.3	2.6	−0.5 (−1.0, 0.1)	−0.5*** (−0.8, −0.3)
Year 4	3.1	2.9	2.4	2.3	−0.1 (−0.7, 0.6)	−0.1 (−0.5, 0.2)
Overall	3.1	2.9	2.5	2.4	−0.1 (−0.4, 0.1)	−0.2** (−0.3, −0.1)

(continued)

Table J-21 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Percentage of discharges with an ED visit within 30 days of discharge†						
Year 1	6.6	6.1	5.7	6.4	−1.5*** (−2.3, −0.6)	−0.8* (−1.6, −0.02)
Year 2	6.6	6.1	5.6	6.5	−1.8*** (−2.8, −0.7)	−0.8*** (−1.3, −0.3)
Year 3	6.6	6.1	5.6	6.6	−1.9** (−3.3, −0.6)	−0.6 (−1.3, 0.1)
Year 4	6.6	6.1	6.2	6.3	−0.8 (−2.5, 0.8)	0.8 (−0.3, 1.9)
Overall	6.6	6.1	5.7	6.5	−1.5*** (−2.1, −0.9)	−0.4* (−0.8, −0.04)

* p<0.10, **p <0.05, *** p<0.01

ACSC = ambulatory care sensitive condition; D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county. Estimates of the probability of any admission for an ACSC were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

(continued)

Table J-21 (continued)
Difference in the pre-post change in rates of avoidable or reducible utilization for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

The total weighted N for probability of an unplanned readmission is 179,194. The total weighted N for probability of an ACSC admission is 3,122,712. The total weighted N for probability of an ED visit within 30 days of discharge is 166,076.

The sensitivity analysis findings are shown in the shaded column.

† Percentage of discharges with an ED visit within 30 days of discharge did not have parallel baseline trends at $p<0.10$.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.2.2 Care Coordination

J.2.2.2.1 Medicare

We present the results of the D-in-D regression analyses for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for the percentage of hospital discharges with a follow-up visit within 14 days after discharge in ***Table J-22***.

- In both the main analysis and the sensitivity analysis, the change in the percentage of Medicare discharges with a follow-up visit within 14 days did not differ between Maryland and the comparison group in the first 4.5 years overall, although the rate declined statistically significantly in Maryland relative to the comparison group in Year 1.

J.2.2.2.2 Commercial Insurance

We present the results of the D-in-D regression analyses for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the percentage of hospital discharges with a follow-up visit within 14 days after discharge among the commercially insured population in ***Table J-23***.

- In the main analysis, we found a slower increase in the percentage of hospital discharges that had a follow-up visit within 14 days in Maryland than in the comparison group. In the sensitivity analysis, however, the change in the percentage of hospital discharges that had a follow-up visit within 14 days did not differ between the commercially insured population in Maryland and in the comparison group in any individual year or in the first 4 years overall.

Table J-22

Difference in the pre-post change in rate of follow-up visits within 14 days of discharge for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of discharges with a follow-up visit within 14 days of discharge						
Year 1	67.3	70.2	66.5	70.8	−1.4* (−2.7, −0.2)	−1.6* (−2.9, −0.3)
Year 2	67.3	70.2	68.1	71.2	−0.3 (−1.8, 1.3)	−0.5 (−2.2, 1.2)
Year 3	67.3	70.2	70.3	73.0	0.2 (−1.5, 1.8)	−0.1 (−2.1, 1.8)
Year 4	67.3	70.2	71.6	73.8	0.6 (−1.0, 2.2)	0.2 (−1.9, 2.4)
Year 5	67.3	70.2	72.4	74.3	0.9 (−0.8, 2.6)	0.4 (−2.0, 2.9)
Overall	67.3	70.2	69.4	72.4	−0.2 (−0.9, 0.5)	−0.4 (−1.3, 0.4)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in probability of a follow-up visit within 14 days of discharge. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, area wage index, and disproportionate share hospital percentage).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N is 2,195,401.

The sensitivity analysis findings are shown in the shaded column.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-23

Difference in the pre-post change in rate of follow-up visits within 14 days of discharge for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Percentage of discharges with a follow-up visit within 14 days of discharge						
Year 1	43.6	42.8	44.5	44.6	−0.9 (−2.0, 0.1)	−1.4** (−2.4, −0.3)
Year 2	43.6	42.8	44.9	44.4	−0.3 (−2.1, 1.5)	−0.9 (−2.2, 0.3)
Year 3	43.6	42.8	46.0	45.0	0.2 (−2.3, 2.7)	−0.6 (−1.7, 0.5)
Year 4	43.6	42.8	46.6	45.5	0.3 (−2.6, 3.2)	−0.7 (−2.5, 1.0)
Overall	43.6	42.8	45.4	44.8	−0.3 (−1.3, 0.7)	−0.9** (−1.6, −0.3)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in probability of a follow-up visit within 14 days of discharge. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N is 181,141.

The sensitivity analysis findings are shown in the shaded column.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.3 Service Mix

J.2.3.1 Hospital Case-Mix Severity

J.2.3.1.1 Medicare

Table J-24 displays findings for the Medicare population for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for two outcomes that measure changes in hospital case-mix severity after the implementation of the All-Payer Model: DRG weight per admission and percentage of admissions classified as major or extreme severity of illness or risk of mortality.

- Admission severity, as measured by DRG weight, increased in both Maryland and the comparison group during the first 4.5 years of the All-Payer Model implementation in the main analysis and the sensitivity analysis. However, it increased more for Maryland Medicare admissions in the main analysis but increased less for Maryland Medicare admissions in the sensitivity analysis. The DRG weight for Maryland Medicare admissions increased by 0.02 less ($p<0.05$) than the average DRG weight for comparison group admissions after 4.5 years of the model.

- Similar to the main analysis, in the sensitivity analysis the percentage of inpatient admissions classified as major or extreme severity of illness or risk of mortality increased less in Maryland than in the comparison group from the baseline to the All-Payer Model implementation period. As a result, in the sensitivity analysis the relative reduction in admissions classified as major/extreme severity during the first 4.5 years of the All-Payer Model overall was 2.6 percentage points larger in Maryland hospitals than in comparison hospitals ($p<0.01$).

Table J-24
Difference in the pre-post change in admission severity for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
DRG weight per admission†						
Year 1	1.5	1.6	1.6	1.6	−0.04** (−0.07, −0.01)	−0.01 (−0.03, 0.02)
Year 2	1.5	1.6	1.6	1.6	−0.02 (−0.05, 0.01)	0.03 (−0.01, 0.06)
Year 3	1.5	1.6	1.6	1.7	−0.03 (−0.06, 0.01)	0.04 (−0.02, 0.09)
Year 4	1.5	1.6	1.7	1.7	−0.01 (−0.06, 0.03)	0.07 (−0.01, 0.14)
Year 5	1.5	1.6	1.7	1.7	0.001 (−0.04, 0.04)	0.10* (0.02, 0.18)
Overall	1.5	1.6	1.6	1.7	−0.02** (−0.04, −0.01)	0.04** (0.01, 0.06)
Percentage of acute admissions with a 3M APR DRG major/extreme severity or risk of mortality						
Year 1	15.0	12.1	16.5	14.3	−1.1** (−2.0, −0.2)	−0.5 (−1.5, 0.5)
Year 2	15.0	12.1	16.1	15.0	−2.4*** (−3.5, −1.3)	−1.5 (−2.9, 0.03)
Year 3	15.0	12.1	15.5	14.9	−2.8*** (−4.0, −1.5)	−1.5 (−3.5, 0.5)
Year 4	15.0	12.1	18.9	19.0	−4.1*** (−5.7, −2.6)	−1.7 (−4.4, 1.0)
Year 5	15.0	12.1	17.7	17.3	−3.4*** (−4.8, −2.0)	−2.0 (−5.2, 1.3)
Overall	15.0	12.1	16.7	15.7	−2.6*** (−3.1, −2.0)	−1.4** (−2.3, −0.5)

(continued)

Table J-24 (continued)
Difference in the pre-post change in admission severity for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

D-in-D = difference-in-differences; DRG = diagnosis-related group; APR = All Patient Refined.

Methods: A weighted least squares model was used to obtain estimates of the difference in DRG weight. A logistic regression model was used to obtain estimates of the difference in percentage of major/extreme severity of illness or risk of mortality for inpatient admissions. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the DRG weight per admission model is 3,062,734. The total weighted N for the percent of admissions with a 3M APR DRG major/extreme severity or risk of mortality model is 3,042,207.

The sensitivity analysis findings are shown in the shaded column.

† DRG weight per admission did not have parallel baseline trends at p<0.05.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.3.1.2 Commercial Insurance

Findings for the commercially insured population for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for changes in hospital case-mix severity after the implementation of the All-Payer Model, as measured by DRG weight per admission, are shown in ***Table J-25***.

- Although the DRG weight increased less for commercial plan members in Maryland than in the comparison group in the main analysis, trends in DRG weight per admission were not significantly different between Maryland and the comparison group during the first 4 years of the All-Payer Model implementation overall or in any year individually in the sensitivity analysis.

J.2.3.2 Type of Hospital Admissions

J.2.3.2.1 Medicare

Table J-26 displays findings for the Medicare population for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for outcomes related to type of hospital admissions: percentage of admissions that occurred through an ED, percentage of ED visits that resulted in an admission, and the rate of unplanned admissions per 1,000 discharges.

- In the main analysis, the percentage of admissions through the ED did not change in Maryland hospitals relative to comparison hospitals in any of the years following implementation of the All-Payer Model. However, in the sensitivity analysis, we found that the percentage of admissions through the ED declined by 4.4 more percentage points in Maryland than in the comparison group.

- For both the main analysis and the sensitivity analysis, the percentage of ED visits that resulted in an admission declined for both Maryland and the comparison group, but it declined more for Maryland. The difference was not statistically significant in any of the individual years following the All-Payer Model implementation or for the first 4.5 years overall for the main analysis, however, the difference was statistically significant in the sensitivity analysis.

- The rate of unplanned admissions per 1,000 discharges did not change in Maryland hospitals relative to comparison hospitals during any year of All-Payer Model implementation for the main analysis or the sensitivity analysis. However, the overall rate of unplanned admissions per 1,000 discharges declined less in Maryland than in the comparison group in the sensitivity analysis.

Table J-25
Difference in the pre-post change in admission severity for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
DRG weight per admission						
Year 1	1.4	1.3	1.4	1.4	−0.02 (−0.05, 0.02)	−0.02* (−0.04, −0.002)
Year 2	1.4	1.3	1.5	1.4	−0.02 (−0.08, 0.04)	−0.03 (−0.06, 0.001)
Year 3	1.4	1.3	1.4	1.4	−0.04 (−0.11, 0.03)	−0.05** (−0.09, −0.01)
Year 4	1.4	1.3	1.5	1.4	−0.02 (−0.11, 0.06)	−0.03* (−0.07, −0.005)
Overall	1.4	1.3	1.5	1.4	−0.03 (−0.06, 0.005)	−0.03*** (−0.05, −0.02)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; DRG = diagnosis-related group.

Methods: A weighted least squares model was used to obtain estimates of the difference in DRG weight. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N for the regression model is 212,432.

The sensitivity analysis findings are shown in the shaded column.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table J-26
Difference in the pre-post change in type of hospital admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of admissions through the ED†						
Year 1	70.2	68.3	66.9	67.6	−2.5* (−4.9, −0.1)	0.2 (−1.9, 2.3)
Year 2	70.2	68.3	65.2	67.9	−4.5** (−7.5, −1.5)	−0.5 (−3.7, 2.7)
Year 3	70.2	68.3	63.8	66.7	−4.7** (−7.6, −1.9)	0.9 (−3.1, 4.9)
Year 4	70.2	68.3	63.3	66.7	−5.3*** (−8.6, −2.0)	1.9 (−3.2, 6.9)
Year 5	70.2	68.3	64.4	68.7	−6.1*** (−9.4, −2.9)	2.3 (−3.6, 8.2)
Overall	70.2	68.3	64.8	67.4	−4.4*** (−5.8, −3.1)	0.8 (−1.0, 2.5)
Percentage of ED visits that resulted in an admission						
Year 1	37.6	41.3	34.7	38.6	−0.3 (−1.9, 1.3)	−0.2 (−1.5, 1.1)
Year 2	37.6	41.3	33.4	38.0	−1.0 (−2.7, 0.7)	−0.9 (−3.1, 1.2)
Year 3	37.6	41.3	33.8	37.6	−0.3 (−2.1, 1.5)	−0.2 (−3.2, 2.9)
Year 4	37.6	41.3	32.2	37.6	−1.9 (−3.7, 0.0)	−1.7 (−5.9, 2.5)
Year 5	37.6	41.3	33.7	39.7	−2.3* (−4.3, −0.3)	−2.1 (−7.5, 3.3)
Overall	37.6	41.3	33.5	38.1	−1.0** (−1.8, −0.2)	−0.9 (−2.3, 0.5)

(continued)

Table J-26 (continued)
Difference in the pre-post change in type of hospital admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Rate of unplanned admissions per 1,000 discharges						
Year 1	792.3	812.8	790.9	808.7	2.9 (−4.3, 10.1)	−0.01 (−6.5, 6.5)
Year 2	792.3	812.8	787.1	804.6	3.5 (−7.2, 14.2)	−0.9 (−10.9, 9.1)
Year 3	792.3	812.8	784.5	793.6	12.7 (−1.6, 27.0)	6.5 (−8.5, 21.5)
Year 4	792.3	812.8	777.3	792.1	7.1 (−8.4, 22.6)	−0.6 (−18.4, 17.1)
Year 5	792.3	812.8	789.4	807.6	2.7 (−12.2, 17.5)	−6.2 (−26.4, 14.0)
Overall	792.3	812.8	785.6	800.7	6.1* (0.4, 11.8)	0.4 (−5.7, 6.6)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates for both outcomes. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage). The percentage of acute admissions through the ED also includes admission-level variables for DRG weight and whether the admission came from a skilled nursing facility.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

(continued)

Table J-26 (continued)
Difference in the pre-post change in type of hospital admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the percentage of acute admissions through the ED is 3,062,721. The total weighted N for the percentage of ED visits that resulted in an admission is 7,152,438. The total weighted N for the rate of unplanned admissions per 1,000 discharges model is 3,062,734.

The sensitivity analysis findings are shown in the shaded column.

† Percentage of admissions through the ED does not have baseline parallel trends at p<0.10.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.3.2.2 Commercial Insurance

Table J-27 presents findings for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for the commercially insured population for percentage of admissions that occurred through an ED, the percentage of ED visits that resulted in an admission, and the rate of unplanned admissions per 1,000 discharges.

- In the first 4 years of the All-Payer Model, the percentage of admissions occurring through the ED decreased from the baseline period for both Maryland and comparison group hospitals in both the main analysis and the sensitivity analysis, but the difference in the decline was only statistically significant in the sensitivity analysis. In the sensitivity analysis, the decrease from the baseline period was statistically significantly larger in Maryland hospitals than comparison group hospitals in each year and the first 4 years of All-Payer Model implementation overall. Overall, the percentage of admissions occurring through the ED declined by 3.7 more percentage points in Maryland than in the comparison group ($p<0.01$).

- The percentage of ED visits that resulted in an admission declined for both Maryland and the comparison group in the main analysis and the sensitivity analysis. In the main analysis, the decline did not differ between Maryland and the comparison group, but the percentage declined more for Maryland in the sensitivity analysis. Overall, the percentage of ED visits that resulted in an admission declined by 1.6 more percentage points in Maryland than in the comparison group ($p<0.01$).

- The rate of unplanned admissions per 1,000 discharges declined among both Maryland and comparison group commercial plan members after 4 years of All-Payer Model implementation in the main analysis and the sensitivity analysis. However, the decline was larger in Maryland than in the comparison group in the main analysis and smaller in Maryland than in the comparison group in the sensitivity analysis. In the sensitivity analysis, the rate increased by 11 unplanned admissions per 1,000 discharges for Maryland relative to the comparison group ($p<0.10$). However, the difference in the rate of decline in unplanned admissions was not statistically significant in any individual year of the All-Payer Model implementation period.

Table J-27
Difference in the pre-post change in type of hospital admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Percentage of admissions through the ED†						
Year 1	43.2	39.8	41.1	39.6	−1.9** (−3.3, −0.5)	0.1 (−1.0, 1.3)
Year 2	43.2	39.8	39.2	38.8	−3.1** (−5.2, −0.9)	−0.1 (−1.7, 1.6)
Year 3	43.2	39.8	38.2	39.4	−4.7*** (−7.4, −1.9)	−0.7 (−2.2, 0.9)
Year 4	43.2	39.8	37.1	39.4	−5.9*** (−9.2, −2.6)	−0.9 (−2.5, 0.7)
Overall	43.2	39.8	39.1	39.3	−3.7*** (−4.8, −2.5)	−0.3 (−1.1, 0.4)
Percentage of ED visits that resulted in an admission†						
Year 1	11.8	12.7	10.3	11.6	−0.6 (−1.2, 0.1)	0.5 (−0.03, 1.0)
Year 2	11.8	12.7	9.3	11.3	−1.5*** (−2.4, −0.6)	0.1 (−0.5, 0.6)
Year 3	11.8	12.7	8.9	11.5	−2.2*** (−3.5, −0.9)	−0.1 (−0.6, 0.5)
Year 4	11.8	12.7	8.5	11.4	−2.8*** (−4.5, −1.1)	−0.05 (−0.6, 0.5)
Overall	11.8	12.7	9.3	11.5	−1.6*** (−2.2, −1.1)	0.2 (−0.1, 0.4)

(continued)

Table J-27 (continued)
Difference in the pre-post change in type of hospital admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Rate of unplanned admissions per 1,000 discharges†						
Year 1	643.4	618.6	625.0	601.5	−1.6 (−14.9, 11.6)	−17.1*** (−24.4, −9.9)
Year 2	643.4	618.6	639.3	600.3	13.8 (−6.6, 34.3)	−8.8 (−22.3, 4.7)
Year 3	643.4	618.6	647.2	607.0	15.2 (−9.8, 40.3)	−14.8* (−28.4, −1.1)
Year 4	643.4	618.6	648.4	601.1	22.5 (−8.0, 53.1)	−15.1* (−28.7, −1.6)
Overall	643.4	618.6	638.5	602.4	11.0* (0.2, 21.8)	−14.2*** (−20.0, −8.4)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; ED = emergency department.

Methods: A logistic regression model was used to obtain estimates for all outcomes. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

(continued)

Table J-27 (continued)
Difference in the pre-post change in type of hospital admissions for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

The total weighted N for the percentage of acute admissions through the ED model and unplanned admissions model is 212,870. The total weighted N for the percentage of ED visits resulting in an admission model is 869,217.

The sensitivity analysis findings are shown in the shaded column.

† The percentage of admissions through the ED, the percentage of ED visits that resulted in an admission, and the rate of unplanned admissions per 1,000 discharges did not have parallel baseline trends at $p<0.05$.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.3.3 Intensity of Hospital Services

J.2.3.3.1 Medicare

Table J-28 presents findings for the Medicare population for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis) for two outcomes that assess whether the intensity of services during an inpatient stay changed during the All-Payer Model implementation period: the case-mix adjusted payment per discharge and the percentage of admissions that included an ICU stay.

- The case-mix-adjusted payment per inpatient discharge increased more in Maryland than in the comparison group in both the main analysis and the sensitivity analysis, but the magnitude of the relative increase was smaller in the sensitivity analysis. In the sensitivity analysis, the case-mix adjusted payment per inpatient discharge increased by $248 more in Maryland than in the comparison group during the first 4.5 years of the All-Payer Model implementation period (p<0.01), indicating that the payment for admissions with similar case-mix severity grew at a faster rate in Maryland.

- The change in the percentage of admissions that included an ICU stay was not statistically significantly different in Maryland hospitals relative to comparison hospitals in any of the first 4.5 years or in the first 4.5 years overall after implementation of the All-Payer Model for either the main analysis or the sensitivity analysis.

J.2.3.3.2 Commercial Insurance

Table J-29 shows results for the commercially insured population for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis) for changes in the case-mix-adjusted payment per discharge and the percentage of admissions that included an ICU stay.

- In the main analysis, we found a relative decline in the case-mix adjusted payment per inpatient discharge for Maryland relative to the comparison group. However, in the sensitivity analysis, the case-mix-adjusted payment per inpatient discharge increased by $1,067 more in Maryland than in the comparison group in the first 4 years of the All-Payer Model implementation period overall (p<0.01), indicating that payment for admissions with similar case-mix severity grew at a faster rate in Maryland.

- Similarly, the results for the percentage of admissions including an ICU stay differed for the main analysis and the sensitivity analysis. In the main analysis, we found a relative increase in the percentage of admissions including an ICU stay. In the sensitivity analysis, however, the percentage of admissions including an ICU stay declined by 1.3 percentage points more for Maryland hospitals than comparison group hospitals after 4 years of All-Payer Model implementation (p<0.05).

Table J-28
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Case-mix-adjusted payment per discharge ($)†						
Year 1	9,902.43	6,521.12	10,079.73	6,711.98	−13.55 (−193.00, 165.90)	287.32* (39.47, 535.18)
Year 2	9,902.43	6,521.12	10,296.61	6,640.38	274.93** (67.26, 482.61)	724.71*** (389.10, 1,060.33)
Year 3	9,902.43	6,521.12	10,121.57	6,594.70	145.57 (−180.14, 471.28)	744.20** (217.58, 1,270.83)
Year 4	9,902.43	6,521.12	10,419.28	6,574.29	463.70** (94.70, 832.70)	1,211.57*** (650.31, 1,772.84)
Year 5	9,902.43	6,521.12	10,543.71	6,624.54	537.87** (204.25, 871.50)	1,434.98*** (847.41, 2,022.56)
Overall	9,902.43	6,521.12	10,260.63	6,630.95	248.38*** (119.44, 377.31)	808.63*** (606.10, 1,011.16)
Percentage of acute admissions with an ICU stay						
Year 1	26.2	45.1	26.8	45.5	0.3 (−2.4, 2.9)	1.2 (−0.5, 2.9)
Year 2	26.2	45.1	26.2	43.9	0.9 (−1.7, 3.5)	2.2 (−1.6, 6.0)
Year 3	26.2	45.1	25.6	45.1	−0.6 (−3.9, 2.8)	1.2 (−4.7, 7.1)
Year 4	26.2	45.1	23.7	45.4	−2.8 (−6.9, 1.3)	−0.5 (−8.4, 7.4)
Year 5	26.2	45.1	22.8	46.3	−4.4 (−9.4, 0.6)	−1.7 (−11.6, 8.2)
Overall	26.2	45.1	25.3	45.1	−0.9 (−2.5, 0.6)	0.7 (−1.8, 3.3)

(continued)

Table J-28 (continued)
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

D-in-D = difference-in-differences; ICU = intensive care unit.

Methods: A weighted least squares model was used to obtain estimates of the difference for case-mix-adjusted payment per discharge. A logistic regression model was used to obtain estimates of the difference the percentage of acute admission with an ICU stay. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), and hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage). The case-mix adjusted payment per discharge is also adjusted for the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. See ***Appendix A*** for additional detail.

The total weighted N for the case-mix-adjusted payments per discharge model and for the percentage of acute admissions with an ICU stay model is 3,062,734.

The sensitivity analysis findings are shown in the shaded column.

[†] Case-mix-adjusted payment per discharge does not have baseline parallel trends at p<0.01.

SOURCE Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-29
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Case-mix-adjusted payment per discharge ($)						
Year 1	10,394.83	10,961.89	11,879.13	12,220.68	225.52 (−532.56, 983.59)	−748.40** (−1,301.63, −195.17)
Year 2	10,394.83	10,961.89	13,367.48	12,623.50	1,311.05* (145.13, 2,476.97)	−132.58 (−815.49, 550.34)
Year 3	10,394.83	10,961.89	13,858.01	13,428.54	996.53 (−343.02, 2,336.09)	−916.82* (−1,749.32, −84.33)
Year 4	10,394.83	10,961.89	15,032.99	13,415.53	2,184.52** (431.32, 3,937.73)	−198.59 (−896.09, 498.90)
Overall	10,394.83	10,961.89	13,350.60	12,849.79	1,067.08*** (461.74, 1,672.42)	−531.68*** (−874.57, −188.80)
Percentage of acute admissions with an ICU stay†						
Year 1	13.3	19.8	12.3	18.8	−0.3 (−1.4, 0.8)	1.1* (0.1, 2.1)
Year 2	13.3	19.8	11.7	18.1	−0.4 (−2.1, 1.2)	1.5*** (0.7, 2.4)
Year 3	13.3	19.8	11.1	18.6	−1.6 (−3.8, 0.5)	1.1** (0.3, 1.9)
Year 4	13.3	19.8	9.5	18.2	−3.3** (−5.9, −0.7)	0.1 (−1.2, 1.3)
Overall	13.3	19.8	11.3	18.5	−1.3** (−2.2, −0.3)	1.0*** (0.5, 1.5)

(continued)

Table J-29 (continued)
Difference in the pre-post change in case-mix-adjusted payment per discharge and percentage of admissions with an ICU stay for commercial plan members in Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

D-in-D = difference-in-differences; ICU = intensive care unit.

Methods: A weighted least squares model was used to obtain estimates of the difference for case-mix-adjusted payment per discharge. A logistic regression model was used to obtain estimates of the difference the percentage of acute admission with an ICU stay. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse, or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. See ***Appendix A*** for additional detail.

The total weighted N for the case-mix-adjusted payments per discharge model is 200,425. The total weighted N for the percentage of acute admissions with an ICU stay model is 212,870.

The sensitivity analysis findings are shown in the shaded column.

† The percentage of acute admissions with an ICU stay did not have parallel baseline trends at p<0.10.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

J.2.4 Spillover

J.2.4.1 Avoidance of Costly Inpatient Cases

Table J-30 shows the differences in the pre-post change in outcomes related to avoidance of Medicare admissions that are likely to be costly for Maryland hospitals relative to the comparison group for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis).

- In both the main and sensitivity analyses, the percentage of admissions that resulted in a STAC transfer decreased by 0.3 percentage points more in Maryland than in the comparison group throughout the entire All-Payer Model period ($p<0.01$).
- In both the main and sensitivity analyses, the percentage of STAC transfers classified as major or extreme severity did not differ between Maryland and the comparison group.
- In the main analysis, the percentage of admissions that resulted in a PAC transfer increased by 0.2 percentage points more in Maryland than in the comparison group from the baseline period throughout the first 4.5 years of All-Payer Model implementation overall ($p<0.01$). On the other hand, in the sensitivity analysis, the percentage of admissions that resulted in a PAC transfer declined by 0.1 percentage points more in Maryland than in the comparison group ($p<0.10$).
- In the main analysis, length of stay for admissions resulting in a PAC transfer decreased by 0.1 day less in Maryland than in the comparison group ($p<0.10$) during the first 4.5 years of the All-Payer Model period. In contrast, in the sensitivity analysis, length of stay for admissions resulting in a PAC transfer decreased by 0.1 day more in Maryland than in the comparison group ($p<0.05$).
- In the main analysis, the change in the percentage of PAC transfers classified as major or extreme severity did not differ between Maryland and the comparison group. However, in the sensitivity analysis, the percentage of PAC transfers classified as major or extreme severity increased by 4.3 percentage points less in Maryland than in the comparison group ($p<0.01$).

Table J-30
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of admissions resulting in STAC transfer						
Year 1	1.3	0.6	1.2	0.6	−0.1 (−0.2, 0.03)	−0.1 (−0.3, 0.05)
Year 2	1.3	0.6	1.1	0.6	−0.2** (−0.4, −0.1)	−0.2** (−0.4, −0.1)
Year 3	1.3	0.6	1.0	0.7	−0.4*** (−0.6, −0.2)	−0.5** (−0.8, −0.1)
Year 4	1.3	0.6	1.0	0.6	−0.4*** (−0.6, −0.2)	−0.4 (−0.9, 0.003)
Year 5	1.3	0.6	0.9	0.6	−0.4*** (−0.6, −0.2)	−0.4 (−1.0, 0.1)
Overall	1.3	0.6	1.1	0.6	−0.3*** (−0.4, −0.2)	−0.3*** (−0.5, −0.2)
Percentage of STAC transfers classified as major or extreme severity						
Year 1	65.1	66.3	67.8	68.9	0.1 (−2.9, 3.1)	0.7 (−4.1, 5.4)
Year 2	65.1	66.3	69.3	72.4	−2.1 (−7.0, 2.8)	−1.3 (−8.1, 5.6)
Year 3	65.1	66.3	68.8	70.9	−1.0 (−4.7, 2.7)	0.1 (−7.2, 7.4)
Year 4	65.1	66.3	72.4	73.0	0.4 (−4.5, 5.4)	1.8 (−7.5, 11.1)
Year 5	65.1	66.3	73.1	71.6	2.7 (−3.0, 8.4)	4.4 (−6.5, 15.2)
Overall	65.1	66.3	69.8	71.3	−0.3 (−2.3, 1.6)	0.7 (−2.7, 4.0)

(continued)

Table J-30 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of admissions resulting in PAC transfer†						
Year 1	1.9	2.1	1.9	2.2	−0.1 (−0.3, 0.1)	0.1 (−0.1, 0.3)
Year 2	1.9	2.1	2.0	2.2	−0.05 (−0.3, 0.2)	0.3 (0.0, 0.5)
Year 3	1.9	2.1	1.8	2.1	−0.1 (−0.3, 0.1)	0.3 (0.001, 0.6)
Year 4	1.9	2.1	1.6	2.0	−0.2 (−0.4, 0.03)	0.3 (−0.1, 0.6)
Year 5	1.9	2.1	1.4	1.7	−0.1 (−0.3, 0.1)	0.3* (0.01, 0.6)
Overall	1.9	2.1	1.8	2.1	−0.1* (−0.2, −0.02)	0.2*** (0.1, 0.4)
Length of stay for admissions resulting in a PAC transfer						
Year 1	5.1	5.1	4.7	4.9	−0.2* (−0.3, −0.01)	−0.04 (−0.1, 0.1)
Year 2	5.1	5.1	4.6	4.8	−0.1 (−0.3, 0.002)	0.02 (−0.1, 0.1)
Year 3	5.1	5.1	4.7	4.8	−0.04 (−0.1, 0.1)	0.2 (−0.1, 0.4)
Year 4	5.1	5.1	4.6	4.7	−0.02 (−0.1, 0.1)	0.2 (−0.1, 0.6)
Year 5	5.1	5.1	4.6	4.7	−0.1 (−0.2, 0.05)	0.2 (−0.1, 0.6)
Overall	5.1	5.1	4.7	4.8	−0.1** (−0.2, −0.03)	0.1* (0.01, 0.2)

(continued)

Table J-30 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Percentage of PAC transfers classified as major or extreme severity						
Year 1	64.3	59.1	65.5	64.7	−4.3** (−7.8, −0.9)	−0.9 (−3.9, 2.2)
Year 2	64.3	59.1	63.8	63.9	−5.4*** (−8.7, −2.0)	−0.1 (−4.6, 4.4)
Year 3	64.3	59.1	67.0	65.4	−3.5** (−6.4, −0.6)	3.5 (−3.8, 10.8)
Year 4	64.3	59.1	66.1	64.9	−4.0* (−7.3, −0.6)	4.9 (−4.8, 14.6)
Year 5	64.3	59.1	68.1	67.0	−3.9 (−7.9, 0.1)	6.7 (−4.3, 17.7)
Overall	64.3	59.1	65.7	64.9	−4.3*** (−5.8, −2.7)	2.1 (−0.9, 5.1)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences; ED = emergency department; PAC = post-acute care; STAC = short-term, acute care.

Methods: A logistic regression model was used to obtain estimates for all binary outcomes. A Poisson model was used for length of stay for admissions resulting in a PAC transfer. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), hospital-level variables (resident-to-bed ratio, number of short-term acute beds, and disproportionate share hospital percentage), and admission-level variables (DRG weight, whether an admission came from a skilled nursing facility, and whether an admission came from the ED).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

(continued)

Table J-30 (continued)
Difference in the pre-post change in outcomes related to avoidance of costly admissions for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for the percentage of admissions resulting in a STAC transfer and the percentage of admissions resulting in a PAC transfer is 3,062,721. The total weighted N for the percentage of STAC transfers classified as major or extreme severity is 26,256. The total weighted N for length of stay for admissions resulting in a PAC transfer is 60,296. The total weighted N for the percentage of PAC transfers classified as major or extreme severity is 60,045.

The sensitivity analysis findings are shown in the shaded column.

†The percentage of admissions resulting in a PAC transfer did not have baseline parallel trends at p<0.10

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.4.2 Shift in Services Provided in Hospital Outpatient Settings

J.2.4.2.1 Medicare

Table J-31 shows the differences in the pre-post change in the percentage of Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland residents relative to the comparison group for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed differential trends (the main analysis).

- In the main analysis, the change in the percentage of Medicare beneficiaries with medical exam visits at hospital outpatient departments did not differ between Maryland and the comparison group. However, in the sensitivity analysis, there was a 0.8 greater percentage point increase in the percent of Medicare beneficiaries with a medical exam visit to a hospital outpatient department ($p<0.10$).

- In the main analysis, the percentage of Medicare beneficiaries with a medical exam visit to a physician office declined by 0.5 percentage points less in Maryland than in the comparison group over the entire 4.5-year All-Payer Model period ($p<0.01$). In the sensitivity analysis, the percentage of Medicare beneficiaries with a medical exam visit to a physician office also declined less in Maryland than the comparison group, though the magnitude of the effect was slightly larger (0.9 percentage points, $p<0.01$).

- In both the main analysis and the sensitivity analysis, the All-Payer Model did not have a statistically significant impact on the percentage of Medicare beneficiaries with medical exam visits at FQHCs and RHCs during the first 4.5 years of implementation overall or during any individual year.

- In the main analysis, the total number of outpatient medical exam visits per beneficiary per year at all sites of care increased by 0.2 visits more in Maryland than in the comparison group during the 4.5-year All-Payer Model period overall ($p<0.01$). In the sensitivity analysis, the total number of outpatient medical exam visits per beneficiary also increased more in Maryland than in the comparison group (0.3 visits, $p<0.01$).

Table J-31
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Hospital outpatient departments (%)						
Year 1	13.6	17.4	15.4	19.9	−0.2 (−1.2, 0.8)	−0.6 (−1.7, 0.5)
Year 2	13.6	17.4	15.6	21.4	−1.3 (−2.9, 0.4)	−2.0 (−4.2, 0.2)
Year 3	13.6	17.4	16.0	17.3	2.5** (0.7, 4.3)	1.7 (−0.9, 4.3)
Year 4	13.6	17.4	15.8	17.8	1.9 (0.0, 3.8)	0.9 (−2.1, 3.9)
Year 5	13.6	17.4	11.4	13.4	1.1 (−0.6, 2.8)	0.1 (−2.6, 2.8)
Overall	13.6	17.4	15.2	18.5	0.8* (0.0, 1.6)	0.02 (−1.1, 1.1)
Physician offices (%)						
Year 1	84.8	83.8	85.1	83.6	0.4*** (0.2, 0.6)	0.2* (0.0, 0.4)
Year 2	84.8	83.8	85.5	83.7	0.7*** (0.4, 1.0)	0.4* (0.0, 0.8)
Year 3	84.8	83.8	85.4	83.5	0.8*** (0.3, 1.3)	0.5 (0.0, 1.0)
Year 4	84.8	83.8	85.5	83.2	1.2*** (0.7, 1.7)	0.8** (0.2, 1.4)
Year 5	84.8	83.8	78.9	75.7	1.7*** (0.9, 2.6)	1.1 (0.0, 2.1)
Overall	84.8	83.8	84.7	82.6	0.9*** (0.7, 1.1)	0.5*** (0.3, 0.8)

(continued)

Table J-31 (continued)
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
FQHCs and RHCs (%)						
Year 1	2.8	3.1	2.9	3.2	0.01 (−0.2, 0.2)	0.0 (−0.1, 0.1)
Year 2	2.8	3.1	3.1	3.2	0.2 (−0.1, 0.5)	0.1 (−0.2, 0.4)
Year 3	2.8	3.1	3.2	3.7	−0.1 (−0.6, 0.3)	−0.2 (−0.6, 0.2)
Year 4	2.8	3.1	3.3	4.1	−0.3 (−1.0, 0.4)	−0.5 (−1.1, 0.2)
Year 5	2.8	3.1	2.8	3.5	−0.3 (−1.1, 0.5)	−0.4 (−1.2, 0.3)
Overall	2.8	3.1	3.1	3.6	−0.1 (−0.3, 0.1)	−0.2 (−0.4, 0.03)
All sites of care combined (# of visits)						
Year 1	8.2	8.3	8.2	8.3	0.05 (−0.01, 0.1)	−0.003 (−0.07, 0.03)
Year 2	8.2	8.3	8.4	8.3	0.2*** (0.1, 0.3)	0.1 (−0.005, 0.2)
Year 3	8.2	8.3	8.5	8.2	0.4*** (0.2, 0.5)	0.2*** (0.1, 0.4)
Year 4	8.2	8.3	8.5	8.2	0.5*** (0.3, 0.6)	0.3*** (0.1, 0.4)
Year 5	8.2	8.3	8.5	8.1	0.5*** (0.4, 0.6)	0.3*** (0.1, 0.5)
Overall	8.2	8.3	8.4	8.2	0.3*** (0.3, 0.3)	0.2*** (0.1, 0.2)

(continued)

Table J-31 (continued)
Difference in the pre-post change in Medicare beneficiaries with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

D-in-D = difference-in-differences; FQHC = federally qualified health center; RHC = rural health clinic.

Methods: A logistic regression model was used to obtain estimates of the difference in the percentage of beneficiaries with an outpatient medical exam visit by place of service. A negative binomial regression model was used to obtain estimates of the number of visits for all sites of care combined. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

The total weighted N for all models is 10,281,981.

The sensitivity analysis findings are shown in the shaded column.

[a] Physician offices includes visits to urgent care centers and Method II critical access hospitals.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.2.4.2.2 Commercial Insurance

Table J-32 shows the differences in the pre-post change in the percentage of commercial plan members with outpatient medical exam visits by place of service for Maryland residents relative to the comparison group for the model that assumed differential trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis).

- In the main analysis, the percentage of commercial plan members with medical exam visits at hospital outpatient departments increased by 1.4 percentage points more for Maryland residents than comparison group residents during the first 4 years of All-Payer Model implementation ($p<0.01$). In contrast, in the sensitivity analysis, the overall change in the percentage of commercial plan members with medical exam visits at hospital outpatient departments did not differ between Maryland and the comparison group.

- The percentage of commercial plan members who had medical exam visits at physician offices increased 2.0 percentage points less in Maryland than in the comparison group during the first 4 years of the All-Payer Model overall ($p<0.01$) in the main analysis. On the other hand, in the sensitivity analysis, the percentage of commercial plan members who had medical exam visits at physician offices increased by 6.2 percentage points more in Maryland than in the comparison group ($p<0.01$).

- In the main analysis, the number of outpatient medical exam visits at any site of care increased by 0.1 visits less for commercial plan members in Maryland than for the comparison group during the 4 years of the All-Payer Model overall. On the other hand, in the sensitivity analysis, the number of outpatient medical exam visits at any site of care increased by 0.4 visits more in Maryland than in the comparison group ($p<0.01$).

Table J-32

Difference in the pre-post change in commercial plan members with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
Hospital outpatient departments (%)						
Year 1	4.0	6.7	5.0	7.2	0.9** (0.3, 1.5)	1.4** (0.2, 2.6)
Year 2	4.0	6.7	5.2	7.3	1.0 (−0.1, 2.2)	1.8** (0.3, 3.3)
Year 3	4.0	6.7	5.4	8.7	0.2 (−2.3, 2.7)	1.5 (−0.1, 3.0)
Year 4	4.0	6.7	5.0	9.0	−0.6 (−3.9, 2.7)	1.0 (−0.2, 2.3)
Overall	4.0	6.7	5.2	8.0	0.4 (−0.6, 1.4)	1.4*** (0.8, 2.1)
Physician offices (%)†						
Year 1	76.6	67.9	79.0	68.5	2.4*** (1.0, 3.8)	−2.4*** (−3.4, −1.4)
Year 2	76.6	67.9	80.7	68.1	5.2*** (3.0, 7.5)	−2.0*** (−3.2, −0.8)
Year 3	76.6	67.9	82.2	67.3	8.3*** (4.7, 11.8)	−1.6** (−2.8, −0.5)
Year 4	76.6	67.9	83.9	67.8	10.6*** (6.7, 14.4)	−1.9*** (−3.0, −0.7)
Overall	76.6	67.9	81.2	68.0	6.2*** (4.9, 7.6)	−2.0*** (−2.6, −1.4)

(continued)

Table J-32 (continued)
Difference in the pre-post change in commercial plan members with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)
All sites of care combined (# of visits) †						
Year 1	3.5	3.1	3.9	3.2	0.1*** (0.1, 0.2)	−0.2*** (−0.2, −0.1)
Year 2	3.5	3.1	4.1	3.2	0.3*** (0.2, 0.4)	−0.1** (−0.2, −0.02)
Year 3	3.5	3.1	4.3	3.2	0.5*** (0.4, 0.6)	−0.1 (−0.1, 0.01)
Year 4	3.5	3.1	4.5	3.2	0.6*** (0.5, 0.8)	−0.04 (−0.1, 0.04)
Overall	3.5	3.1	4.1	3.2	0.4*** (0.3, 0.4)	−0.1*** (−0.1, −0.1)

* p<0.10, **p <0.05, *** p<0.01

D-in-D = difference-in-differences.

Methods: A logistic regression model was used to obtain estimates of the difference in the percentage of beneficiaries with an outpatient medical exam visit by place of service. A negative binomial regression model was used to obtain estimates of the number of visits for all sites of care combined. Models adjusted for individual-level variables (gender, age, drug coverage, mental health coverage, relationship to the policyholder [employee, spouse or child], and commercial plan type) and the urban/rural status of the county.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

(continued)

Table J-32 (continued)
Difference in the pre-post change in commercial plan members with outpatient medical exam visits by place of service for Maryland and the comparison group, first 4 years of Maryland All-Payer Model implementation

The total weighted N for all models is 4,045,874.

The sensitivity analysis findings are shown in the shaded column.

[a] Physician offices includes visits to urgent care centers.

† The percentage with a visit to a physician office and the total number of medical exam visits to all sites of care did not have parallel baseline trends at $p<0.05$.

SOURCE: MarketScan Data, MarketScan is ©2016 Truven Health Analytics Inc., an IBM Company.

Table J-33 shows the differences in the pre-post change in total episode payments and total payments during the 14-day pre-admission and 30-day post-discharge windows only for Maryland Medicare beneficiaries relative to the comparison group for the model that assumed parallel trends (the sensitivity analysis) and the model that assumed parallel trends (the main analysis).

- In the main analysis, total episode payments increased $884 more in Maryland than in the comparison group during the first 4.5 years of the All-Payer Model period ($p<0.01$). In the sensitivity analysis, the total episode payments similarly increased $1,178 more in Maryland than in the comparison group over the All-Payer Model period ($p<0.01$). In both the main and sensitivity analyses, the magnitude of the difference increased in each year.

- In the main analysis, changes to payments during the pre-admission and post-discharge windows did not differ between Maryland and the comparison group during the first 4.5 years of the All-Payer Model period, indicating faster growth in spending during an index admission drove the faster growth in total episode payments in Maryland. In contrast, in the sensitivity analysis, payments during the pre-admission and post-discharge windows increased by $271.12 more in Maryland than in the comparison group ($p<0.01$), suggesting that increases in payments prior to inpatient admission and after discharge contributed to increases in total episode payments in Maryland.

Table J-33
Difference in the pre-post change in Medicare payments for inpatient episodes of care for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

Outcome	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)
Total episode, all payment windows and all payment components						
Year 1	23,521.08	19,835.08	24,304.78	20,265.18	353.60 (−2.39, 709.58)	195.90 (−228.25, 620.04)
Year 2	23,521.08	19,835.08	24,808.53	20,134.54	987.99*** (553.87, 1,422.11)	752.13** (202.95, 1,301.31)
Year 3	23,521.08	19,835.08	24,985.61	20,204.62	1,094.99*** (547.64, 1,642.33)	780.98 (−62.12, 1,624.09)
Year 4	23,521.08	19,835.08	25,684.55	20,228.63	1,769.92*** (1,085.16, 2,454.69)	1,377.79** (455.49, 2,300.08)
Year 5	23,521.08	19,835.08	25,229.98	19,247.93	2,296.05*** (1,540.68, 3,051.41)	1,825.75*** (811.54, 2,839.97)
Overall	23,521.08	19,835.08	24,967.63	20,103.21	1,178.33*** (934.47, 1,422.18)	883.69*** (549.89, 1,217.49)
Total pre-admission and post-discharge window payments, all payment components						
Year 1	8,976.97	8,580.45	9,361.96	8,970.45	−5.01 (−186.44, 176.43)	−135.36 (−307.40, 36.68)
Year 2	8,976.97	8,580.45	9,596.71	8,985.75	214.44 (−20.20, 449.09)	19.48 (−246.77, 285.73)
Year 3	8,976.97	8,580.45	9,863.39	9,175.27	291.60* (36.30, 546.91)	32.03 (−349.19, 413.26)
Year 4	8,976.97	8,580.45	10,012.42	9,180.27	435.64** (139.38, 731.89)	111.51 (−321.70, 544.73)
Year 5	8,976.97	8,580.45	9,167.08	8,172.23	598.34*** (295.48, 901.20)	209.63 (−305.34, 724.60)
Overall	8,976.97	8,580.45	9,645.06	8,977.36	271.12*** (157.60, 384.65)	27.58 (−127.89, 183.05)

(continued)

Table J-33 (continued)
Difference in the pre-post change in Medicare payments for inpatient episodes of care for Medicare beneficiaries in Maryland and the comparison group, first 4.5 years of Maryland All-Payer Model implementation

*p<0.10, **p<0.05, *** p<0.01

D-in-D = difference-in-differences.

Methods: A weighted least squares model was used to obtain estimates of the differences in Medicare payments for inpatient episodes of care. Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, and number of chronic conditions in the previous year), county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians), hospital-level variables (resident-to-bed ratio, number of short-term acute beds, area wage index, and disproportionate share hospital percentage), and case-mix severity (DRG weight) for the admission.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. The relative difference is the D-in-D estimate as a percentage of Maryland's baseline period adjusted mean.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. See ***Appendix A*** for additional detail.

The total weighted N is 2,237,756.

The sensitivity analysis findings are shown in the shaded column.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

J.3 Sensitivity Analysis for Subgroups

J.3.1 Subgroup Baseline Trend Analysis

We estimated the model shown in ***Equation J.1*** to test the assumption that Maryland and the comparison group had similar (parallel) baseline trends for the subgroups and outcomes reported in ***Section 8***. We estimated the model for each subgroup separately and, as we did for the overall population, we conducted a joint significance test of the interactions between the Maryland indicator and the baseline years 2012 and 2013, with the first baseline year (2011) omitted. If the interaction terms were jointly significant, we concluded that the subgroup was not on a similar trajectory in Maryland and the comparison group during the baseline period. The subgroup analyses in ***Section 8*** used a difference-in-difference-in-differences (DDD) model that combined subgroups (for example, we estimated a single model that included teaching and non-teaching hospitals). To conclude that Maryland and the comparison group had similar baseline trends for the DDD analyses, we required both subgroups to have similar baseline trend,

In this section, we present a set of tables, one for each set of subgroups, that summarize the results of baseline trend analyses for the outcomes in ***Section 8***. We first present hospital subgroup findings and then present beneficiary subgroup findings.

For each outcome, we report whether both subgroups had parallel trends in Maryland and comparison group during the baseline period. We also present the sign and significance of the DDD estimate for both the model assuming parallel baseline trends and the model assuming differential baseline trends. To be consistent with the overall Medicare population analyses, the main model for all subgroup analyses assumed differing baseline trends in Maryland and the comparison group; the subgroup sensitivity analyses used the model that assumed baseline parallel trends.

J.3.1.1 Hospital Subgroups

Table J-34 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on hospital participation in the Total Patient Revenue (TPR) system.

- Hospitals that participated in TPR and those that did not participate in TPR did not meet the assumption of parallel trends for case-mix-adjusted payment per discharge, DRG weight per admission, and the rate of unplanned readmissions within 30 days of discharge.

- Hospitals that participated in TPR and those that did not participate in TPR met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge The DDD coefficient in the sensitivity analysis was statistically significant and positive. In the main analysis, the DDD coefficient was negative but statistically insignificant.

Table J-34
Baseline trend results for hospitals by TPR system participation status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Case-mix-adjusted payment per discharge ($)	N	– (0.85)	– (<0.001)
DRG weight per admission	N	– (0.51)	+ (0.72)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	N	+ (0.07)	+ (0.80)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	+ (0.01)	– (0.31)

DDD = difference-in-difference-in-differences; DRG = diagnosis-related group; TPR = Total Patient Revenue

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at $p<0.10$; N = one or both subpopulations did not have parallel baseline trends at $p<0.05$; [2] Sign indicates direction of the DDD coefficient.

Table J-35 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on hospital teaching status.

- Non-teaching and teaching hospitals did not meet the assumption of parallel trends for case-mix-adjusted payment per discharge, DRG weight per admission, and the rate of unplanned readmissions within 30 days of discharge.
- Non-teaching and teaching hospitals met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. The DDD coefficient was negative in both the sensitivity analysis and the main analysis, but it was statistically significant only in the main analysis.

Table J-35
Baseline trend results for hospitals by teaching status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Case-mix-adjusted payment per discharge ($)	N	+ (0.005)	− (0.92)
DRG weight per admission	N	+ (0.32)	− (0.08)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	N*	+ (0.12)	+ (<0.001)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	− (0.15)	− (<0.001)

DDD = difference-in-difference-in-differences; DRG = diagnosis-related group.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at $p<0.10$; N = one or both subpopulations did not have parallel baseline trends at $p<0.05$; [2] Sign indicates direction of the DDD coefficient.

Table J-36 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on hospital DSH percentage.

- Low/medium DSH percentage hospitals and high-DSH percentage hospitals did not meet the assumption of parallel trends for case-mix-adjusted payment per discharge and DRG weight per admission.

- Low/medium DSH percentage hospitals and high-DSH percentage hospitals met the assumption of parallel trends for the rate of unplanned readmissions within 30 days of discharge. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.

- Low/medium DSH percentage hospitals and high-DSH percentage hospitals met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.

Table J-36
Baseline trend results for hospitals by DSH percentage

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Case-mix-adjusted payment per discharge ($)	N	+ (0.002)	+ (0.86)
DRG weight per admission	N*	+ (<0.001)	+ (<0.001)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	Y	+ (0.04)	+ (0.07)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	– (<0.001)	– (<0.001)

DDD = difference-in-difference-in-differences; DRG = diagnosis-related group; DSH = disproportionate share hospital.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient.

Table J-37 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on hospital ACO alignment status.

- Hospitals that had never been aligned with an ACO and ACO-aligned hospitals did not meet the assumption of parallel trends for case-mix-adjusted payment per discharge, DRG weight per admission, and the rate of unplanned readmissions within 30 days of discharge.
- Hospitals that had never been aligned with an ACO and ACO-aligned hospitals met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. The DDD coefficient in the sensitivity analysis was negative in both the sensitivity analysis and the main analysis, but it was statistically significant only in the main analysis.

Table J-37
Baseline trend results for hospitals by ACO alignment status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Case-mix-adjusted payment per discharge ($)	N	− (0.54)	+ (0.59)
DRG weight per admission	N*	− (<0.001)	− (0.001)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	N*	+ (0.02)	− (0.73)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	− (0.29)	− (0.006)

DDD = difference-in-difference-in-differences; DRG = diagnosis-related group.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at $p<0.10$; N = one or both subpopulations did not have parallel baseline trends at $p<0.05$; [2] Sign indicates direction of the DDD coefficient.

In summary, we found the percentage of discharges with a follow-up visit within 14 days had parallel trends prior to the All-Payer Model for all four hospital subgroups. Of these, the direction of the difference between the subgroups changed for only one outcome in the sensitivity analyses. For teaching status and ACO alignment, the direction of the difference between subgroups was the same in the sensitivity analyses and the main analyses, but the differences were only significant in the main analyses. In the sensitivity analysis, hospitals that had participated in TPR had a significantly larger change in 14-day follow-up than hospitals that had not participated, but there was no difference between the groups in the main analysis. Findings for differences between subgroups by DSH percentage were the same in the sensitivity and the main analysis.

J.3.1.2 Beneficiary Subgroups

Table J-38 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on beneficiary dual eligibility for Medicare and Medicaid.

- Beneficiaries with Medicare only and those with dual Medicare-Medicaid eligibility status did not meet the assumption of parallel trends for total expenditures, total hospital expenditures, inpatient expenditures, ED visit expenditures, other hospital outpatient department expenditures, inpatient admissions, ED visits, and percentage of hospital discharges with a follow-up visit within 14 days of discharge.

- Beneficiaries with Medicare only and those with dual Medicare-Medicaid eligibility status met the assumption of the parallel trends for the rate of unplanned readmissions within 30 days of discharge. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.

Table J-38
Baseline trend results for Medicare beneficiaries by Medicare-Medicaid dual eligibility status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Total PBPM ($)	N	+ (<0.001)	– (0.002)
Total hospital PBPM ($)	N	+ (0.28)	– (0.08)
Inpatient facility PBPM ($)	N	+ (0.79)	– (0.48)
ED visits PBPM ($)	N	+ (0.04)	– (<0.001)
Other hospital outpatient department PBPM ($)	N	+ (0.14)	– (0.55)
All-cause acute inpatient admissions per 1,000 population	N	– (0.59)	– (<0.001)
ED visits per 1,000 population	N	– (<0.001)	– (0.23)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	Y	+ (0.45)	+ (0.80)
Percentage of discharges with a follow-up visit within 14 days of discharge	N*	+ (0.53)	– (<0.001)

DDD = difference-in-difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient.

Table J-39 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on beneficiary original reason for Medicare entitlement.

- Aged beneficiaries and disabled beneficiaries did not meet the assumption of parallel trends for inpatient expenditures, ED visit expenditures, hospital outpatient department expenditures, inpatient admissions, ED visits, and percentage of hospital discharges with a follow-up visit within 14 days of discharge.

- Aged beneficiaries and disabled beneficiaries met the assumption of parallel trends for total expenditures. The DDD coefficient was not statistically significant in either the sensitivity analysis or the main analysis, but the sign differed.

- Aged beneficiaries and disabled beneficiaries met the assumption of parallel trends for total hospital expenditures. The DDD coefficient was not statistically significant in either the sensitivity analysis or the main analysis, but the sign differed.

- Aged beneficiaries and disabled beneficiaries met the assumption of parallel trends for the rate of unplanned readmissions within 30 days of discharge. The DDD coefficient was negative in both the sensitivity analysis and the main analysis, but it was statistically significant in the main analysis only.

Table J-39
Baseline trend results for Medicare beneficiaries by original reason for Medicare entitlement benefit

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Total PBPM ($)	Y	+ (0.73)	− (0.47)
Total hospital PBPM ($)	Y	+ (0.30)	− (0.71)
Inpatient facility PBPM ($)	N	− (0.91)	+ (0.18)
ED visits PBPM ($)	N	+ (<0.001)	− (<0.001)
Other hospital outpatient department PBPM ($)	N	+ (0.30)	− (0.01)
All-cause acute inpatient admissions per 1,000 population	N	− (0.007)	− (0.12)
ED visits per 1,000 population	N*	− (<0.001)	+ (0.69)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	Y	− (0.97)	− (0.03)
Percentage of discharges with a follow-up visit within 14 days of discharge	N	+ (<0.001)	− (<0.001)

DDD = difference-in-difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient.

Table J-40 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on beneficiary multiple chronic conditions (MCC) status.

- Beneficiaries without MCCs and beneficiaries with MCCs did not meet the assumption of parallel trends for inpatient facility expenditures, ED visit expenditures, hospital outpatient department expenditures, and ED visits.

- Beneficiaries without MCCs and beneficiaries with MCCs met the assumption of parallel trends for total expenditures. The DDD coefficient was positive and statistically significant in the sensitivity analysis, but negative and statistically significant in the main analysis.

- Beneficiaries without MCCs and beneficiaries with MCCs met the assumption of parallel trends for total hospital expenditure. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.

- Beneficiaries without MCCs and beneficiaries with MCCs met the assumption of parallel trends for inpatient admissions. The DDD coefficient was negative in both the sensitivity analysis and the main analysis, but it was statistically significant in the main analysis only.

- Beneficiaries without MCCs and beneficiaries with MCCs met the assumption of parallel trends for the rate of unplanned readmissions within 30 days of discharge. The DDD coefficient was negative in both the sensitivity analysis and the main analysis, but it was statistically significant in the sensitivity analysis only.

- Beneficiaries without MCCs and beneficiaries with MCCs met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. The DDD coefficient was positive in both the sensitivity analysis and the main analysis, but it was statistically significant in the sensitivity analysis only.

Table J-40
Baseline trend results for Medicare beneficiaries by multiple chronic condition status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Total PBPM ($)	Y	+ (0.05)	− (0.005)
Total hospital PBPM ($)	Y	− (0.09)	− (0.008)
Inpatient facility PBPM ($)	N	− (0.004)	+ (0.61)
ED visits PBPM ($)	N	+ (<0.001)	− (<0.001)
Other hospital outpatient department PBPM ($)	N	− (0.13)	− (<0.001)
All-cause acute inpatient admissions per 1,000 population	Y	− (0.38)	− (<0.001)
ED visits per 1,000 population	N	+ (<0.001)	+ (0.24)

(continued)

Table J-40 (continued)
Baseline trend results for Medicare beneficiaries by multiple chronic condition status

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Unplanned readmissions within 30 days of discharge per 1,000 discharges	Y	– (0.02)	– (0.68)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	+ (0.06)	+ (0.44)

DDD = difference-in-difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient.

Table J-41 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on beneficiary race.

- Non-white and white beneficiaries did not meet the assumption of parallel trends for total expenditures, inpatient expenditures, ED visit expenditures, hospital outpatient department expenditures, inpatient admissions, and ED visits.
- Non-white and white beneficiaries met the assumption of parallel trends for total hospital expenditures. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.
- Non-white and white beneficiaries met the assumption of parallel trends for the rate of unplanned readmissions within 30 days of discharge. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.
- Non-white and white beneficiaries met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. In the sensitivity analysis, the DDD coefficient was negative but statistically insignificant. In the main analysis, the DDD coefficient was positive and statistically significant.

Table J-41
Baseline trend results for Medicare beneficiaries by race

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Total PBPM ($)	N*	– (<0.001)	– (0.004)
Total hospital PBPM ($)	Y	– (0.002)	– (<0.001)
Inpatient facility PBPM ($)	N	– (0.40)	– (<0.001)
ED visits PBPM ($)	N	– (0.002)	+ (<0.001)
Other hospital outpatient department PBPM ($)	N	– (<0.001)	– (0.07)
All-cause acute inpatient admissions per 1,000 population	N*	+ (0.001)	+ (0.04)
ED visits per 1,000 population	N	– (<0.001)	+ (0.13)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	Y	– (0.03)	– (0.08)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	– (0.49)	+ (0.01)

DDD = difference-in-difference-in-differences; ED = emergency department; PBPM = per beneficiary per month.

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient.

Table J-42 presents results from the baseline trends test and the overall DDD estimates from parallel and differential trend models for subgroups based on beneficiary residence.

- Rural and urban beneficiaries did not meet the assumption of parallel trends for total hospital expenditures, inpatient expenditures, ED visit expenditures, hospital outpatient department expenditures, ED visits, and the rate of unplanned readmissions within 30 days of discharge.

- Rural and urban beneficiaries met the assumption of parallel trends for total expenditures. In the sensitivity analysis, the DDD coefficient was negative and statistically significant. For the main analysis, the DDD coefficient was positive but statistically insignificant.

- Rural and urban beneficiaries met the assumption of parallel trends for inpatient admissions. The direction and statistical significance of the DDD estimate was the same in the sensitivity analysis and the main analysis.

- Rural and urban beneficiaries met the assumption of parallel trends for the percentage of hospital discharges with a follow-up visit within 14 days of discharge. The DDD coefficient was not statistically significant in either the sensitivity analysis or the main analysis, but the sign differed.

Table J-42
Baseline trend results for Medicare beneficiaries by residency

Outcome	Parallel trends assumption met for both subgroups?[1]	Sign of overall DDD estimate assuming parallel trends (p-value)[2]	Sign of overall DDD estimate assuming differential trends (p-value)[2]
Total PBPM ($)	Y	− (0.06)	+ (0.55)
Total hospital PBPM ($)	N*	− (<0.001)	+ (0.02)
Inpatient facility PBPM ($)	N	+ (0.94)	+ (0.06)
ED visits PBPM ($)	N	− (0.55)	− (0.24)
Other hospital outpatient department PBPM ($)	N	− (<0.001)	+ (0.09)
All-cause acute inpatient admissions per 1,000 population	Y	− (0.05)	− (0.05)
ED visits per 1,000 population	N	+ (0.02)	+ (<0.001)
Unplanned readmissions within 30 days of discharge per 1,000 discharges	N*	+ (0.85)	− (0.94)
Percentage of discharges with a follow-up visit within 14 days of discharge	Y	+ (0.81)	− (0.22)

DDD = difference-in-difference-in-differences; ED = emergency department; PBPM = per beneficiary per month

NOTES: [1] Y= both subpopulations had parallel baseline trends; N*= one or both subpopulations did not have parallel baseline trends at p<0.10; N = one or both subpopulations did not have parallel baseline trends at p<0.05; [2] Sign indicates direction of the DDD coefficient

Across the five beneficiary-level subgroups, 15 out of 45 outcomes had parallel trends during the baseline period. Of these, the direction or the significance of the difference between the subgroups changed for seven outcomes in the sensitivity analyses. In four cases, the significance of the difference between subgroups changed in the sensitivity analyses, although the direction of the difference was unchanged: (1) the difference between beneficiaries based on original reason for entitlement for readmissions was not significant in the sensitivity analysis but significant in the main analysis; (2) the difference between beneficiaries based on multiple chronic condition status for all-cause admissions was not significant in the sensitivity analysis but significant in the main analysis; (3) the difference between beneficiaries based on multiple chronic condition status for readmissions was significant in the sensitivity analysis but not significant in the main model; and (4) the difference between beneficiaries based on multiple chronic condition status for 14-day follow-up visits was significant in the sensitivity analysis but not significant in the main analysis. In three cases the significance and direction of the difference between subgroups changed in the sensitivity analysis: (1) in the sensitivity analyses residents of urban areas had a larger reduction in total expenditures than residents of rural areas, while the main analysis showed a larger, but not significantly different, reduction for residents of rural areas; (2) in the sensitivity analyses whites had a smaller, but not significantly different, increase in 14-day follow-up visits than non-whites, but in the main analyses whites had a larger relative increase; and (3) in the sensitivity analyses beneficiaries with multiple chronic conditions had a smaller reduction in total expenditures than beneficiaries who did not have multiple chronic conditions, but in the main analyses they had a larger reduction.

J.3.2 Sensitivity Analysis Results for Subgroups

In this section, we present the results from DDD analyses for hospital and beneficiary subgroups from the model that assumed parallel baseline trends (the sensitivity analysis). For comparison, we also show D-in-D estimates for differences between Maryland and the comparison group within subgroups from the model that assumed differential trends (the main analysis) and the p-value of the DDD estimate from these models (test of equality across subgroups). We present these for all subgroups and all years in ***Tables J-43*** to ***J-51***.

Table J-43
Impacts on hospital outcomes by TPR system participation status, first 4.5 years of Maryland All-Payer Model implementation

TPR participation status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Case-mix-adjusted payment per discharge ($)									
No (weighted N=2,589,832)	Year 1	9,944.33	6,628.30	10,071.22	6,848.73	−93.62 (−289.72, 102.47)	—	306.52* (15.68, 597.37)	—
	Year 2	9,944.33	6,628.30	10,384.48	6,791.18	277.18** (44.86, 509.50)	—	875.58*** (503.74, 1,247.42)	—
	Year 3	9,944.33	6,628.30	10,250.88	6,749.70	185.06 (−184.25, 554.37)	—	981.64*** (368.25, 1,595.03)	—
	Year 4	9,944.33	6,628.30	10,565.96	6,717.06	532.79** (119.51, 946.07)	—	1,527.91*** (902.13, 2,153.70)	—
	Year 5	9,944.33	6,628.30	10,695.34	6,767.59	611.63*** (240.00, 983.27)	—	1,805.28*** (1,165.67, 2,444.90)	—
	Overall	9,944.33	6,628.30	10,354.62	6,776.76	261.57*** (117.01, 406.14)	—	1,006.89*** (777.38, 1,236.39)	—
Yes (weighted N=485,261)	Year 1	9,721.88	5,869.09	10,195.90	5,896.04	447.07* (54.01, 840.13)	0.04	181.51 (−226.12, 589.13)	0.70
	Year 2	9,721.88	5,869.09	9,885.74	5,723.25	309.70 (−150.32, 769.72)	0.92	−86.47 (−759.26, 586.32)	0.05
	Year 3	9,721.88	5,869.09	9,500.99	5,641.33	6.88 (−492.39, 506.15)	0.64	−519.90 (−1,359.53, 319.74)	0.03
	Year 4	9,721.88	5,869.09	9,695.79	5,693.23	149.78 (−530.59, 830.15)	0.43	−506.94 (−1,657.00, 643.12)	0.01
	Year 5	9,721.88	5,869.09	9,800.11	5,731.60	215.73 (−428.07, 859.53)	0.38	−571.17 (−1,863.08, 720.74)	0.01
	Overall	9,721.88	5,869.09	9,821.82	5,738.96	230.07 (−9.19, 469.33)	0.85	−263.00 (−645.82, 119.82)	<0.001

(continued)

Table J-43 (continued)
Impacts on hospital outcomes by TPR system participation status, first 4.5 years of Maryland All-Payer Model implementation

TPR participation status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
DRG weight per admission									
No (weighted N=2,589,832)	Year 1	1.547	1.586	1.571	1.644	−0.035* (−0.065, −0.005)	—	−0.004 (−0.035, 0.026)	—
	Year 2	1.547	1.586	1.602	1.655	−0.014 (−0.044, 0.015)	—	0.031 (−0.011, 0.073)	—
	Year 3	1.547	1.586	1.646	1.709	−0.024 (−0.064, 0.016)	—	0.036 (−0.027, 0.100)	—
	Year 4	1.547	1.586	1.678	1.732	−0.015 (−0.063, 0.032)	—	0.060 (−0.026, 0.146)	—
	Year 5	1.547	1.586	1.722	1.766	−0.005 (−0.052, 0.041)	—	0.085 (−0.007, 0.176)	—
	Overall	1.547	1.586	1.634	1.693	−0.020* (−0.038, −0.003)	—	0.036** (0.008, 0.064)	—
Yes (weighted N=485,261)	Year 1	1.455	1.459	1.443	1.515	−0.067** (−0.110, −0.023)	0.32	−0.023 (−0.079, 0.032)	0.62
	Year 2	1.455	1.459	1.481	1.537	−0.051 (−0.104, 0.002)	0.34	0.013 (−0.056, 0.082)	0.72
	Year 3	1.455	1.459	1.536	1.58	−0.039 (−0.091, 0.013)	0.73	0.047 (−0.045, 0.139)	0.88
	Year 4	1.455	1.459	1.554	1.569	−0.010 (−0.081, 0.060)	0.93	0.096 (−0.013, 0.205)	0.67
	Year 5	1.455	1.459	1.606	1.572	0.039 (−0.034, 0.112)	0.43	0.167** (0.031, 0.302)	0.41
	Overall	1.455	1.459	1.514	1.552	−0.033** (−0.059, −0.008)	0.51	0.047** (0.007, 0.086)	0.72

(continued)

Table J-43 (continued)
Impacts on hospital outcomes by TPR system participation status, first 4.5 years of Maryland All-Payer Model implementation

TPR participation status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
No (weighted N=1,650,058)	Year 1	165.4	164.9	154.5	155.3	−1.3 (−6.1, 3.5)	—	2.3 (−3.4, 8.0)	—
	Year 2	165.4	164.9	148.2	154.9	−7.2** (−12.0, −2.4)	—	−1.9 (−9.9, 6.2)	—
	Year 3	165.4	164.9	148.1	152.6	−5.0 (−10.5, 0.6)	—	1.9 (−8.4, 12.1)	—
	Year 4	165.4	164.9	140.4	152.1	−12.2*** (−18.3, −6.1)	—	−3.7 (−17.1, 9.7)	—
	Year 5	165.4	164.9	145.3	153.9	−9.0** (−16.3, −1.7)	—	1.2 (−15.2, 17.6)	—
	Overall	165.4	164.9	147.7	153.8	−6.6*** (−9.1, −4.1)	—	−0.2 (−4.8, 4.4)	—
Yes (weighted N=315,693)	Year 1	149.4	162.5	139.9	151.1	1.1 (−7.5, 9.7)	0.69	1.6 (−7.0, 10.2)	0.91
	Year 2	149.4	162.5	135.3	152.2	−4.6 (−14.8, 5.6)	0.70	−3.9 (−14.3, 6.5)	0.80
	Year 3	149.4	162.5	139.1	143.3	7.7 (−5.0, 20.4)	0.13	8.5 (−5.6, 22.7)	0.53
	Year 4	149.4	162.5	135.6	146.7	1.0 (−14.6, 16.6)	0.19	2.1 (−12.8, 17.0)	0.64
	Year 5	149.4	162.5	131.3	154.8	−11.1 (−23.8, 1.7)	0.82	−9.7 (−33.2, 13.9)	0.53
	Overall	149.4	162.5	136.9	149	0.1 (−5.5, 5.6)	0.07	0.9 (−5.1, 6.8)	0.80

(continued)

Table J-43 (continued)
Impacts on hospital outcomes by TPR system participation status, first 4.5 years of Maryland All-Payer Model implementation

TPR participation status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow−up visit within 14 days of discharge									
No (weighted N=1,828,935)	Year 1	67.7	70.7	66.5	71.3	−1.8** (−3.3, −0.4)	—	−1.7* (−3.2, −0.1)	—
	Year 2	67.7	70.7	68	71.7	−0.8 (−2.5, 0.9)	—	−0.6 (−2.5, 1.4)	—
	Year 3	67.7	70.7	70.2	73.4	−0.3 (−2.1, 1.4)	—	0.0 (−2.2, 2.1)	—
	Year 4	67.7	70.7	71.6	73.9	0.6 (−1.2, 2.3)	—	0.9 (−1.4, 3.3)	—
	Year 5	67.7	70.7	72.2	74.4	0.6 (−1.2, 2.5)	—	1.1 (−1.6, 3.7)	—
	Overall	67.7	70.7	69.3	72.7	−0.5 (−1.3, 0.3)	—	−0.2 (−1.2, 0.7)	—
Yes (weighted N=347,144)	Year 1	65.7	68	66.9	68.6	0.5 (−1.2, 2.2)	0.08	−1.4 (−3.6, 0.8)	0.87
	Year 2	65.7	68	69.3	69.1	2.4* (0.1, 4.8)	0.06	−0.4 (−3.8, 3.0)	0.94
	Year 3	65.7	68	71.9	71.1	2.9 (−0.4, 6.3)	0.16	−0.7 (−4.9, 3.5)	0.83
	Year 4	65.7	68	72.1	73	1.2 (−2.7, 5.0)	0.82	−3.1 (−8.2, 1.9)	0.23
	Year 5	65.7	68	74.1	73.9	2.2 (−1.2, 5.5)	0.51	−2.8 (−8.8, 3.2)	0.34
	Overall	65.7	68	70.4	70.7	1.8** (0.5, 3.2)	0.01	−1.5 (−3.3, 0.3)	0.31

* p<0.10, **p <0.05, *** p<0.01

DRG = diagnosis-related group; TPR = Total Patient Revenue.

(continued)

Table J-43 (continued)
Impacts on hospital outcomes by TPR system participation status, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-44
Impacts on hospital outcomes by teaching status, first 4.5 years of Maryland All-Payer Model implementation

Teaching status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Case-mix-adjusted payment per discharge ($)									
Non-teaching (weighted N=1,851,577)	Year 1	8,634.91	5,685.58	8,718.35	5,821.29	−52.14 (−260.35, 156.07)	—	305.95** (62.11, 549.80)	—
	Year 2	8,634.91	5,685.58	8,852.02	5,731.79	171.03 (−71.71, 413.77)	—	706.31*** (320.75, 1,091.87)	—
	Year 3	8,634.91	5,685.58	8,729.18	5,659.63	120.34 (−122.01, 362.70)	—	832.64*** (355.06, 1,310.22)	—
	Year 4	8,634.91	5,685.58	8,857.81	5,655.41	253.20 (−25.06, 531.46)	—	1,143.01*** (578.26, 1,707.76)	—
	Year 5	8,634.91	5,685.58	9,020.68	5,724.53	346.95** (58.05, 635.85)	—	1,414.13*** (738.85, 2,089.42)	—
	Overall	8,634.91	5,685.58	8,813.46	5,718.69	145.17** (32.37, 257.98)	—	812.50*** (607.65, 1,017.35)	—
Teaching (weighted N=1,093,924)	Year 1	12,255.03	7,471.41	12,671.19	7,735.00	152.56 (−110.12, 415.24)	0.29	216.75 (−330.18, 763.67)	0.81
	Year 2	12,255.03	7,471.41	13,052.27	7,622.38	646.26*** (307.17, 985.35)	0.06	742.15* (80.16, 1,404.15)	0.94
	Year 3	12,255.03	7,471.41	12,884.28	7,618.08	482.58 (−281.54, 1,246.69)	0.45	610.30 (−645.90, 1,866.49)	0.79
	Year 4	12,255.03	7,471.41	13,517.52	7,580.12	1,153.77** (263.12, 2,044.42)	0.11	1,313.53 (−4.36, 2,631.42)	0.85
	Year 5	12,255.03	7,471.41	13,578.10	7,613.26	1,181.21** (390.26, 1,972.17)	0.10	1,373.20* (153.34, 2,593.06)	0.96
	Overall	12,255.03	7,471.41	13,081.87	7,637.75	660.49*** (376.36, 944.61)	0.005	779.88*** (321.33, 1,238.44)	0.92

(continued)

Table J-44 (continued)
Impacts on hospital outcomes by teaching status, first 4.5 years of Maryland All-Payer Model implementation

Teaching status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
DRG weight per admission									
Non-teaching (weighted N=1,851,577)	Year 1	1.441	1.479	1.453	1.531	−0.040*** (−0.064, −0.016)	—	0.008 (−0.022, 0.039)	—
	Year 2	1.441	1.479	1.475	1.548	−0.035** (−0.059, −0.012)	—	0.037 (−0.006, 0.079)	—
	Year 3	1.441	1.479	1.509	1.586	−0.039** (−0.068, −0.010)	—	0.057 (−0.009, 0.123)	—
	Year 4	1.441	1.479	1.544	1.604	−0.022 (−0.062, 0.017)	—	0.097* (0.011, 0.183)	—
	Year 5	1.441	1.479	1.588	1.626	0.000 (−0.038, 0.038)	—	0.143** (0.047, 0.240)	—
	Overall	1.441	1.479	1.504	1.573	−0.031*** (−0.044, −0.017)	—	0.059*** (0.031, 0.087)	—
Teaching (weighted N=1,093,924)	Year 1	1.68	1.702	1.704	1.766	−0.040 (−0.095, 0.015)	0.99	−0.033 (−0.077, 0.012)	0.20
	Year 2	1.68	1.702	1.756	1.774	0.003 (−0.051, 0.057)	0.28	0.015 (−0.048, 0.077)	0.63
	Year 3	1.68	1.702	1.82	1.844	−0.002 (−0.078, 0.075)	0.46	0.014 (−0.081, 0.108)	0.54
	Year 4	1.68	1.702	1.838	1.86	0.000 (−0.095, 0.096)	0.73	0.019 (−0.116, 0.155)	0.42
	Year 5	1.68	1.702	1.884	1.901	0.004 (−0.090, 0.099)	0.94	0.027 (−0.105, 0.159)	0.24
	Overall	1.68	1.702	1.789	1.819	−0.008 (−0.042, 0.025)	0.32	0.006 (−0.036, 0.048)	0.08

(continued)

Table J-44 (continued)
Impacts on hospital outcomes by teaching status, first 4.5 years of Maryland All-Payer Model implementation

Teaching status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-teaching (weighted N=1,285,756)	Year 1	159.2	159.2	148.8	152	−3.1 (−8.3, 2.1)	—	−5.0 (−11.3, 1.3)	—
	Year 2	159.2	159.2	143.2	150.5	−7.3** (−12.7, −2.0)	—	−10.1* (−19.4, −0.9)	—
	Year 3	159.2	159.2	141.4	148.4	−7.0** (−12.9, −1.2)	—	−10.7 (−22.3, 0.9)	—
	Year 4	159.2	159.2	136.3	148.7	−12.6*** (−19.9, −5.3)	—	−17.2* (−32.6, −1.8)	—
	Year 5	159.2	159.2	137.4	151.1	−13.8*** (−22.1, −5.4)	—	−19.4 (−38.8, 0.1)	—
	Overall	159.2	159.2	142.1	150	−8.0*** (−10.8, −5.2)	—	−11.5*** (−16.8, −6.2)	—
Teaching (weighted N=649,953)	Year 1	169.2	171.7	157.1	159.2	0.4 (−6.5, 7.3)	0.50	11.4*** (5.3, 17.6)	0.002
	Year 2	169.2	171.7	150.2	159.8	−7.3 (−15.1, 0.6)	0.99	9.1* (0.7, 17.5)	0.01
	Year 3	169.2	171.7	154.7	154.4	2.7 (−7.2, 12.7)	0.16	23.1*** (12.4, 33.9)	<0.001
	Year 4	169.2	171.7	143.3	155.1	−9.5 (−19.2, 0.2)	0.67	16.0* (0.7, 31.3)	0.01
	Year 5	169.2	171.7	150.9	157.4	−4.1 (−13.9, 5.7)	0.21	26.1** (7.5, 44.7)	0.01
	Overall	169.2	171.7	151.4	157.2	−3.4 (−7.5, 0.6)	0.12	15.9*** (10.8, 21.0)	<0.001

(continued)

Table J-44 (continued)
Impacts on hospital outcomes by teaching status, first 4.5 years of Maryland All-Payer Model implementation

Teaching status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow−up visit within 14 days of discharge									
Non-teaching (weighted N=1,385,752)	Year 1	68.5	70.9	68.7	71.9	−0.8 (−2.0, 0.4)	—	−0.4 (−1.7, 1.0)	—
	Year 2	68.5	70.9	70.4	72.1	0.6 (−0.8, 2.0)	—	1.2 (−0.6, 3.0)	—
	Year 3	68.5	70.9	72.6	74.4	0.5 (−1.2, 2.2)	—	1.3 (−1.0, 3.5)	—
	Year 4	68.5	70.9	73.9	75.2	0.8 (−0.8, 2.5)	—	1.8 (−0.8, 4.3)	—
	Year 5	68.5	70.9	74.6	76.2	0.5 (−1.1, 2.1)	—	1.6 (−1.3, 4.5)	—
	Overall	68.5	70.9	71.6	73.7	0.3 (−0.4, 1.0)	—	1.0* (0.1, 2.0)	—
Teaching (weighted N=775,048)	Year 1	64.6	68.9	61.8	68.8	−2.7* (−5.2, −0.2)	0.26	−3.7** (−6.2, −1.2)	0.05
	Year 2	64.6	68.9	63.2	69.4	−1.9 (−4.9, 1.2)	0.23	−3.4* (−6.6, −0.1)	0.04
	Year 3	64.6	68.9	65.5	70.2	−0.5 (−3.4, 2.5)	0.63	−2.4 (−5.8, 0.9)	0.12
	Year 4	64.6	68.9	66.8	70.8	0.1 (−2.8, 3.0)	0.72	−2.3 (−6.0, 1.3)	0.13
	Year 5	64.6	68.9	67.6	70.4	1.3 (−1.7, 4.3)	0.69	−1.6 (−5.8, 2.7)	0.32
	Overall	64.6	68.9	64.6	69.8	−1.0 (−2.3, 0.3)	0.15	−2.8*** (−4.3, −1.3)	<0.001

* p<0.10, **p <0.05, *** p<0.01

DRG = diagnosis-related group.

(continued)

Table J-44 (continued)
Impacts on hospital outcomes by teaching status, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-45
Impacts on hospital outcomes by DSH percentage, first 4.5 years of Maryland All-Payer Model implementation

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Case-mix-adjusted payment per discharge ($)									
Low/ Medium (weighted N=2,368,414)	Year 1	8,972.78	6,063.41	9,172.21	6,287.53	−24.70 (−198.17, 148.76)	—	297.82** (86.77, 508.87)	—
	Year 2	8,972.78	6,063.41	9,314.05	6,218.92	185.75 (−10.54, 382.04)	—	667.69*** (335.60, 999.78)	—
	Year 3	8,972.78	6,063.41	9,226.18	6,228.47	88.32 (−155.44, 332.09)	—	729.57*** (291.55, 1,167.60)	—
	Year 4	8,972.78	6,063.41	9,424.26	6,264.72	250.15 (−73.48, 573.77)	—	1,051.13*** (492.66, 1,609.61)	—
	Year 5	8,972.78	6,063.41	9,619.27	6,360.83	349.05** (68.06, 630.05)	—	1,309.77*** (685.80, 1,933.74)	—
	Overall	8,972.78	6,063.41	9,318.71	6,262.00	147.47** (36.93, 258.01)	—	748.59*** (557.91, 939.26)	—
High (weighted N=817,340)	Year 1	12,583.31	7,669.78	12,885.64	7,921.99	50.14 (−328.61, 428.88)	0.76	19.48 (−641.39, 680.35)	0.50
	Year 2	12,583.31	7,669.78	13,396.67	7,829.18	653.97** (158.89, 1,149.06)	0.14	608.18 (−246.61, 1,462.96)	0.91
	Year 3	12,583.31	7,669.78	13,361.46	7,647.54	800.40 (−267.68, 1,868.48)	0.29	739.36 (−886.57, 2,365.30)	0.99
	Year 4	12,583.31	7,669.78	14,181.60	7,609.88	1,658.20*** (639.54, 2,676.87)	0.03	1,581.92* (11.06, 3,152.79)	0.61
	Year 5	12,583.31	7,669.78	14,211.47	7,620.39	1,677.57*** (817.56, 2,537.57)	0.02	1,586.19* (165.36, 3,007.01)	0.77
	Overall	12,583.31	7,669.78	13,520.68	7,742.65	864.31*** (504.06, 1,224.57)	0.002	807.47** (240.66, 1,374.27)	0.86

(continued)

Table J-45 (continued)
Impacts on hospital outcomes by DSH percentage, first 4.5 years of Maryland All-Payer Model implementation

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
DRG weight per admission									
Low/ Medium (weighted N=2,368414)	Year 1	1.516	1.556	1.536	1.621	−0.047** (−0.077, −0.016)	—	−0.015 (−0.045, 0.014)	—
	Year 2	1.516	1.556	1.553	1.631	−0.039** (−0.064, −0.014)	—	0.008 (−0.030, 0.046)	—
	Year 3	1.516	1.556	1.588	1.69	−0.063*** (−0.093, −0.033)	—	−0.001 (−0.057, 0.054)	—
	Year 4	1.516	1.556	1.616	1.713	−0.057** (−0.094, −0.021)	—	0.020 (−0.055, 0.095)	—
	Year 5	1.516	1.556	1.665	1.742	−0.038 (−0.077, 0.001)	—	0.055 (−0.029, 0.138)	—
	Overall	1.516	1.556	1.583	1.672	−0.050*** (−0.064, −0.036)	—	0.008 (−0.017, 0.033)	—
High (weighted N=817,340)	Year 1	1.571	1.599	1.589	1.626	−0.009 (−0.054, 0.036)	0.25	0.033 (−0.015, 0.080)	0.15
	Year 2	1.571	1.599	1.663	1.65	0.041 (−0.021, 0.103)	0.06	0.103** (0.028, 0.178)	0.06
	Year 3	1.571	1.599	1.75	1.684	0.094* (0.006, 0.182)	0.008	0.177** (0.062, 0.292)	0.02
	Year 4	1.571	1.599	1.787	1.685	0.130* (0.019, 0.242)	0.01	0.234** (0.076, 0.391)	0.04
	Year 5	1.571	1.599	1.823	1.715	0.136** (0.032, 0.240)	0.01	0.260*** (0.104, 0.417)	0.05
	Overall	1.571	1.599	1.708	1.666	0.070*** (0.033, 0.107)	<0.001	0.147*** (0.098, 0.196)	<0.001

(continued)

Table J-45 (continued)
Impacts on hospital outcomes by DSH percentage, first 4.5 years of Maryland All-Payer Model implementation

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Low/ Medium (weighted N=1,558,564)	Year 1	159.9	161.5	147.7	152.3	−3.0 (−7.6, 1.6)	—	0.0 (−5.6, 5.6)	—
	Year 2	159.9	161.5	142	152.8	−9.2*** (−14.2, −4.3)	—	−4.8 (−12.8, 3.3)	—
	Year 3	159.9	161.5	141.9	147.5	−4.0 (−9.4, 1.4)	—	1.6 (−8.3, 11.6)	—
	Year 4	159.9	161.5	136.2	148.6	−10.8*** (−17.4, −4.3)	—	−3.7 (−16.8, 9.4)	—
	Year 5	159.9	161.5	138.9	150.8	−10.3** (−17.7, −3.0)	—	−1.8 (−18.5, 15.0)	—
	Overall	159.9	161.5	141.8	150.4	−7.1*** (−9.6, −4.5)	—	−1.7 (−6.3, 2.9)	—
High (weighted N=450,327)	Year 1	172.7	171.9	166.9	159.8	6.4 (−4.7, 17.5)	0.20	12.0 (−2.0, 26.0)	0.19
	Year 2	172.7	171.9	159.8	156.2	2.9 (−5.1, 10.9)	0.03	11.2 (−4.1, 26.4)	0.13
	Year 3	172.7	171.9	161.5	157.3	3.5 (−10.1, 17.0)	0.40	14.2 (−8.1, 36.5)	0.40
	Year 4	172.7	171.9	149.2	158.3	−9.9 (−22.8, 3.0)	0.92	3.7 (−25.1, 32.4)	0.70
	Year 5	172.7	171.9	154.9	159.3	−5.2 (−16.7, 6.4)	0.53	10.9 (−18.1, 40.0)	0.53
	Overall	172.7	171.9	159.2	158	0.4 (−5.0, 5.7)	0.04	10.4* (0.7, 20.1)	0.07

(continued)

Table J-45 (continued)
Impacts on hospital outcomes by DSH percentage, first 4.5 years of Maryland All-Payer Model implementation

DSH percentage	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow−up visit within 14 days of discharge									
Low/ Medium (weighted N=1,672,536)	Year 1	68	71.4	68	71.9	−0.5 (−1.7, 0.6)	—	−0.6 (−1.9, 0.7)	—
	Year 2	68	71.4	69.8	72.3	0.9 (−0.6, 2.4)	—	0.8 (−1.0, 2.6)	—
	Year 3	68	71.4	72.1	74.1	1.3 (−0.5, 3.1)	—	1.2 (−1.0, 3.4)	—
	Year 4	68	71.4	73.5	74.9	1.8* (0.1, 3.6)	—	1.7 (−0.8, 4.2)	—
	Year 5	68	71.4	74.4	75.7	1.8 (−0.1, 3.7)	—	1.7 (−1.3, 4.6)	—
	Overall	68	71.4	71.2	73.5	0.9** (0.2, 1.7)	—	0.8 (−0.1, 1.8)	—
High (weighted N=56,0326)	Year 1	63.8	66	60.7	66.9	−4.0** (−7.3, −0.7)	0.10	−4.7** (−8.0, −1.5)	0.05
	Year 2	63.8	66	61.7	67.4	−3.5* (−6.7, −0.2)	0.05	−4.5** (−8.3, −0.8)	0.03
	Year 3	63.8	66	64.3	68.9	−2.5 (−5.7, 0.7)	0.10	−3.9 (−8.2, 0.4)	0.08
	Year 4	63.8	66	65.6	69.8	−2.2 (−5.5, 1.1)	0.08	−3.9 (−8.4, 0.6)	0.08
	Year 5	63.8	66	66.2	68.7	−0.4 (−3.9, 3.0)	0.34	−2.5 (−7.9, 2.8)	0.26
	Overall	63.8	66	63.3	68.2	−2.8*** (−4.3, −1.3)	<0.001	−4.1*** (−6.0, −2.3)	<0.001

* p<0.10, **p <0.05, *** p<0.01

DRG = diagnosis-related group; DSH = disproportionate share hospital.

(continued)

Table J-45 (continued)
Impacts on hospital outcomes by DSH percentage, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-46
Impacts on hospital outcomes by ACO alignment status, first 4.5 years of Maryland All-Payer Model implementation

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Case-mix-adjusted payment per discharge ($)									
Non-aligned (weighted N=1,261,543)	Year 1	10,110.03	6,603.69	10,257.84	6,841.97	−90.81 (−412.55, 230.92)	—	133.84 (−213.29, 480.97)	—
	Year 2	10,110.03	6,603.69	10,521.75	6,683.46	331.60* (34.23, 628.97)	—	667.61** (134.52, 1,200.70)	—
	Year 3	10,110.03	6,603.69	10,411.26	6,602.10	302.48 (−65.36, 670.32)	—	749.72* (57.80, 1,441.64)	—
	Year 4	10,110.03	6,603.69	10,697.10	6,652.39	538.03** (120.55, 955.51)	—	1,096.81** (239.13, 1,954.50)	—
	Year 5	10,110.03	6,603.69	10,792.56	6,711.36	574.52* (57.19, 1,091.84)	—	1,244.88* (192.87, 2,296.89)	—
	Overall	10,110.03	6,603.69	10,500.99	6,697.84	295.55*** (129.31, 461.79)	—	712.41*** (412.52, 1,012.30)	—
Aligned (weighted N=1,801,191)	Year 1	9,751.07	6,484.04	9,942.67	6,638.42	36.88 (−181.87, 255.62)	0.60	386.63* (25.56, 747.71)	0.42
	Year 2	9,751.07	6,484.04	10,127.03	6,636.53	223.13 (−79.31, 525.57)	0.68	745.81*** (295.03, 1,196.59)	0.86
	Year 3	9,751.07	6,484.04	9,906.11	6,616.80	21.94 (−474.62, 518.49)	0.46	717.54 (−54.56, 1,489.64)	0.96
	Year 4	9,751.07	6,484.04	10,209.27	6,538.39	403.51 (−144.84, 951.86)	0.75	1,272.33*** (512.13, 2,032.53)	0.81
	Year 5	9,751.07	6,484.04	10,349.56	6,583.56	498.63* (63.06, 934.20)	0.86	1,540.64*** (819.11, 2,262.16)	0.71
	Overall	9,751.07	6,484.04	10,078.07	6,606.10	204.99* (16.87, 393.11)	0.54	857.63*** (576.08, 1,139.19)	0.59

(continued)

Table J-46 (continued)
Impacts on hospital outcomes by ACO alignment status, first 4.5 years of Maryland All-Payer Model implementation

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
DRG weight per admission									
Non-aligned (weighted N=1,261,543)	Year 1	1.553	1.591	1.59	1.641	−0.013 (−0.057, 0.032)	—	0.021 (−0.023, 0.064)	—
	Year 2	1.553	1.591	1.632	1.651	0.019 (−0.022, 0.060)	—	0.069** (0.015, 0.123)	—
	Year 3	1.553	1.591	1.688	1.706	0.020 (−0.044, 0.085)	—	0.087* (0.000, 0.174)	—
	Year 4	1.553	1.591	1.748	1.712	0.075 (−0.003, 0.152)	—	0.158** (0.047, 0.269)	—
	Year 5	1.553	1.591	1.791	1.751	0.079* (0.003, 0.155)	—	0.179*** (0.066, 0.292)	—
	Overall	1.553	1.591	1.676	1.685	0.030* (0.003, 0.057)	—	0.092*** (0.056, 0.128)	—
Aligned (weighted N=1,801,191)	Year 1	1.519	1.551	1.524	1.613	−0.056*** (−0.090, −0.023)	0.21	−0.027 (−0.059, 0.006)	0.15
	Year 2	1.519	1.551	1.552	1.629	−0.045** (−0.081, −0.009)	0.07	0.000 (−0.048, 0.047)	0.11
	Year 3	1.519	1.551	1.592	1.679	−0.055** (−0.098, −0.012)	0.13	0.004 (−0.065, 0.074)	0.22
	Year 4	1.519	1.551	1.604	1.707	−0.071** (−0.118, −0.024)	0.01	0.003 (−0.091, 0.097)	0.08
	Year 5	1.519	1.551	1.652	1.731	−0.047 (−0.095, 0.002)	0.03	0.042 (−0.062, 0.146)	0.14
	Overall	1.519	1.551	1.577	1.664	−0.056*** (−0.074, −0.037)	<0.001	0.000 (−0.031, 0.031)	0.001

(continued)

Table J-46 (continued)
Impacts on hospital outcomes by ACO alignment status, first 4.5 years of Maryland All-Payer Model implementation

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-aligned (weighted N=782,129)	Year 1	167.4	161.7	156.6	154.7	−3.4 (−9.0, 2.2)	—	2.4 (−5.6, 10.4)	—
	Year 2	167.4	161.7	151.8	153.4	−7.0* (−14.0, −0.1)	—	1.6 (−7.8, 11.0)	—
	Year 3	167.4	161.7	150.3	151.2	−6.1 (−13.6, 1.3)	—	4.9 (−8.3, 18.2)	—
	Year 4	167.4	161.7	139.9	153.3	−18.7*** (−26.3, −11.1)	—	−4.8 (−19.8, 10.3)	—
	Year 5	167.4	161.7	143.5	157.6	−19.5*** (−28.0, −10.9)	—	−2.6 (−21.5, 16.3)	—
	Overall	167.4	161.7	149.3	153.6	−9.6*** (−12.8, −6.3)	—	0.8 (−4.7, 6.3)	—
Aligned (weighted N=1,198,693)	Year 1	159.9	166.4	149.2	155.1	0.2 (−5.8, 6.2)	0.47	1.5 (−5.1, 8.0)	0.88
	Year 2	159.9	166.4	142.4	155.4	−6.9** (−12.5, −1.3)	0.98	−5.0 (−14.5, 4.6)	0.42
	Year 3	159.9	166.4	144.1	151	−0.9 (−8.0, 6.2)	0.41	1.5 (−10.4, 13.4)	0.75
	Year 4	159.9	166.4	139.2	150.6	−5.4 (−13.3, 2.4)	0.05	−2.3 (−18.5, 13.8)	0.86
	Year 5	159.9	166.4	142.5	151.6	−3.1 (−11.5, 5.3)	0.02	0.6 (−19.4, 20.6)	0.85
	Overall	159.9	166.4	143.7	152.9	−3.2* (−6.4, −0.1)	0.02	−0.9 (−6.5, 4.6)	0.73

(continued)

Table J-46 (continued)
Impacts on hospital outcomes by ACO alignment status, first 4.5 years of Maryland All-Payer Model implementation

ACO alignment status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-aligned (weighted N=880,061)	Year 1	66	69.2	65.6	69.8	−1.0 (−2.4, 0.4)	—	−0.5 (−2.2, 1.1)	—
	Year 2	66	69.2	67.2	69.3	1.1 (−0.4, 2.6)	—	1.8 (−0.3, 4.0)	—
	Year 3	66	69.2	68.9	71.5	0.5 (−1.2, 2.2)	—	1.4 (−1.3, 4.1)	—
	Year 4	66	69.2	70.2	72.3	0.9 (−0.8, 2.6)	—	2.1 (−0.9, 5.1)	—
	Year 5	66	69.2	70.2	73.5	−0.3 (−2.4, 1.9)	—	1.1 (−2.8, 5.0)	—
	Overall	66	69.2	68.1	71	0.3 (−0.4, 1.0)	—	1.2* (0.0, 2.3)	—
Aligned (weighted N=1,315,340)	Year 1	68.1	71	67	71.6	−1.7 (−3.6, 0.1)	0.59	−2.3** (−4.2, −0.5)	0.22
	Year 2	68.1	71	68.6	72.6	−1.2 (−3.4, 1.0)	0.15	−2.1 (−4.4, 0.3)	0.04
	Year 3	68.1	71	71.2	74	−0.1 (−2.5, 2.3)	0.76	−1.2 (−3.8, 1.4)	0.25
	Year 4	68.1	71	72.4	74.8	0.3 (−2.1, 2.7)	0.74	−1.0 (−3.9, 1.8)	0.22
	Year 5	68.1	71	73.7	74.8	1.5 (−0.9, 4.0)	0.36	−0.1 (−3.1, 3.0)	0.70
	Overall	68.1	71	70.1	73.4	−0.5 (−1.5, 0.6)	0.29	−1.5** (−2.7, −0.4)	0.01

* p<0.10, **p <0.05, *** p<0.01

DRG = diagnosis-related group; ACO = accountable care organization.

(continued)

Table J-46 (continued)
Impacts on hospital outcomes by ACO alignment status, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in case-mix-adjustment payment per discharge and DRG weight per admission. A logistic model was used to obtain estimates of the differences in probability of an unplanned readmission within 30 days of discharge and probability of a follow-up visit within 14 days of discharge. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for DRG weight per admission, unplanned readmissions, and follow-up visit within 14 days included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and DSH percentage. The model for case-mix-adjustment payment included all previously mentioned covariates as well as the area wage index.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-47
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	853.76	781.72	862.36	798.53	−8.20 (−17.09, 0.69)	—	−14.03** (−24.88, −3.18)	—
	Year 2	853.76	781.72	866.25	796.13	−1.91 (−13.46, 9.63)	—	−10.68 (−29.07, 7.71)	—
	Year 3	853.76	781.72	913.23	852.02	−10.82 (−23.63, 2.00)	—	−22.52 (−45.77, 0.72)	—
	Year 4	853.76	781.72	949.50	879.69	−2.22 (−16.81, 12.37)	—	−16.87 (−45.89, 12.16)	—
	Year 5	853.76	781.72	1,004.72	939.26	−6.56 (−27.21, 14.08)	—	−24.15 (−63.27, 14.97)	—
	Overall	853.76	781.72	910.31	843.88	−5.87 (−11.76, 0.03)	—	−16.98*** (−27.53, −6.42)	—
Dual (weighted N=1,693,796)	Year 1	1,490.16	1,424.06	1,460.95	1,392.87	1.28 (−16.19, 18.75)	0.40	−43.18*** (−70.18, −16.19)	0.12
	Year 2	1,490.16	1,424.06	1,457.23	1,357.58	32.86*** (15.51, 50.21)	<0.001	−34.09 (−71.19, 3.02)	0.37
	Year 3	1,490.16	1,424.06	1,564.75	1,499.88	−1.92 (−26.16, 22.32)	0.51	−91.35*** (−147.76, −34.93)	0.05
	Year 4	1,490.16	1,424.06	1,511.76	1,416.75	28.21 (−7.54, 63.96)	0.10	−83.70* (−156.87, −10.53)	0.13
	Year 5	1,490.16	1,424.06	1,581.54	1,473.48	41.27* (4.61, 77.93)	0.007	−93.13* (−184.99, −1.26)	0.21
	Overall	1,490.16	1,424.06	1,508.64	1,423.10	18.17** (6.22, 30.12)	<0.001	−66.93*** (−92.44, −41.42)	0.002

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total hospital PBPM ($)*									
Medicare only (weighted N=8,551,964)	Year 1	461.32	379.44	467.15	395.04	−9.75** (−16.52, −2.97)	—	−9.59** (−17.34, −1.85)	—
	Year 2	461.32	379.44	462.32	392.64	−12.17** (−20.73, −3.62)	—	−11.94 (−26.03, 2.14)	—
	Year 3	461.32	379.44	487.36	428.71	−23.21*** (−32.92, −13.50)	—	−22.91** (−40.71, −5.10)	—
	Year 4	461.32	379.44	508.38	447.91	−21.39*** (−33.37, −9.41)	—	−21.01 (−42.65, 0.63)	—
	Year 5	461.32	379.44	549.79	491.65	−23.72** (−40.80, −6.63)	—	−23.26 (−52.33, 5.82)	—
	Overall	461.32	379.44	489.23	424.69	−17.50*** (−22.13, −12.87)	—	−17.21*** (−25.14, −9.28)	—
Dual (weighted N=1,693,796)	Year 1	871.21	714.56	852.05	702.03	−6.98 (−21.96, 8.00)	0.76	−20.89 (−42.92, 1.14)	0.45
	Year 2	871.21	714.56	848.34	682.50	8.83 (−7.93, 25.59)	0.02	−12.10 (−42.07, 17.87)	0.99
	Year 3	871.21	714.56	904.85	784.28	−36.43*** (−51.37, −21.49)	0.12	−64.38** (−108.01, −20.76)	0.12
	Year 4	871.21	714.56	881.11	742.43	−18.32 (−42.01, 5.37)	0.79	−53.30 (−112.00, 5.40)	0.35
	Year 5	871.21	714.56	937.77	786.49	−5.73 (−36.54, 25.08)	0.20	−47.73 (−123.08, 27.63)	0.57
	Overall	871.21	714.56	879.34	734.25	−12.62** (−21.38, −3.87)	0.28	−39.22*** (−59.61, −18.83)	0.08

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Inpatient facility PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	329.90	280.81	319.47	280.26	−9.91** (−16.71, −3.11)	—	1.28 (−5.49, 8.05)	—
	Year 2	329.90	280.81	310.44	273.18	−11.86*** (−18.57, −5.15)	—	4.98 (−7.19, 17.14)	—
	Year 3	329.90	280.81	326.84	298.03	−20.31*** (−27.63, −12.99)	—	2.16 (−13.22, 17.54)	—
	Year 4	329.90	280.81	338.11	305.98	−16.98*** (−24.15, −9.81)	—	11.13 (−8.67, 30.93)	—
	Year 5	329.90	280.81	371.29	337.82	−15.64** (−26.81, −4.47)	—	18.11 (−10.61, 46.83)	—
	Overall	329.90	280.81	329.18	294.88	−14.91*** (−18.27, −11.56)	—	6.42 (−0.77, 13.60)	—
Dual (weighted N=1,693,796)	Year 1	662.40	585.45	619.49	556.50	−14.47** (−26.39, −2.56)	0.50	−8.07 (−28.09, 11.94)	0.47
	Year 2	662.40	585.45	611.03	532.55	1.00 (−15.21, 17.22)	0.16	10.68 (−17.25, 38.60)	0.75
	Year 3	662.40	585.45	652.09	608.51	−33.89*** (−44.84, −22.95)	0.04	−20.95 (−64.44, 22.55)	0.37
	Year 4	662.40	585.45	627.95	566.09	−15.61* (−29.46, −1.76)	0.87	0.61 (−57.82, 59.03)	0.74
	Year 5	662.40	585.45	676.76	598.81	0.48 (−17.37, 18.33)	0.09	19.97 (−55.73, 95.67)	0.96
	Overall	662.40	585.45	633.27	569.58	−14.05*** (−20.33, −7.77)	0.79	−1.74 (−21.85, 18.38)	0.48

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	24.28	16.01	30.28	20.59	1.44** (0.24, 2.64)	—	−3.24*** (−4.32, −2.16)	—
	Year 2	24.28	16.01	31.95	20.45	3.24*** (1.28, 5.20)	—	−3.80*** (−5.44, −2.17)	—
	Year 3	24.28	16.01	33.64	22.48	2.91*** (1.43, 4.40)	—	−6.49*** (−8.74, −4.23)	—
	Year 4	24.28	16.01	36.95	23.92	4.77*** (3.35, 6.19)	—	−6.99 *** (−9.92, −4.05)	—
	Year 5	24.28	16.01	38.21	25.19	4.77*** (3.20, 6.35)	—	−9.35*** (−12.96, −5.74)	—
	Overall	24.28	16.01	33.8	22.24	3.30*** (2.59, 4.00)	—	−5.63*** (−6.65, −4.61)	—
Dual (weighted N=1,693,796)	Year 1	62.72	34.18	75.12	41.68	4.98** (1.13, 8.83)	0.06	−6.83*** (−9.27, −4.39)	<0.001
	Year 2	62.72	34.18	77.84	42.88	6.49** (1.83, 11.16)	0.07	−11.30*** (−15.51, −7.09)	<0.001
	Year 3	62.72	34.18	80.74	48.58	3.70* (0.46, 6.93)	0.54	−20.09*** (−27.91, −12.26)	<0.001
	Year 4	62.72	34.18	82.83	49.34	5.03** (0.97, 9.08)	0.90	−24.75*** (−34.73, −14.76)	<0.001
	Year 5	62.72	34.18	84.12	51.5	4.16 (−0.05, 8.37)	0.76	−31.60*** (−44.42, −18.78)	<0.001
	Overall	62.72	34.18	79.76	46.25	4.95*** (3.11, 6.78)	0.04	−17.69*** (−21.09, −14.28)	<0.001

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Other hospital outpatient department PBPM ($)									
Medicare only (weighted N=8,551,964)	Year 1	107.14	82.62	117.40	94.19	−1.27 (−4.40, 1.85)	—	−7.63*** (−10.58, −4.68)	—
	Year 2	107.14	82.62	119.93	99.00	−3.56 (−8.01, 0.90)	—	−13.12*** (−17.88, −8.35)	—
	Year 3	107.14	82.62	126.88	108.20	−5.81 (−12.17, 0.55)	—	−18.58*** (−24.36, −12.80)	—
	Year 4	107.14	82.62	133.32	118.02	−9.18* (−17.65, −0.71)	—	−25.15*** (−32.93, −17.37)	—
	Year 5	107.14	82.62	140.29	128.65	−12.85*** (−20.95, −4.74)	—	−32.02*** (−42.30, −21.74)	—
	Overall	107.14	82.62	126.25	107.57	−5.88*** (−8.70, −3.07)	—	−18.00*** (−20.76, −15.24)	—
Dual (weighted N=1,693,796)	Year 1	146.09	94.94	157.44	103.85	2.51 (−3.78, 8.80)	0.19	−5.99** (−10.80, −1.18)	0.67
	Year 2	146.09	94.94	159.47	107.06	1.34 (−6.59, 9.26)	0.11	−11.47*** (−17.91, −5.03)	0.74
	Year 3	146.09	94.94	172.02	127.19	−6.24 (−14.75, 2.28)	0.89	−23.35*** (−31.76, −14.94)	0.41
	Year 4	146.09	94.94	170.33	126.99	−7.74 (−19.78, 4.30)	0.73	−29.16*** (−40.30, −18.02)	0.62
	Year 5	146.09	94.94	176.88	136.18	−10.37 (−24.31, 3.57)	0.66	−36.10*** (−49.67, −22.53)	0.69
	Overall	146.09	94.94	166.31	118.42	−3.51 (−7.83, 0.80)	0.14	−19.80*** (−23.74, −15.86)	0.55

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
All-cause acute inpatient admissions per 1,000 population									
Medicare only (weighted N=8,551,964)	Year 1	278.9	282.8	257.2	261.2	−0.5 (−4.9, 3.8)	—	−3.2 (−8.4, 2.0)	—
	Year 2	278.9	282.8	243.4	252.4	−5.7** (−10.4, −1.0)	—	−9.7** (−17.6, −1.7)	—
	Year 3	278.9	282.8	243.8	256.5	−8.9*** (−14.3, −3.6)	—	−14.0** (−24.6, −3.3)	—
	Year 4	278.9	282.8	236.5	259.3	−18.4*** (−24.6, −12.2)	—	−24.8*** (−39.1, −10.4)	—
	Year 5	278.9	282.8	252.7	279.6	−21.5*** (−28.6, −14.5)	—	−29.5*** (−46.7, −12.3)	—
	Overall	278.9	282.8	246.0	259.9	−10.0*** (−12.4, −7.5)	—	−14.9*** (−19.8, −9.9)	—
Dual (weighted N=1,693,796)	Year 1	593.0	558.3	523.4	492.1	−0.1 (−11.7, 11.6)	0.94	−18.6* (−34.9, −2.2)	0.10
	Year 2	593.0	558.3	482.4	472.5	−20.2** (−36.1, −4.3)	0.08	−47.6*** (−71.1, −24.0)	0.005
	Year 3	593.0	558.3	501.2	495.9	−23.6*** (−38.6, −8.5)	0.05	−58.4*** (−84.3, −32.4)	0.003
	Year 4	593.0	558.3	445.5	458.6	−41.2*** (−58.6, −23.7)	0.01	−85.2*** (−121.1, −49.3)	0.005
	Year 5	593.0	558.3	471.7	479.0	−35.8*** (−55.2, −16.4)	0.20	−89.9*** (−134.2, −45.6)	0.03
	Overall	593.0	558.3	485.6	479.8	−23.3*** (−30.4, −16.1)	<0.001	−57.2*** (−70.1, −44.3)	<0.001

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits per 1,000 population									
Medicare only (weighted N=8,551,964)	Year 1	331.7	312.1	348.9	328.6	−0.4 (−6.8, 6.1)	—	6.0 (−0.9, 12.9)	—
	Year 2	331.7	312.1	356.7	333.9	2.0 (−5.7, 9.6)	—	11.7* (1.8, 21.7)	—
	Year 3	331.7	312.1	355.3	343.4	−9.4** (−16.8, −1.9)	—	3.6 (−10.0, 17.2)	—
	Year 4	331.7	312.1	361.7	347.4	−7.2 (−15.2, 0.8)	—	9.2 (−7.8, 26.1)	—
	Year 5	331.7	312.1	361.9	345.6	−5.3 (−14.3, 3.8)	—	14.3 (−5.8, 34.4)	—
	Overall	331.7	312.1	356.4	339.2	−4.0* (−7.4, −0.5)	—	8.4** (2.4, 14.4)	—
Dual (weighted N=1,693,796)	Year 1	1041.6	962.2	1063.1	947.1	37.1*** (15.3, 59.0)	0.002	38.1*** (15.5, 60.7)	0.01
	Year 2	1041.6	962.2	1047.4	966.9	0.7 (−30.6, 32.0)	0.94	2.2 (−40.4, 44.8)	0.70
	Year 3	1041.6	962.2	1047.1	1009.8	−42.9* (−80.1, −5.8)	0.12	−41.0 (−93.2, 11.2)	0.13
	Year 4	1041.6	962.2	1008.9	951.3	−20.5 (−67.5, 26.4)	0.64	−18.1 (−84.5, 48.2)	0.46
	Year 5	1041.6	962.2	987.2	938.7	−28.2 (−81.8, 25.4)	0.47	−25.4 (−99.8, 48.9)	0.33
	Overall	1041.6	962.2	1035.1	965.6	−9.5 (−26.6, 7.6)	0.59	−7.7 (−31.2, 15.8)	0.23

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Medicare only (weighted N=1,597,380)	Year 1	153.3	154.5	143.2	146.7	−2.2 (−6.7, 2.3)	—	0.9 (−4.8, 6.5)	—
	Year 2	153.3	154.5	137.5	146.7	−8.1*** (−12.4, −3.8)	—	−3.5 (−10.6, 3.5)	—
	Year 3	153.3	154.5	137.8	142.3	−3.2 (−8.6, 2.1)	—	2.6 (−7.1, 12.3)	—
	Year 4	153.3	154.5	133	145.3	−11.2*** (−16.9, −5.4)	—	−3.7 (−16.5, 9.0)	—
	Year 5	153.3	154.5	136.5	146.9	−9.1** (−15.6, −2.7)	—	−0.2 (−15.9, 15.4)	—
	Overall	153.3	154.5	137.8	145.4	−6.4*** (−8.7, −4.1)	—	−0.9 (−5.2, 3.5)	—
Dual (weighted N=382,067)	Year 1	201.9	204.4	188.5	189.2	1.7 (−8.0, 11.4)	0.53	4.5 (−8.8, 17.8)	0.69
	Year 2	201.9	204.4	181.6	186.7	−2.8 (−11.6, 6.0)	0.29	1.3 (−15.5, 18.2)	0.64
	Year 3	201.9	204.4	182.1	186.9	−2.4 (−11.1, 6.3)	0.87	3.0 (−17.6, 23.6)	0.98
	Year 4	201.9	204.4	166	178.9	−10.7 (−21.9, 0.4)	0.95	−4.1 (−26.9, 18.7)	0.98
	Year 5	201.9	204.4	168.9	184.7	−13.5** (−24.7, −2.3)	0.50	−5.5 (−36.3, 25.4)	0.80
	Overall	201.9	204.4	178.7	185.4	−4.4 (−8.9, 0.1)	0.45	0.6 (−8.3, 9.5)	0.80

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Dual eligibility status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Medicare only (weighted N=1,565,592)	Year 1	68.4	72.2	67	72.5	−1.6** (−3.0, −0.3)	—	−1.2 (−2.7, 0.3)	—
	Year 2	68.4	72.2	68.7	72.5	−0.1 (−1.7, 1.5)	—	0.5 (−1.4, 2.4)	—
	Year 3	68.4	72.2	70.6	74.3	−0.1 (−1.9, 1.6)	—	0.7 (−1.5, 2.9)	—
	Year 4	68.4	72.2	72.2	75.2	0.6 (−1.2, 2.3)	—	1.6 (−0.9, 4.0)	—
	Year 5	68.4	72.2	73.1	75.9	0.7 (−1.2, 2.7)	—	1.9 (−0.9, 4.8)	—
	Overall	68.4	72.2	69.9	73.8	−0.2 (−1.0, 0.5)	—	0.5 (−0.4, 1.5)	—
Dual (weighted N=629,810)	Year 1	64.8	65.3	65.1	66.7	−1.0 (−2.5, 0.4)	0.40	−2.5*** (−3.9, −1.1)	0.12
	Year 2	64.8	65.3	66.7	67.8	−0.6 (−2.4, 1.2)	0.55	−2.8** (−4.8, −0.8)	0.007
	Year 3	64.8	65.3	69.8	69.5	0.7 (−1.0, 2.5)	0.35	−2.1 (−4.2, 0.1)	0.04
	Year 4	64.8	65.3	70.3	70.2	0.5 (−1.2, 2.3)	0.99	−2.9** (−5.3, −0.5)	0.004
	Year 5	64.8	65.3	70.7	70	1.1 (−0.7, 3.0)	0.72	−3.0* (−5.9, −0.1)	0.01
	Overall	64.8	65.3	68.2	68.6	0.0 (−0.8, 0.8)	0.53	−2.6*** (−3.6, −1.7)	<0.001

* p<0.10, **p <0.05, *** p<0.01

ED = emergency department; PBPM = per beneficiary per month.

(continued)

Table J-47 (continued)
Impacts on beneficiary outcomes by Medicare-Medicaid dual eligibility status, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

[*] Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-48
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	862.91	815.52	859.93	820.04	−7.52 (−16.91, 1.88)	—	−18.56*** (−28.91, −8.21)	—
	Year 2	862.91	815.52	868.26	822.94	−2.09 (−14.75, 10.58)	—	−18.70* (−36.86, −0.54)	—
	Year 3	862.91	815.52	904.65	862.17	−4.93 (−17.21, 7.36)	—	−27.11 (−50.73, −3.49)	—
	Year 4	862.91	815.52	932.15	880.21	4.54 (−12.73, 21.82)	—	−23.21 (−55.18, 8.76)	—
	Year 5	862.91	815.52	985.94	937.19	1.34 (−18.12, 20.80)	—	−31.98 (−72.22, 8.27)	—
	Overall	862.91	815.52	902.37	856.72	−2.01 (−8.30, 4.28)	—	−23.08*** (−34.13, −12.03)	—
Disabled (weighted N=2,160,303)	Year 1	1,307.55	1,146.29	1,328.88	1,170.54	−3.00 (−20.99, 15.00)	0.66	−19.73 (−42.36, 2.90)	0.94
	Year 2	1,307.55	1,146.29	1,310.82	1,133.87	15.61 (−3.89, 35.11)	0.14	−9.59 (−35.63, 16.45)	0.62
	Year 3	1,307.55	1,146.29	1,446.69	1,299.31	−13.96 (−45.91, 17.99)	0.62	−47.62* (−95.89, 0.65)	0.47
	Year 4	1,307.55	1,146.29	1,440.28	1,276.26	2.69 (−25.94, 31.31)	0.92	−39.44 (−90.70, 11.82)	0.60
	Year 5	1,307.55	1,146.29	1,513.99	1,351.87	0.78 (−28.54, 30.10)	0.97	−49.82 (−121.64, 22.00)	0.65
	Overall	1,307.55	1,146.29	1,397.06	1,234.67	0.38 (−11.35, 12.12)	0.73	−31.54*** (−50.84, −12.23)	0.47

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total hospital PBPM ($)*									
Aged (weighted N=8,121,678)	Year 1	455.81	385.09	454.32	394.71	−11.09*** (−17.98, −4.20)	—	−12.35*** (−19.82, −4.88)	—
	Year 2	455.81	385.09	452.64	395.61	−13.68** (−22.95, −4.41)	—	−15.57* (−29.67, −1.47)	—
	Year 3	455.81	385.09	470.68	422.03	−22.05*** (−30.97, −13.13)	—	−24.58** (−42.96, −6.20)	—
	Year 4	455.81	385.09	486.76	435.28	−19.23** (−32.36, −6.09)	—	−22.39 (−45.78, 1.01)	—
	Year 5	455.81	385.09	527.81	478.70	−21.60** (−37.22, −5.97)	—	−25.39 (−54.78, 4.00)	—
	Overall	455.81	385.09	473.26	419.53	−17.15*** (−21.88, −12.43)	—	−19.55*** (−27.81, −11.29)	—
Disabled (weighted N=2,160,303)	Year 1	790.18	607.39	803.94	624.46	−3.35 (−17.18, 10.48)	0.31	−8.85 (−25.88, 8.17)	0.76
	Year 2	790.18	607.39	789.30	604.89	1.58 (−13.31, 16.48)	0.08	−6.70 (−26.54, 13.15)	0.49
	Year 3	790.18	607.39	865.71	710.95	−28.06** (−49.19, −6.94)	0.63	−39.13* (−73.92, −4.34)	0.49
	Year 4	790.18	607.39	868.17	702.58	−17.24 (−34.86, 0.37)	0.86	−31.09 (−71.12, 8.94)	0.71
	Year 5	790.18	607.39	922.67	754.94	−15.11 (−40.40, 10.18)	0.58	−31.73 (−88.66, 25.19)	0.83
	Overall	790.18	607.39	842.27	671.19	−12.25** (−20.38, −4.11)	0.30	−22.74*** (−37.43, −8.05)	0.71

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Inpatient facility PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	330.08	290.18	314.49	285.18	−10.63*** (−17.35, −3.92)	—	−1.38 (−8.39, 5.63)	—
	Year 2	330.08	290.18	308.59	281.58	−12.92*** (−19.81, −6.04)	—	0.99 (−11.37, 13.35)	—
	Year 3	330.08	290.18	319.12	297.70	−18.52*** (−25.10, −11.94)	—	0.06 (−15.62, 15.74)	—
	Year 4	330.08	290.18	325.86	302.01	−16.08*** (−23.57, −8.59)	—	7.16 (−13.86, 28.19)	—
	Year 5	330.08	290.18	357.87	333.54	−15.60*** (−25.14, −6.06)	—	12.31 (−15.35, 39.97)	—
	Overall	330.08	290.18	321.70	296.38	−14.70*** (−17.96, −11.44)	—	2.95 (−4.43, 10.33)	—
Disabled (weighted N=2,160,303)	Year 1	581.86	470.96	564.22	466.29	−13.12 (−26.43, 0.19)	0.71	2.08 (−13.71, 17.88)	0.74
	Year 2	581.86	470.96	544.91	440.74	−6.88 (−23.71, 9.94)	0.52	16.02 (−2.55, 34.60)	0.20
	Year 3	581.86	470.96	601.99	523.07	−32.14*** (−51.02, −13.25)	0.20	−1.53 (−34.85, 31.79)	0.93
	Year 4	581.86	470.96	600.67	503.47	−13.86 (−29.96, 2.25)	0.82	24.45 (−17.66, 66.55)	0.44
	Year 5	581.86	470.96	650.57	543.61	−4.09 (−21.30, 13.12)	0.20	41.91 (−21.40, 105.21)	0.33
	Overall	581.86	470.96	586.24	490.11	−15.17*** (−22.73, −7.61)	0.91	13.85 (−1.13, 28.83)	0.18

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	24.07	15.98	29.68	20.33	1.28 (0.00, 2.57)	—	−3.34*** (−4.49, −2.19)	—
	Year 2	24.07	15.98	31.57	20.47	3.03** (1.00, 5.06)	—	−3.92*** (−5.63, −2.21)	—
	Year 3	24.07	15.98	33.29	22.35	2.86*** (1.33, 4.39)	—	−6.42*** (−8.73, −4.10)	—
	Year 4	24.07	15.98	36.26	23.65	4.54*** (2.99, 6.09)	—	−7.07*** (−9.99, −4.15)	—
	Year 5	24.07	15.98	37.48	24.98	4.43*** (2.76, 6.11)	—	−9.51*** (−13.17, −5.84)	—
	Overall	24.07	15.98	33.28	22.08	3.12*** (2.37, 3.86)	—	−5.70*** (−6.74, −4.66)	—
Disabled (weighted N=2,160,303)	Year 1	55.25	31.64	68.23	39.17	5.50*** (2.79, 8.22)	<0.001	−5.41*** (−7.85, −2.97)	0.09
	Year 2	55.25	31.64	70.03	39.26	7.22*** (3.43, 11.00)	<0.001	−9.22*** (−12.92, −5.52)	0.01
	Year 3	55.25	31.64	72.84	43.71	5.56*** (2.57, 8.56)	0.02	−16.40*** (−23.02, −9.78)	0.002
	Year 4	55.25	31.64	76.58	44.66	8.36*** (5.36, 11.37)	0.003	−19.12*** (−28.17, −10.08)	0.01
	Year 5	55.25	31.64	77.74	46.58	7.61*** (4.46, 10.75)	0.02	−25.41*** (−36.60, −14.21)	0.003
	Overall	55.25	31.64	72.61	42.24	6.78*** (5.33, 8.22)	<0.001	−14.05*** (−17.03, −11.07)	<0.001

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Other hospital outpatient department PBPM ($)									
Aged (weighted N=8,121,678)	Year 1	101.67	78.93	110.15	89.19	−1.74 (−4.63, 1.14)	—	−7.63*** (−10.09, −5.18)	—
	Year 2	101.67	78.93	112.49	93.57	−3.79 (−7.91, 0.33)	—	−12.65*** (−16.81, −8.48)	—
	Year 3	101.67	78.93	118.28	101.97	−6.39* (−12.16, −0.63)	—	−18.22*** (−23.44, −13.00)	—
	Year 4	101.67	78.93	124.64	109.62	−7.69 (−15.98, 0.61)	—	−22.48*** (−29.22, −15.74)	—
	Year 5	101.67	78.93	132.45	120.18	−10.43** (−18.60, −2.26)	—	−28.20*** (−36.89, −19.50)	—
	Overall	101.67	78.93	118.29	101.06	−5.56*** (−8.26, −2.87)	—	−16.80*** (−19.20, −14.39)	—
Disabled (weighted N=2,160,303)	Year 1	153.08	104.79	171.49	119.01	4.27 (−1.92, 10.45)	0.04	−5.52** (−9.64, −1.41)	0.38
	Year 2	153.08	104.79	174.36	124.89	1.25 (−6.86, 9.35)	0.12	−13.50*** (−19.82, −7.18)	0.81
	Year 3	153.08	104.79	190.89	144.16	−1.49 (−11.02, 8.03)	0.19	−21.20*** (−30.73, −11.66)	0.58
	Year 4	153.08	104.79	190.92	154.45	−11.75* (−23.14, −0.36)	0.31	−36.41*** (−48.25, −24.57)	0.03
	Year 5	153.08	104.79	194.36	164.76	−18.62*** (−30.04, −7.20)	0.04	−48.24*** (−62.47, −34.00)	0.01
	Overall	153.08	104.79	183.42	138.84	−3.86 (−8.08, 0.36)	0.30	−22.54*** (−26.66, −18.42)	0.01

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
All−cause acute inpatient admissions per 1,000 population									
Aged (weighted N=8,121,678)	Year 1	286.1	295.5	261.7	270.9	−0.6 (−5.2, 4.0)	—	−6.6* (−12.2, −1.0)	—
	Year 2	286.1	295.5	248.5	263.2	−6.4** (−11.1, −1.6)	—	−15.2*** (−23.3, −7.1)	—
	Year 3	286.1	295.5	247.6	264.8	−8.5** (−13.9, −3.0)	—	−19.8*** (−30.8, −8.8)	—
	Year 4	286.1	295.5	238.9	265.5	−17.5*** (−23.5, −11.5)	—	−31.8*** (−46.1, −17.5)	—
	Year 5	286.1	295.5	255.0	285.6	−20.1*** (−27.0, −13.1)	—	−38.0*** (−55.4, −20.6)	—
	Overall	286.1	295.5	249.7	268.3	−9.7*** (−12.1, −7.2)	—	−20.7*** (−25.7, −15.7)	—
Disabled (weighted N=2,160,303)	Year 1	496.4	447.9	451.0	404.5	2.6 (−8.8, 14.0)	0.60	−0.8 (−14.6, 13.0)	0.48
	Year 2	496.4	447.9	413.0	386.0	−16.1* (−31.6, −0.6)	0.22	−21.2* (−40.0, −2.3)	0.56
	Year 3	496.4	447.9	433.5	412.0	−22.1** (−37.5, −6.8)	0.08	−28.5** (−50.7, −6.3)	0.47
	Year 4	496.4	447.9	395.4	395.9	−43.7*** (−63.8, −23.5)	0.01	−51.8*** (−81.2, −22.5)	0.19
	Year 5	496.4	447.9	420.4	423.8	−48.4*** (−66.4, −30.5)	0.002	−58.7*** (−92.5, −24.8)	0.26
	Overall	496.4	447.9	422.7	402.3	−23.2*** (−30.6, −15.9)	<0.001	−29.5*** (−40.0, −19.1)	0.12

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits per 1,000 population									
Aged (weighted N=8,121,678)	Year 1	324.6	308.1	342.5	322.3	3.0 (−3.1, 9.1)	—	6.6 (−0.1, 13.4)	—
	Year 2	324.6	308.1	351.0	330.6	2.8 (−5.1, 10.7)	—	8.5 (−1.3, 18.3)	—
	Year 3	324.6	308.1	350.1	338.3	−6.0 (−12.9, 0.8)	—	1.5 (−12.1, 15.2)	—
	Year 4	324.6	308.1	356.4	341.3	−3.1 (−10.9, 4.7)	—	6.6 (−10.4, 23.5)	—
	Year 5	324.6	308.1	355.2	339.9	−2.7 (−11.9, 6.4)	—	8.7 (−11.1, 28.6)	—
	Overall	324.6	308.1	350.6	334.0	−1.1 (−4.4, 2.3)	—	6.1* (0.1, 12.1)	—
Disabled (weighted N=2,160,303)	Year 1	941.2	826.8	958.3	831.5	12.0 (−7.0, 31.0)	0.35	27.9*** (10.9, 44.9)	0.02
	Year 2	941.2	826.8	944.1	830.2	−1.0 (−24.8, 22.9)	0.78	23.5 (−8.4, 55.5)	0.40
	Year 3	941.2	826.8	939.2	864.4	−43.2** (−71.4, −15.0)	0.02	−11.6 (−52.3, 29.1)	0.54
	Year 4	941.2	826.8	911.6	834.0	−38.1** (−68.7, −7.6)	0.05	1.7 (−54.5, 57.8)	0.87
	Year 5	941.2	826.8	905.5	827.5	−36.3 (−75.4, 2.8)	0.16	10.2 (−55.3, 75.7)	0.97
	Overall	941.2	826.8	934.4	838.7	−20.0*** (−32.3, −7.7)	0.007	10.2 (−8.8, 29.2)	0.69

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Aged (weighted N=1,715,191)	Year 1	156.5	158.7	146	149.5	−1.3 (−5.6, 3.1)	—	2.6 (−2.6, 7.7)	—
	Year 2	156.5	158.7	140.6	148.9	−6.2** (−10.6, −1.7)	—	−0.5 (−7.7, 6.8)	—
	Year 3	156.5	158.7	139.7	144.1	−2.3 (−7.8, 3.2)	—	5.0 (−4.6, 14.5)	—
	Year 4	156.5	158.7	132.7	146.4	−11.5*** (−17.2, −5.9)	—	−2.3 (−14.1, 9.4)	—
	Year 5	156.5	158.7	136.2	149.2	−10.8*** (−17.2, −4.4)	—	0.2 (−14.6, 15.0)	—
	Overall	156.5	158.7	139.6	147.4	−5.8*** (−8.1, −3.4)	—	1.1 (−3.0, 5.3)	—
Disabled (weighted N=265,630)	Year 1	205.2	201	193	189.5	−0.5 (−9.7, 8.8)	0.89	−4.1 (−18.1, 10.0)	0.45
	Year 2	205.2	201	183.1	190.4	−11.5** (−20.5, −2.5)	0.31	−16.9* (−34.0, 0.1)	0.13
	Year 3	205.2	201	191.5	194.9	−7.4 (−17.7, 2.8)	0.43	−14.6 (−38.6, 9.4)	0.22
	Year 4	205.2	201	183.8	185.5	−5.7 (−16.8, 5.4)	0.33	−14.5 (−42.3, 13.4)	0.48
	Year 5	205.2	201	186.9	185	−2.0 (−15.4, 11.4)	0.26	−12.4 (−44.6, 19.8)	0.53
	Overall	205.2	201	187.8	189.6	−5.9** (−10.6, −1.3)	0.97	−12.6** (−22.8, −2.4)	0.03

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Original reason for Medicare entitlement	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Aged (weighted N=1,511,984)	Year 1	70.2	73.3	69	73.7	−1.7** (−2.9, −0.4)	—	−1.1 (−2.4, 0.3)	—
	Year 2	70.2	73.3	70.5	74.2	−0.7 (−2.2, 0.7)	—	0.2 (−1.6, 2.0)	—
	Year 3	70.2	73.3	72.5	76	−0.7 (−2.4, 1.0)	—	0.5 (−1.6, 2.5)	—
	Year 4	70.2	73.3	74	76.6	0.2 (−1.5, 1.9)	—	1.6 (−0.6, 3.9)	—
	Year 5	70.2	73.3	74.7	77.2	0.3 (−1.5, 2.1)	—	2.0 (−0.6, 4.6)	—
	Overall	70.2	73.3	71.7	75.3	−0.6 (−1.4, 0.1)	—	0.4 (−0.5, 1.3)	—
Disabled (weighted N=683,417)	Year 1	60.8	63.4	60.9	64.4	−1.0 (−2.7, 0.8)	0.33	−2.8*** (−4.5, −1.1)	0.04
	Year 2	60.8	63.4	62.7	64.6	0.7 (−1.4, 2.8)	0.11	−2.0 (−4.3, 0.3)	0.09
	Year 3	60.8	63.4	65.6	66.2	1.9 (−0.1, 3.9)	0.007	−1.6 (−4.1, 0.9)	0.14
	Year 4	60.8	63.4	66.4	67.5	1.4 (−0.5, 3.3)	0.25	−2.9 (−5.8, 0.0)	0.009
	Year 5	60.8	63.4	67.4	67.7	2.1 (0.0, 4.2)	0.10	−3.0 (−6.6, 0.6)	0.03
	Overall	60.8	63.4	64.2	65.8	0.9 (0.0, 1.8)	<0.001	−2.4*** (−3.5, −1.3)	<0.001

* p<0.10, **p <0.05, *** p<0.01

ED = emergency department; PBPM = per beneficiary per month.

(continued)

Table J-48 (continued)
Impacts on beneficiary outcomes by original reason for Medicare entitlement, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-49
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	319.88	284.64	323.58	299.30	−10.96** (−20.34, −1.57)	—	−9.14 (−24.39, 6.12)	—
	Year 2	319.88	284.64	322.83	294.45	−6.85 (−15.67, 1.97)	—	−4.11 (−25.27, 17.06)	—
	Year 3	319.88	284.64	342.47	316.14	−8.90 (−18.35, 0.55)	—	−5.23 (−32.87, 22.41)	—
	Year 4	319.88	284.64	367.31	338.08	−6.00 (−15.57, 3.56)	—	−1.41 (−36.45, 33.63)	—
	Year 5	319.88	284.64	317.92	299.91	−17.22** (−30.41, −4.04)	—	−11.70 (−51.04, 27.63)	—
	Overall	319.88	284.64	336.77	310.57	−9.14*** (−13.52, −4.75)	—	−5.68 (−17.98, 6.63)	—
MCC (weighted N=8,837,507)	Year 1	1,060.21	984.78	1,061.29	990.85	−5.04 (−15.28, 5.21)	0.47	−20.37*** (−30.71, −10.03)	0.26
	Year 2	1,060.21	984.78	1,064.94	985.29	4.18 (−10.06, 18.42)	0.29	−18.88* (−35.83, −1.93)	0.25
	Year 3	1,060.21	984.78	1,127.89	1,058.29	−5.87 (−22.05, 10.31)	0.79	−36.66** (−64.24, −9.09)	0.09
	Year 4	1,060.21	984.78	1,147.28	1,065.15	6.66 (−13.05, 26.38)	0.33	−31.85 (−65.98, 2.28)	0.18
	Year 5	1,060.21	984.78	1,220.87	1,140.14	5.27 (−17.75, 28.29)	0.10	−40.97 (−87.44, 5.49)	0.29
	Overall	1,060.21	984.78	1,114.64	1,038.21	0.63 (−6.77, 8.02)	0.05	−28.64*** (−40.67, −16.61)	0.005

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total hospital PBPM ($)*									
Non-MCC (weighted N=1,444,474)	Year 1	189.25	157.16	190.16	165.88	−7.80* (−14.53, −1.07)	—	−6.76 (−18.24, 4.72)	—
	Year 2	189.25	157.16	188.54	163.15	−6.69 (−13.62, 0.24)	—	−5.12 (−21.44, 11.20)	—
	Year 3	189.25	157.16	200.39	178.48	−10.17* (−19.22, −1.11)	—	−8.07 (−28.81, 12.67)	—
	Year 4	189.25	157.16	214.93	193.41	−10.56** (−17.81, −3.32)	—	−7.94 (−34.90, 19.03)	—
	Year 5	189.25	157.16	189.26	173.75	−16.57*** (−26.48, −6.66)	—	−13.42 (−44.48, 17.65)	—
	Overall	189.25	157.16	197.50	174.97	−9.64*** (−13.17, −6.10)	—	−7.66 (−17.08, 1.77)	—
MCC (weighted N=8,837,507)	Year 1	580.47	477.58	582.36	488.28	−8.81* (−16.81, −0.80)	0.87	−12.73*** (−20.14, −5.31)	0.42
	Year 2	580.47	477.58	577.60	484.77	−10.06 (−20.89, 0.77)	0.68	−15.95* (−29.82, −2.08)	0.30
	Year 3	580.47	477.58	610.70	532.86	−25.05*** (−37.15, −12.95)	0.14	−32.92*** (−53.82, −12.01)	0.09
	Year 4	580.47	477.58	623.56	540.43	−19.76** (−34.40, −5.11)	0.30	−29.60* (−55.03, −4.16)	0.20
	Year 5	580.47	477.58	677.79	595.58	−20.67* (−40.51, −0.83)	0.73	−32.49 (−66.97, 1.99)	0.32
	Overall	580.47	477.58	607.84	521.27	−16.56*** (−22.22, −10.89)	0.09	−24.04*** (−33.11, −14.96)	0.01

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Inpatient facility PBPM ($)									
Non−MCC (weighted N=1,444,474)	Year 1	125.62	108.24	119.37	110.28	−8.31** (−14.44, −2.18)	—	−3.47 (−14.53, 7.58)	—
	Year 2	125.62	108.24	115.95	106.86	−8.31** (−14.59, −2.02)	—	−1.00 (−17.26, 15.25)	—
	Year 3	125.62	108.24	126.81	116.54	−7.13 (−15.92, 1.65)	—	2.63 (−16.78, 22.05)	—
	Year 4	125.62	108.24	135.31	124.42	−6.51* (−12.83, −0.19)	—	5.72 (−20.30, 31.75)	—
	Year 5	125.62	108.24	120.25	108.69	−5.84 (−14.58, 2.90)	—	8.86 (−22.31, 40.02)	—
	Overall	125.62	108.24	123.91	113.86	−7.38*** (−10.63, −4.13)	—	1.83 (−7.29, 10.95)	—
MCC (weighted N=8,837,507)	Year 1	424.83	365.04	406.95	358.04	−10.95** (−18.87, −3.03)	0.60	−0.34 (−7.43, 6.74)	0.66
	Year 2	424.83	365.04	397.46	349.01	−11.40** (−20.25, −2.56)	0.62	4.56 (−7.93, 17.04)	0.58
	Year 3	424.83	365.04	419.01	382.45	−23.29*** (−31.16, −15.43)	0.009	−1.99 (−21.05, 17.07)	0.72
	Year 4	424.83	365.04	423.36	380.10	−16.60*** (−25.03, −8.17)	0.09	10.06 (−15.10, 35.21)	0.78
	Year 5	424.83	365.04	466.47	420.55	−13.94** (−25.72, −2.15)	0.29	18.06 (−18.13, 54.26)	0.62
	Overall	424.83	365.04	418.04	373.52	−15.44*** (−19.35, −11.53)	0.003	4.81 (−3.99, 13.62)	0.61

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	12.14	8.35	14.31	10.37	0.15 (−0.54, 0.85)	—	−1.37*** (−2.19, −0.55)	—
	Year 2	12.14	8.35	15.26	10.52	0.95* (0.06, 1.84)	—	−1.35* (−2.51, −0.18)	—
	Year 3	12.14	8.35	15.49	11.31	0.39 (−0.45, 1.24)	—	−2.69*** (−4.36, −1.01)	—
	Year 4	12.14	8.35	16.7	12.28	0.64 (−0.36, 1.64)	—	−3.22*** (−5.09, −1.34)	—
	Year 5	12.14	8.35	15.24	11.6	−0.14 (−1.27, 0.99)	—	−4.78*** (−7.17, −2.38)	—
	Overall	12.14	8.35	15.42	11.16	0.47* (0.06, 0.87)	—	−2.44*** (−3.13, −1.74)	—
MCC (weighted N=8,837,507)	Year 1	33.54	21.2	41.54	26.59	2.63** (0.75, 4.51)	0.004	−4.14*** (−5.54, −2.74)	<0.001
	Year 2	33.54	21.2	43.58	26.72	4.54*** (1.64, 7.43)	0.01	−5.64*** (−7.69, −3.59)	<0.001
	Year 3	33.54	21.2	45.77	29.43	4.02*** (1.84, 6.19)	<0.001	−9.58*** (−12.96, −6.19)	<0.001
	Year 4	33.54	21.2	49.2	30.69	6.18*** (4.06, 8.30)	<0.001	−10.82*** (−15.39, −6.25)	<0.001
	Year 5	33.54	21.2	50.71	32.48	5.91*** (3.70, 8.11)	<0.001	−14.51*** (−20.29, −8.73)	<0.001
	Overall	33.54	21.2	45.71	28.84	4.54*** (3.49, 5.59)	<0.001	−8.38*** (−9.92, −6.84)	<0.001

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Other hospital outpatient department PBPM ($)									
Non-MCC (weighted N=1,444,474)	Year 1	51.49	40.57	56.47	45.22	0.36 (−2.06, 2.78)	—	−1.92 (−5.55, 1.72)	—
	Year 2	51.49	40.57	57.34	45.77	0.66 (−2.06, 3.39)	—	−2.77 (−8.00, 2.46)	—
	Year 3	51.49	40.57	58.09	50.62	−3.42** (−6.09, −0.76)	—	−8.01* (−15.19, −0.84)	—
	Year 4	51.49	40.57	62.91	56.71	−4.70** (−8.08, −1.31)	—	−10.44** (−18.92, −1.97)	—
	Year 5	51.49	40.57	53.77	53.46	−10.59*** (−13.81, −7.37)	—	−17.50*** (−27.91, −7.08)	—
	Overall	51.49	40.57	58.17	49.95	−2.72*** (−4.03, −1.42)	—	−7.05 (−10.12, −3.98)	—
MCC (weighted N=8,837,507)	Year 1	122.09	91.35	133.87	103.65	−0.48 (−4.57, 3.60)	0.76	−8.24*** (−10.81, −5.68)	0.01
	Year 2	122.09	91.35	136.55	109.04	−3.20 (−8.88, 2.49)	0.25	−14.87*** (−19.31, −10.43)	<0.001
	Year 3	122.09	91.35	145.91	120.98	−5.77 (−13.47, 1.93)	0.60	−21.35*** (−27.11, −15.59)	0.01
	Year 4	122.09	91.35	151.01	129.65	−9.34 (−19.35, 0.66)	0.34	−28.83*** (−36.54, −21.12)	0.003
	Year 5	122.09	91.35	160.61	142.55	−12.64** (−22.40, −2.89)	0.70	−36.04*** (−45.92, −26.17)	0.005
	Overall	122.09	91.35	144.08	118.92	−5.66*** (−9.07, −2.24)	0.13	−20.47*** (−23.15, −17.78)	<0.001

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
All-cause acute inpatient admissions per 1,000 population									
Non-MCC (weighted N=1,444,474)	Year 1	98.7	94.8	90.4	89.2	−2.6 (−5.8, 0.7)	—	−5.6 (−11.7, 0.5)	—
	Year 2	98.7	94.8	83.2	84.8	−5.3*** (−8.4, −2.2)	—	−9.7* (−18.3, −1.1)	—
	Year 3	98.7	94.8	86.9	87.2	−3.8* (−7.1, −0.5)	—	−9.5 (−20.0, 1.0)	—
	Year 4	98.7	94.8	83.4	89.4	−9.2*** (−12.8, −5.5)	—	−16.2** (−29.1, −3.4)	—
	Year 5	98.7	94.8	74.4	77.8	−6.4** (−11.0, −1.9)	—	−14.1* (−26.7, −1.5)	—
	Overall	98.7	94.8	84.7	86.6	−5.3*** (−6.9, −3.8)	—	−10.7*** (−15.3, −6.1)	—
MCC (weighted N=8,837,507)	Year 1	365.5	367.0	334.0	334.3	1.0 (−4.8, 6.8)	0.31	−5.5 (−11.9, 0.9)	0.99
	Year 2	365.5	367.0	314.8	323.8	−8.0* (−15.2, −0.8)	0.50	−17.8*** (−27.5, −8.1)	0.21
	Year 3	365.5	367.0	317.2	330.4	−11.5*** (−18.7, −4.2)	0.05	−23.8*** (−36.3, −11.4)	0.07
	Year 4	365.5	367.0	301.4	327.1	−23.9*** (−32.6, −15.2)	<0.001	−39.6*** (−56.5, −22.7)	0.02
	Year 5	365.5	367.0	325.6	356.7	−27.9*** (−36.6, −19.2)	<0.001	−47.7*** (−68.1, −27.3)	0.005
	Overall	365.5	367.0	317.7	332.0	−12.7*** (−16.1, −9.3)	<0.001	−24.9*** (−30.7, −19.0)	<0.001

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits per 1,000 population									
Non-MCC (weighted N=1,444,474)	Year 1	227.9	213.3	226.6	212.0	0.1 (−6.8, 7.0)	—	3.7 (−5.3, 12.8)	—
	Year 2	227.9	213.3	226.9	212.3	0.1 (−6.9, 7.1)	—	5.4 (−6.9, 17.7)	—
	Year 3	227.9	213.3	217.6	212.7	−9.5** (−17.1, −1.9)	—	−2.5 (−18.9, 14.0)	—
	Year 4	227.9	213.3	215.6	211.8	−10.4** (−18.9, −2.0)	—	−1.8 (−21.3, 17.7)	—
	Year 5	227.9	213.3	201.5	198.3	−9.9* (−19.7, −0.1)	—	−0.4 (−22.2, 21.5)	—
	Overall	227.9	213.3	219.5	210.7	−5.5** (−9.0, −1.9)	—	1.1 (−6.0, 8.1)	—
MCC (weighted N=8,837,507)	Year 1	483.5	449.0	508.1	466.6	5.7 (−2.8, 14.3)	0.27	11.5** (2.4, 20.5)	0.24
	Year 2	483.5	449.0	515.5	475.8	3.3 (−6.9, 13.4)	0.56	12.2 (−1.7, 26.2)	0.52
	Year 3	483.5	449.0	516.2	491.1	−12.1* (−22.3, −1.9)	0.66	−0.4 (−19.9, 19.1)	0.88
	Year 4	483.5	449.0	519.3	489.5	−7.7 (−18.4, 2.9)	0.61	7.3 (−17.4, 31.9)	0.56
	Year 5	483.5	449.0	520.5	490.3	−7.3 (−19.4, 4.9)	0.68	10.5 (−18.9, 39.9)	0.57
	Overall	483.5	449.0	515.5	481.9	−3.3 (−8.0, 1.3)	0.38	7.9 (−0.7, 16.6)	0.24

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-MCC (weighted N=67,507)	Year 1	103	103.7	100.3	104.8	−3.7 (−19.5, 12.1)	—	−4.1 (−30.2, 22.1)	—
	Year 2	103	103.7	90.5	86.7	4.5 (−10.8, 19.7)	—	4.0 (−23.2, 31.2)	—
	Year 3	103	103.7	95.1	91	4.7 (−10.4, 19.8)	—	4.1 (−32.6, 40.8)	—
	Year 4	103	103.7	98.3	88.5	10.6 (−4.1, 25.3)	—	9.8 (−36.7, 56.4)	—
	Year 5	103	103.7	96.4	90.8	6.3 (−17.0, 29.7)	—	5.4 (−50.8, 61.7)	—
	Overall	103	103.7	96	92.6	4.1 (−3.2, 11.3)	—	3.5 (−13.0, 20.0)	—
MCC (weighted N=1,910,564)	Year 1	165.3	166.7	154.2	156.6	−1.0 (−5.3, 3.3)	0.78	2.0 (−3.1, 7.1)	0.71
	Year 2	165.3	166.7	148.3	157	−7.3*** (−11.8, −2.8)	0.21	−2.8 (−9.9, 4.3)	0.69
	Year 3	165.3	166.7	148.6	153.1	−3.1 (−8.3, 2.1)	0.36	2.6 (−6.5, 11.8)	0.95
	Year 4	165.3	166.7	141.2	153.9	−11.4*** (−17.2, −5.6)	0.01	−4.1 (−15.9, 7.6)	0.63
	Year 5	165.3	166.7	144.7	156.1	−10.0** (−16.5, −3.5)	0.26	−1.3 (−15.7, 13.1)	0.84
	Overall	165.3	166.7	147.9	155.3	−6.1*** (−8.4, −3.7)	0.02	−0.6 (−4.7, 3.5)	0.68

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

MCC status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-MCC (weighted N=98,931)	Year 1	51.1	56.8	49.9	57.5	−1.8 (−4.1, 0.6)	—	−3.0 (−6.0, 0.0)	—
	Year 2	51.1	56.8	50.9	57	−0.3 (−3.4, 2.8)	—	−2.2 (−6.6, 2.3)	—
	Year 3	51.1	56.8	54.7	57.5	3.0 (−0.2, 6.1)	—	0.5 (−4.4, 5.4)	—
	Year 4	51.1	56.8	55	58.1	2.6 (−0.3, 5.4)	—	−0.5 (−6.6, 5.6)	—
	Year 5	51.1	56.8	55.4	58.7	2.4 (−1.2, 6.1)	—	−1.3 (−7.7, 5.1)	—
	Overall	51.1	56.8	52.7	57.6	0.9 (−0.5, 2.2)	—	−1.4 (−3.6, 0.8)	—
MCC (weighted N=2,093,487)	Year 1	68.1	70.9	67.3	71.5	−1.4* (−2.7, −0.2)	0.76	−1.5* (−2.9, −0.2)	0.35
	Year 2	68.1	70.9	68.9	71.9	−0.3 (−1.7, 1.2)	0.98	−0.4 (−2.1, 1.3)	0.47
	Year 3	68.1	70.9	71.1	73.7	0.0 (−1.6, 1.6)	0.05	−0.2 (−2.1, 1.7)	0.81
	Year 4	68.1	70.9	72.4	74.5	0.5 (−1.1, 2.1)	0.11	0.3 (−1.9, 2.4)	0.82
	Year 5	68.1	70.9	73.2	75	0.8 (−0.9, 2.4)	0.35	0.5 (−2.0, 2.9)	0.63
	Overall	68.1	70.9	70.2	73.1	−0.2 (−0.9, 0.5)	0.06	−0.4 (−1.2, 0.4)	0.44

* p<0.10, **p <0.05, *** p<0.01

ED = emergency department; MCC = multiple chronic conditions; PBPM = per beneficiary per month.

(continued)

Table J-49 (continued)
Impacts on beneficiary outcomes by multiple chronic condition status, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-50
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	1,019.24	924.65	1,033.07	930.19	8.19 (−10.26, 26.64)	—	−3.80 (−22.37, 14.77)	—
	Year 2	1,019.24	924.65	1,025.04	906.09	24.25* (0.32, 48.19)	—	6.16 (−17.12, 29.45)	—
	Year 3	1,019.24	924.65	1,132.01	1,023.48	13.84 (−15.48, 43.16)	—	−10.35 (−46.07, 25.36)	—
	Year 4	1,019.24	924.65	1,128.39	1,005.56	28.14 (−4.78, 61.06)	—	−2.16 (−48.95, 44.64)	—
	Year 5	1,019.24	924.65	1,185.82	1,072.10	19.03 (−13.71, 51.76)	—	−17.37 (−92.47, 57.73)	—
	Overall	1,019.24	924.65	1,093.66	979.56	18.87** (6.27, 31.47)	—	−4.31 (−21.65, 13.02)	—
White (weighted N=7,254,735)	Year 1	930.3	866.83	927.49	877.24	−13.22** (−21.95, −4.49)	0.05	−25.75*** (−35.54, −15.96)	0.09
	Year 2	930.3	866.83	934.9	879.66	−8.23 (−18.33, 1.87)	0.02	−27.06** (−44.96, −9.16)	0.04
	Year 3	930.3	866.83	969.23	924.64	−18.88*** (−30.63, −7.12)	0.07	−44.01*** (−67.69, −20.33)	0.17
	Year 4	930.3	866.83	1,000.22	945.77	−9.02 (−23.53, 5.49)	0.06	−40.46** (−71.71, −9.20)	0.19
	Year 5	930.3	866.83	1,057.85	1,004.34	−9.96 (−27.28, 7.37)	0.11	−47.69** (−86.02, −9.37)	0.50
	Overall	930.3	866.83	969.15	917.55	−12.07*** (−17.53, −6.62)	<0.001	−35.84*** (−46.57, −25.11)	0.004

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total hospital PBPM ($)*									
Non-white (weighted N=3,027,246)	Year 1	584.51	453.03	591.57	463.75	−3.70 (−16.31, 8.91)	—	−0.82 (−13.08, 11.44)	—
	Year 2	584.51	453.03	582.83	452.07	−0.77 (−15.88, 14.34)	—	3.59 (−10.95, 18.13)	—
	Year 3	584.51	453.03	642.38	528.89	−18.03** (−32.47, −3.59)	—	−12.20 (−34.79, 10.38)	—
	Year 4	584.51	453.03	645.07	522.17	−8.62 (−26.09, 8.85)	—	−1.32 (−32.53, 29.89)	—
	Year 5	584.51	453.03	687.17	571.7	−16.06 (−45.94, 13.82)	—	−7.29 (−58.14, 43.57)	—
	Overall	584.51	453.03	624.74	501.68	−8.89* (−16.44, −1.34)	—	−3.31 (−14.72, 8.11)	—
White (weighted N=7,254,735)	Year 1	502.22	420.98	501.46	432.88	−12.65*** (−19.62, −5.69)	0.21	−16.52*** (−23.89, −9.15)	0.07
	Year 2	502.22	420.98	498.79	433.16	−15.61*** (−23.99, −7.22)	0.07	−21.42** (−36.10, −6.74)	0.02
	Year 3	502.22	420.98	515.44	462.92	−28.71*** (−37.96, −19.47)	0.23	−36.47*** (−55.09, −17.86)	0.13
	Year 4	502.22	420.98	533.05	478.35	−26.53*** (−37.59, −15.47)	0.05	−36.23*** (−58.75, −13.71)	0.06
	Year 5	502.22	420.98	577.25	522	−25.99*** (−38.84, −13.13)	0.53	−37.64** (−66.15, −9.13)	0.30
	Overall	502.22	420.98	519.44	459.54	−21.48*** (−25.75, −17.21)	0.002	−28.81*** (−36.93, −20.70)	<0.001

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Inpatient facility PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	431.45	354.01	414	347.41	−11.03 (−25.37, 3.31)	—	8.09 (−2.07, 18.24)	—
	Year 2	431.45	354.01	401.18	332.06	−8.50 (−25.18, 8.18)	—	20.36*** (7.75, 32.98)	—
	Year 3	431.45	354.01	445.79	389.69	−21.52** (−39.40, −3.64)	—	17.09 (−2.73, 36.90)	—
	Year 4	431.45	354.01	441.21	374.93	−11.34 (−25.31, 2.62)	—	37.00** (4.34, 69.66)	—
	Year 5	431.45	354.01	478.47	414.38	−13.53 (−31.00, 3.94)	—	44.56 (−11.34, 100.47)	—
	Overall	431.45	354.01	432.24	367.62	−13.22*** (−20.50, −5.93)	—	23.77*** (12.28, 35.26)	—
White (weighted N=7,254,735)	Year 1	363.01	316.29	347.5	312.31	−11.56*** (−17.69, −5.43)	0.94	−4.51 (−11.66, 2.63)	0.09
	Year 2	363.01	316.29	340.54	307.14	−13.35*** (−19.68, −7.02)	0.61	−2.76 (−15.74, 10.23)	0.01
	Year 3	363.01	316.29	349.64	326.12	−23.23*** (−29.88, −16.59)	0.88	−9.09 (−25.98, 7.79)	0.04
	Year 4	363.01	316.29	358.86	331.44	−19.33*** (−27.00, −11.65)	0.36	−1.64 (−22.62, 19.33)	0.02
	Year 5	363.01	316.29	393.56	362.24	−15.43*** (−24.92, −5.95)	0.86	5.79 (−21.04, 32.62)	0.17
	Overall	363.01	316.29	354.07	323.99	−16.73*** (−19.90, −13.56)	0.40	−3.36 (−10.84, 4.11)	<0.001

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	38.19	21.13	48.77	27.04	4.73** (1.36, 8.09)	—	−4.23*** (−5.94, −2.51)	—
	Year 2	38.19	21.13	50.83	27.46	6.35** (2.12, 10.58)	—	−7.16*** (−10.22, −4.10)	—
	Year 3	38.19	21.13	53.32	31.25	5.05** (1.32, 8.78)	—	−13.02*** (−18.28, −7.76)	—
	Year 4	38.19	21.13	55.75	32.59	6.15*** (2.42, 9.88)	—	−16.48*** (−24.17, −8.78)	—
	Year 5	38.19	21.13	57.34	33.91	6.41*** (2.45, 10.37)	—	−20.78*** (−30.60, −10.95)	—
	Overall	38.19	21.13	52.87	30.14	5.68*** (3.95, 7.42)	—	−11.63*** (−14.18, −9.08)	—
White (weighted N=7,254,735)	Year 1	27.55	18.16	33.23	22.93	0.93 (−0.20, 2.05)	0.04	−3.69*** (−5.01, −2.37)	0.56
	Year 2	27.55	18.16	34.96	22.98	2.60** (0.93, 4.27)	0.04	−4.34*** (−6.26, −2.41)	0.13
	Year 3	27.55	18.16	36.58	24.91	2.30*** (1.07, 3.53)	0.20	−6.96*** (−9.70, −4.22)	0.02
	Year 4	27.55	18.16	39.98	26.11	4.49*** (2.94, 6.05)	0.47	−7.09*** (−10.28, −3.89)	0.01
	Year 5	27.55	18.16	40.94	27.66	3.91*** (2.10, 5.72)	0.34	−9.99*** (−13.98, −6.01)	0.03
	Overall	27.55	18.16	36.73	24.61	2.73*** (2.07, 3.39)	0.002	−6.02*** (−7.18, −4.86)	<0.001

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Other hospital outpatient department PBPM ($)									
Non-white (weighted N=3,027,246)	Year 1	114.86	77.89	128.8	89.3	2.61 (−2.16, 7.38)	—	−4.68* (−8.82, −0.54)	—
	Year 2	114.86	77.89	130.82	92.55	1.38 (−5.61, 8.37)	—	−9.61** (−15.97, −3.26)	—
	Year 3	114.86	77.89	143.27	107.95	−1.57 (−9.93, 6.80)	—	−16.27*** (−24.85, −7.70)	—
	Year 4	114.86	77.89	148.12	114.65	−3.42 (−15.36, 8.51)	—	−21.84*** (−31.70, −11.98)	—
	Year 5	114.86	77.89	151.36	123.41	−8.94 (−21.06, 3.17)	—	−31.08*** (−44.47, −17.68)	—
	Overall	114.86	77.89	139.63	103.92	−1.35 (−5.42, 2.71)	—	−15.44*** (−19.20, −11.69)	—
White (weighted N=7,254,735)	Year 1	111.67	86.53	120.73	97.64	−2.02 (−5.17, 1.14)	0.05	−8.32*** (−10.95, −5.69)	0.18
	Year 2	111.67	86.53	123.29	103.04	−4.86** (−8.87, −0.85)	0.03	−14.33*** (−18.52, −10.13)	0.20
	Year 3	111.67	86.53	129.22	111.89	−7.78** (−13.36, −2.20)	0.05	−20.42*** (−25.95, −14.89)	0.44
	Year 4	111.67	86.53	134.21	120.8	−11.70*** (−19.11, −4.28)	0.08	−27.50*** (−35.41, −19.59)	0.39
	Year 5	111.67	86.53	142.75	132.1	−14.46*** (−21.91, −7.00)	0.31	−33.43*** (−43.35, −23.52)	0.77
	Overall	111.67	86.53	128.65	110.94	−7.48*** (−9.98, −4.98)	<0.001	−19.43*** (−22.08, −16.77)	0.07

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
All-cause acute inpatient admissions per 1,000 population									
Non-white (weighted N=3,027,246)	Year 1	371.7	340.7	331.6	307.7	−4.6 (−15.7, 6.6)	—	−9.8 (−21.4, 1.7)	—
	Year 2	371.7	340.7	305.6	293.5	−15.5** (−27.5, −3.6)	—	−23.3*** (−36.7, −9.8)	—
	Year 3	371.7	340.7	315.8	308.0	−18.8** (−32.5, −5.1)	—	−28.3*** (−44.9, −11.8)	—
	Year 4	371.7	340.7	290.0	298.2	−34.0*** (−49.8, −18.3)	—	−46.1*** (−68.1, −24.1)	—
	Year 5	371.7	340.7	311.1	321.6	−37.0*** (−49.7, −24.2)	—	−52.0*** (−80.0, −24.0)	—
	Overall	371.7	340.7	310.3	304.1	−20.8*** (−26.9, −14.7)	—	−30.3*** (−38.4, −22.2)	—
White (weighted N=7,254,735)	Year 1	312.4	322.3	288.1	295.6	1.5 (−3.3, 6.2)	0.38	−4.3 (−9.8, 1.3)	0.42
	Year 2	312.4	322.3	273.5	287.5	−5.4* (−10.4, −0.5)	0.13	−14.0** (−23.1, −5.0)	0.25
	Year 3	312.4	322.3	273.3	290.5	−8.2** (−13.5, −2.9)	0.17	−19.3*** (−31.2, −7.4)	0.33
	Year 4	312.4	322.3	264.1	291.2	−17.9*** (−24.4, −11.5)	0.07	−32.1*** (−48.5, −15.6)	0.29
	Year 5	312.4	322.3	280.8	312.7	−21.3*** (−29.5, −13.1)	0.04	−39.0*** (−59.4, −18.6)	0.48
	Overall	312.4	322.3	275.4	293.6	−9.1*** (−11.6, −6.5)	0.001	−19.9*** (−25.5, −14.3)	0.04

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits per 1,000 population									
Non-white (weighted N=3,027,246)	Year 1	606.7	528.4	644.6	538.5	26.3*** (14.1, 38.5)	—	20.2** (6.4, 34.0)	—
	Year 2	606.7	528.4	647.5	543.6	23.6*** (9.7, 37.5)	—	14.2 (−6.8, 35.2)	—
	Year 3	606.7	528.4	649.0	567.1	−1.8 (−13.7, 10.0)	—	−13.9 (−41.1, 13.3)	—
	Year 4	606.7	528.4	637.1	557.6	−2.9 (−17.0, 11.2)	—	−18.3 (−56.8, 20.2)	—
	Year 5	606.7	528.4	634.7	556.6	−4.0 (−21.9, 13.8)	—	−22.2 (−68.9, 24.6)	—
	Overall	606.7	528.4	643.3	552.5	9.0** (2.9, 15.2)	—	−2.7 (−16.0, 10.6)	—
White (weighted N=7,254,735)	Year 1	386.4	367.4	399.5	382.8	−3.0 (−9.8, 3.9)	<0.001	6.5 (−1.5, 14.6)	0.10
	Year 2	386.4	367.4	406.3	391.2	−5.0 (−13.7, 3.7)	<0.001	9.7 (−2.2, 21.5)	0.72
	Year 3	386.4	367.4	403.5	400.1	−16.9*** (−26.8, −7.0)	0.05	2.7 (−14.2, 19.5)	0.30
	Year 4	386.4	367.4	410.3	401.4	−11.8* (−22.6, −1.0)	0.32	13.0 (−7.2, 33.2)	0.14
	Year 5	386.4	367.4	408.6	399.1	−11.0 (−22.8, 0.8)	0.51	18.2 (−5.5, 41.8)	0.13
	Overall	386.4	367.4	405.3	394.5	−9.4*** (−13.7, −5.1)	<0.001	9.1** (1.9, 16.3)	0.13

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Non-white (weighted N=546,784)	Year 1	183	182	172	167.6	3.5 (−4.4, 11.5)	—	8.2 (−3.5, 20.0)	—
	Year 2	183	182	167.2	167	−0.7 (−7.9, 6.4)	—	6.3 (−7.3, 20.0)	—
	Year 3	183	182	169.6	164.9	3.6 (−5.3, 12.5)	—	12.6 (−5.1, 30.2)	—
	Year 4	183	182	154.8	166.1	−12.1** (−21.6, −2.6)	—	−0.8 (−22.9, 21.4)	—
	Year 5	183	182	157.7	166.3	−9.4 (−20.2, 1.4)	—	4.0 (−22.7, 30.6)	—
	Overall	183	182	165.2	166.4	−2.1 (−6.1, 1.8)	—	6.4 (−1.6, 14.4)	—
White (weighted N=1,434,038)	Year 1	155.5	157.5	145	149.8	−2.9 (−7.1, 1.3)	0.19	−0.6 (−5.7, 4.5)	0.26
	Year 2	155.5	157.5	138.5	149.5	−9.3*** (−13.8, −4.7)	0.05	−5.8 (−13.4, 1.7)	0.20
	Year 3	155.5	157.5	138.1	145.5	−5.5* (−10.7, −0.4)	0.06	−1.1 (−10.9, 8.6)	0.26
	Year 4	155.5	157.5	134.1	145.9	−10.1*** (−16.0, −4.1)	0.72	−4.6 (−17.2, 8.1)	0.8
	Year 5	155.5	157.5	137.7	149.1	−9.5** (−16.5, −2.5)	0.99	−2.9 (−19.0, 13.2)	0.71
	Overall	155.5	157.5	138.9	147.9	−7.1*** (−9.5, −4.8)	0.03	−3.0 (−7.4, 1.4)	0.08

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Race	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Non-white (weighted N=709,327)	Year 1	62.5	65.1	61.4	65.6	−1.6 (−3.4, 0.2)	—	−2.8** (−4.8, −0.8)	—
	Year 2	62.5	65.1	63.5	66.4	−0.3 (−2.5, 1.9)	—	−2.1 (−4.8, 0.7)	—
	Year 3	62.5	65.1	66.6	68.8	0.2 (−1.9, 2.4)	—	−2.0 (−5.1, 1.0)	—
	Year 4	62.5	65.1	67.6	68.9	1.2 (−1.0, 3.4)	—	−1.6 (−5.2, 2.0)	—
	Year 5	62.5	65.1	68.2	68.4	2.2 (−0.2, 4.6)	—	−1.2 (−5.4, 3.1)	—
	Overall	62.5	65.1	65.1	67.5	0.1 (−0.9, 1.0)	—	−2.0** (−3.4, −0.7)	—
White (weighted N=1,486,075)	Year 1	69.6	72.6	68.9	73.3	−1.4* (−2.6, −0.1)	0.79	−1.0 (−2.4, 0.3)	0.11
	Year 2	69.6	72.6	70.3	73.5	−0.3 (−1.7, 1.2)	0.96	0.3 (−1.5, 2.0)	0.17
	Year 3	69.6	72.6	72.2	75	0.1 (−1.6, 1.8)	0.92	0.8 (−1.3, 2.9)	0.14
	Year 4	69.6	72.6	73.6	76.1	0.3 (−1.4, 2.0)	0.46	1.1 (−1.2, 3.4)	0.25
	Year 5	69.6	72.6	74.4	77.1	0.1 (−1.6, 1.9)	0.11	1.1 (−1.6, 3.8)	0.44
	Overall	69.6	72.6	71.5	74.7	−0.3 (−1.0, 0.4)	0.49	0.3 (−0.6, 1.2)	0.006

* p<0.10, ** p<0.05, *** p<0.01

ED = emergency department; PBPM = per beneficiary per month.

(continued)

Table J-50 (continued)
Impacts on beneficiary outcomes by race, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Table J-51
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total PBPM ($)									
Rural (weighted N=460,143)	Year 1	905.44	777.59	944.68	777.45	39.43** (12.19, 66.67)	—	13.18 (−16.87, 43.22)	—
	Year 2	905.44	777.59	923.3	779.8	15.70 (−18.01, 49.42)	—	−23.77 (−77.02, 29.47)	—
	Year 3	905.44	777.59	949.17	822.62	−1.25 (−25.20, 22.69)	—	−53.96** (−98.20, −9.72)	—
	Year 4	905.44	777.59	953.5	819.2	6.50 (−23.67, 36.68)	—	−59.43 (−134.57, 15.70)	—
	Year 5	905.44	777.59	1,017.51	872.27	17.44 (−27.17, 62.05)	—	−61.73 (−150.67, 27.22)	—
	Overall	905.44	777.59	951.01	808.22	15.26* (1.44, 29.07)	—	−34.60** (−60.31, −8.89)	—
Urban (weighted N=9,814,131)	Year 1	956.45	890.74	956.93	899.53	−8.33 (−17.57, 0.91)	0.006	−20.25*** (−30.29, −10.21)	0.08
	Year 2	956.45	890.74	960.93	893.69	1.52 (−11.09, 14.12)	0.51	−16.42* (−32.66, −0.18)	0.83
	Year 3	956.45	890.74	1,019.58	960.51	−6.66 (−21.00, 7.69)	0.75	−30.61** (−56.37, −4.84)	0.45
	Year 4	956.45	890.74	1,040.75	970.75	4.27 (−12.90, 21.43)	0.91	−25.70 (−57.23, 5.83)	0.49
	Year 5	956.45	890.74	1,098.21	1,031.55	0.93 (−19.95, 21.82)	0.57	−35.05 (−78.29, 8.19)	0.66
	Overall	956.45	890.74	1,006.75	942.56	−1.88 (−8.42, 4.65)	0.06	−24.63*** (−35.83, −13.42)	0.55

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Total hospital PBPM ($)*									
Rural (weighted N=460,143)	Year 1	528.6	397.94	569.24	398.47	40.20*** (16.66, 63.74)	—	5.75 (−21.26, 32.76)	—
	Year 2	528.6	397.94	538.09	399.38	8.14 (−20.20, 36.48)	—	−43.67 (−88.98, 1.63)	—
	Year 3	528.6	397.94	546.6	423.9	−7.87 (−23.76, 8.02)	—	−77.04*** (−121.21, −32.88)	—
	Year 4	528.6	397.94	554.3	425.43	−1.71 (−23.89, 20.48)	—	−88.24** (−160.83, −15.65)	—
	Year 5	528.6	397.94	604.46	463.33	10.56 (−23.34, 44.45)	—	−93.34* (−179.12, −7.56)	—
	Overall	528.6	397.94	557.84	417.79	9.66 (−1.20, 20.52)	—	−55.78*** (−80.02, −31.53)	—
Urban (weighted N=9,814,131)	Year 1	524.1	434.1	524.14	445.45	−11.32*** (−18.44, −4.19)	<0.001	−12.35*** (−19.52, −5.18)	0.29
	Year 2	524.1	434.1	521.06	441.93	−10.88* (−20.45, −1.30)	0.29	−12.43 (−25.11, 0.26)	0.28
	Year 3	524.1	434.1	552.34	485.99	−23.66*** (−34.13, −13.18)	0.17	−25.73** (−44.45, −7.00)	0.08
	Year 4	524.1	434.1	565.82	495.24	−19.43*** (−32.47, −6.39)	0.24	−22.01 (−44.85, 0.82)	0.15
	Year 5	524.1	434.1	609.23	540.67	−21.44* (−39.60, −3.29)	0.15	−24.55** (−56.21, 7.11)	0.22
	Overall	524.1	434.1	548.8	475.51	−16.97** (−21.99, −11.94)	<0.001	−18.93*** (−27.13, −10.73)	0.02

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Inpatient facility PBPM ($)									
Rural (weighted N=460,143)	Year 1	370.38	300.58	377.27	289.99	17.48 (−0.30, 35.26)	—	11.16 (−18.42, 40.74)	—
	Year 2	370.38	300.58	343.79	288.66	−14.67 (−39.73, 10.38)	—	−24.17 (−76.82, 28.47)	—
	Year 3	370.38	300.58	340.4	301.49	−30.89*** (−44.40, −17.38)	—	−43.57 (−96.56, 9.42)	—
	Year 4	370.38	300.58	340.22	297.64	−27.22** (−44.93, −9.51)	—	−43.08 (−123.53, 37.37)	—
	Year 5	370.38	300.58	374.96	326.54	−21.38 (−51.38, 8.61)	—	−40.42 (−135.70, 54.86)	—
	Overall	370.38	300.58	353.05	298.15	−14.80*** (−23.87, −5.72)	—	−26.79 (−54.26, 0.68)	—
Urban (weighted N=9,814,131)	Year 1	382.33	329.82	365.37	324.96	−12.15*** (−19.42, −4.88)	0.01	−1.22 (−7.93, 5.48)	0.50
	Year 2	382.33	329.82	357.86	316.44	−11.14** (−19.23, −3.06)	0.83	5.30 (−6.02, 16.61)	0.37
	Year 3	382.33	329.82	379.23	347.3	−20.64*** (−28.27, −13.02)	0.29	1.31 (−15.71, 18.33)	0.19
	Year 4	382.33	329.82	384.52	346.85	−14.89*** (−22.27, −7.52)	0.28	12.57 (−10.22, 35.37)	0.27
	Year 5	382.33	329.82	420.18	380.22	−12.61** (−22.93, −2.29)	0.64	20.38 (−13.29, 54.04)	0.32
	Overall	382.33	329.82	377.33	339.15	−14.51*** (−18.07, −10.94)	0.94	6.34 (−1.65, 14.34)	0.06

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits PBPM ($)									
Rural (weighted N=460,143)	Year 1	30.55	21.25	36.7	25.84	1.58 (−2.10, 5.27)	—	−3.57** (−5.93, −1.22)	—
	Year 2	30.55	21.25	38.35	24.86	4.21** (1.17, 7.25)	—	−3.55 (−8.63, 1.53)	—
	Year 3	30.55	21.25	40.68	27.13	4.27 (−0.35, 8.90)	—	−6.08 (−12.93, 0.76)	—
	Year 4	30.55	21.25	44.66	28.1	7.27*** (3.97, 10.57)	—	−5.68 (−14.65, 3.29)	—
	Year 5	30.55	21.25	44.17	28.79	6.10** (2.03, 10.16)	—	−9.46* (−18.14, −0.78)	—
	Overall	30.55	21.25	40.56	26.76	4.54*** (2.83, 6.25)	—	−5.26*** (−8.23, −2.29)	—
Urban (weighted N=9,814,131)	Year 1	30.45	19.22	37.66	24.22	2.23** (0.51, 3.96)	0.79	−3.77*** (−5.10, −2.44)	0.90
	Year 2	30.45	19.22	39.55	24.43	3.91** (1.26, 6.57)	0.90	−5.11*** (−7.05, −3.18)	0.63
	Year 3	30.45	19.22	41.47	26.87	3.40*** (1.37, 5.42)	0.77	−8.66*** (−11.87, −5.46)	0.57
	Year 4	30.45	19.22	44.57	28.12	5.24*** (3.23, 7.24)	0.37	−9.85*** (−14.10, −5.59)	0.48
	Year 5	30.45	19.22	45.83	29.62	5.01*** (2.93, 7.08)	0.69	−13.11*** (−18.52, −7.69)	0.55
	Overall	30.45	19.22	41.42	26.33	3.86*** (2.88, 4.83)	0.55	−7.59*** (−9.03, −6.15)	0.24

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Other hospital outpatient department PBPM ($)									
Rural (weighted N=460,143)	Year 1	127.66	76.1	155.27	82.64	21.14*** (13.01, 29.26)	—	−1.84 (−8.09, 4.41)	—
	Year 2	127.66	76.1	155.96	85.86	18.61*** (7.17, 30.05)	—	−15.95*** (−21.88, −10.02)	—
	Year 3	127.66	76.1	165.52	95.27	18.75*** (7.12, 30.38)	—	−27.39*** (−40.88, −13.91)	—
	Year 4	127.66	76.1	169.43	99.69	18.24*** (9.37, 27.11)	—	−39.48*** (−54.30, −24.66)	—
	Year 5	127.66	76.1	185.34	108	25.85*** (13.41, 38.28)	—	−43.46*** (−64.30, −22.62)	—
	Overall	127.66	76.1	164.22	92.88	19.92*** (15.20, 24.64)	—	−23.73*** (−29.11, −18.34)	—
Urban (weighted N=9,814,131)	Year 1	111.33	85.06	121.1	96.27	−1.40 (−5.20, 2.40)	<0.001	−7.35*** (−9.80, −4.91)	0.18
	Year 2	111.33	85.06	123.65	101.07	−3.65 (−8.96, 1.66)	0.004	−12.61*** (−16.90, −8.32)	0.46
	Year 3	111.33	85.06	131.64	111.82	−6.41 (−13.61, 0.79)	0.002	−18.38*** (−23.91, −12.85)	0.32
	Year 4	111.33	85.06	136.73	120.27	−9.77* (−19.26, −0.28)	<0.001	−24.74*** (−32.02, −17.46)	0.15
	Year 5	111.33	85.06	143.21	130.82	−13.84*** (−23.14, −4.55)	<0.001	−31.82*** (−41.38, −22.26)	0.41
	Overall	111.33	85.06	130.06	110.03	−6.32** (−9.54, −3.10)	<0.001	−17.68*** (−20.25, −15.11)	0.09

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
All-cause acute inpatient admissions per 1,000 population									
Rural (weighted N=460,143)	Year 1	311.3	336.2	293.0	298.9	16.0** (4.1, 27.9)	—	17.5 (−1.1, 36.1)	—
	Year 2	311.3	336.2	277.5	288.8	10.3 (−4.0, 24.5)	—	12.5 (−20.1, 45.1)	—
	Year 3	311.3	336.2	271.0	297.7	−4.7 (−18.3, 8.9)	—	−1.8 (−44.1, 40.6)	—
	Year 4	311.3	336.2	255.5	293.4	−16.6 (−36.2, 3.0)	—	−12.9 (−68.5, 42.6)	—
	Year 5	311.3	336.2	252.6	312.7	−36.6*** (−56.8, −16.4)	—	−32.0 (−96.0, 31.9)	—
	Overall	311.3	336.2	271.7	296.7	−3.0 (−10.1, 4.1)	—	−0.2 (−19.3, 18.8)	—
Urban (weighted N=9,814,131)	Year 1	328.9	328.2	300.2	299.9	−0.5 (−5.7, 4.8)	0.04	−6.9* (−12.7, −1.1)	0.04
	Year 2	328.9	328.2	282.3	290.3	−8.9** (−15.3, −2.5)	0.04	−18.4*** (−27.3, −9.5)	0.13
	Year 3	328.9	328.2	285.7	296.1	−10.7*** (−17.4, −3.9)	0.52	−22.7*** (−34.4, −11.1)	0.43
	Year 4	328.9	328.2	271.7	294.0	−22.4*** (−30.7, −14.1)	0.65	−37.7*** (−53.4, −22.0)	0.47
	Year 5	328.9	328.2	290.7	315.9	−24.5*** (−32.8, −16.1)	0.35	−43.6*** (−62.3, −24.9)	0.77
	Overall	328.9	328.2	285.5	297.4	−12.3*** (−15.4, −9.1)	0.05	−24.1*** (−29.5, −18.7)	0.05

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
ED visits per 1,000 population									
Rural (weighted N=460,143)	Year 1	520.3	482.3	531.3	515.6	−24.0** (−43.2, −4.8)	—	−31.6* (−61.3, −1.9)	—
	Year 2	520.3	482.3	558.5	525.7	−8.3 (−38.3, 21.6)	—	−20.3 (−66.6, 26.1)	—
	Year 3	520.3	482.3	546.3	545.5	−40.6* (−80.2, −0.9)	—	−56.8* (−105.9, −7.8)	—
	Year 4	520.3	482.3	548.1	545.2	−39.5* (−74.2, −4.7)	—	−60.4 (−126.7, 6.0)	—
	Year 5	520.3	482.3	566.0	523.1	1.7 (−46.0, 49.4)	—	−22.4 (−91.2, 46.5)	—
	Overall	520.3	482.3	548.3	532.0	−24.8*** (−39.9, −9.6)	—	−40.1*** (−63.5, −16.7)	—
Urban (weighted N=9,814,131)	Year 1	443.7	412.6	464.0	426.0	5.9 (−2.0, 13.9)	0.02	12.4** (4.1, 20.7)	0.02
	Year 2	443.7	412.6	469.3	433.8	2.8 (−6.7, 12.3)	0.56	12.8* (0.3, 25.3)	0.25
	Year 3	443.7	412.6	468.3	445.8	−10.9* (−20.2, −1.5)	0.23	2.2 (−15.6, 20.1)	0.06
	Year 4	443.7	412.6	470.4	444.5	−7.6 (−17.9, 2.8)	0.15	9.1 (−13.9, 32.2)	0.10
	Year 5	443.7	412.6	467.8	443.3	−8.8 (−20.3, 2.7)	0.72	10.9 (−16.1, 37.9)	0.45
	Overall	443.7	412.6	468.0	438.2	−3.2 (−7.6, 1.1)	0.02	9.3* (1.3, 17.3)	<0.001

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Unplanned readmissions within 30 days of discharge per 1,000 discharges									
Rural (weighted N=86,391)	Year 1	142.2	167.1	142.6	162.5	4.5 (−13.7, 22.7)	—	8.6 (−6.5, 23.7)	—
	Year 2	142.2	167.1	133.6	162.7	−4.9 (−23.7, 14.0)	—	1.3 (−13.9, 16.5)	—
	Year 3	142.2	167.1	126.8	156.1	−5.8 (−29.2, 17.7)	—	1.9 (−21.7, 25.5)	—
	Year 4	142.2	167.1	118.9	155.9	−13.8 (−36.5, 8.8)	—	−4.2 (−30.6, 22.2)	—
	Year 5	142.2	167.1	117.4	166.3	−24.4 (−50.9, 2.1)	—	−12.4 (−40.7, 16.0)	—
	Overall	142.2	167.1	129.8	160.1	−6.3 (−16.0, 3.5)	—	0.9 (−8.6, 10.5)	—
Urban (weighted N=1,893,319)	Year 1	163.8	164	152.7	154.1	−1.3 (−5.6, 3.0)	0.61	1.9 (−3.3, 7.0)	0.49
	Year 2	163.8	164	146.8	153.8	−6.9** (−11.4, −2.4)	0.86	−2.2 (−9.4, 5.0)	0.74
	Year 3	163.8	164	147.6	150.3	−2.5 (−7.8, 2.7)	0.82	3.5 (−5.8, 12.8)	0.92
	Year 4	163.8	164	140.6	151.1	−10.4*** (−16.3, −4.4)	0.81	−2.8 (−14.8, 9.2)	0.94
	Year 5	163.8	164	144.1	152.9	−8.5** (−15.0, −2.1)	0.33	0.6 (−14.3, 15.4)	0.51
	Overall	163.8	164	146.7	152.4	−5.5*** (−7.9, −3.2)	0.85	0.2 (−4.0, 4.3)	0.94

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Residency status	Period	Baseline period adjusted mean, Maryland	Baseline period adjusted mean, comparison group	All-Payer Model period adjusted mean, Maryland	All-Payer Model period adjusted mean, comparison group	Regression-adjusted difference-in-differences assuming parallel trends (90% confidence interval)	p-value for test of equality across subgroups assuming parallel trends	Regression-adjusted difference-in-differences assuming differential trends (90% confidence interval)	p-value for test of equality across subgroups assuming differential trends
Percentage of discharges with a follow-up visit within 14 days of discharge									
Rural (weighted N=93,092)	Year 1	64.9	66.6	64.9	68	−1.3 (−3.1, 0.4)	—	−0.4 (−3.4, 2.5)	—
	Year 2	64.9	66.6	67.2	67	1.8 (−1.2, 4.9)	—	3.2 (−1.8, 8.2)	—
	Year 3	64.9	66.6	68.3	70.5	−0.5 (−3.7, 2.7)	—	1.2 (−4.3, 6.8)	—
	Year 4	64.9	66.6	69.6	73.1	−1.9 (−4.7, 1.0)	—	0.2 (−5.8, 6.2)	—
	Year 5	64.9	66.6	71.2	72.1	0.7 (−3.2, 4.5)	—	3.2 (−4.6, 11.0)	—
	Overall	64.9	66.6	67.7	69.8	−0.3 (−1.6, 1.0)	—	1.2 (−1.1, 3.6)	—
Urban (weighted N=2,101,200)	Year 1	67.4	70.4	66.5	71	−1.48 (−2.8, −0.1)	0.94	−1.7** (−3.0, −0.3)	0.51
	Year 2	67.4	70.4	68.1	71.4	−0.4 (−1.9, 1.2)	0.25	−0.7 (−2.4, 1.0)	0.20
	Year 3	67.4	70.4	70.4	73.1	0.2 (−1.5, 1.9)	0.73	−0.2 (−2.2, 1.7)	0.67
	Year 4	67.4	70.4	71.7	73.8	0.7 (−0.9, 2.3)	0.16	0.2 (−2.0, 2.3)	0.99
	Year 5	67.4	70.4	72.5	74.4	0.9 (−0.9, 2.6)	0.93	0.2 (−2.3, 2.7)	0.54
	Overall	67.4	70.4	69.5	72.5	−0.1 (−0.9, 0.6)	0.81	−0.6 (−1.4, 0.3)	0.22

* p<0.10, ** p<0.05, *** p<0.01

ED = emergency department; PBPM = per beneficiary per month.

(continued)

Table J-51 (continued)
Impacts on beneficiary outcomes by residency, first 4.5 years of Maryland All-Payer Model implementation

Methods: A weighted least squares model was used to obtain estimates of the difference in expenditure measures. A negative binomial model was used to obtain estimates of the differences in the number of all-cause acute inpatient admissions and ED visits. A logistic model was used to obtain estimates of the differences in probability of unplanned readmissions within 30 days of discharge and percentage of discharges with a follow-up visit within 14 days. Number of admissions and number of ED visits estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Probability of any unplanned readmissions estimates were multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Probability of a 14-day follow-up visit estimates were multiplied by 100 to obtain a percentage.

Models adjusted for person-level variables (age category, gender, race, dual Medicare-Medicaid eligibility status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, hierarchical condition category risk score, number of chronic conditions in the previous year) and county-level variables (metropolitan/non-metropolitan, population density per square mile, percentage uninsured, percentage without high school diploma, percentage with a college degree, percentage in poverty, and supply of short-term, acute care hospital beds and primary care physicians). The models for readmissions and 14-day follow-up included all previously mentioned covariates, as well as the hospital covariates: resident-to-bed ratio, number of beds, and disproportionate share hospital (DSH) percentage.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after implementation of the All-Payer Model in Maryland relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in Maryland than in the comparison group. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the change of an outcome between the subgroups.

NOTES: The same baseline period is used for the D-in-D estimate for all implementation periods, so the adjusted mean is the same for each year and for the implementation period overall. For continuous outcomes estimated using linear models, the year-specific regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights for these estimates. For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See ***Appendix A*** for additional detail.

* Total hospital PBPM includes payments for inpatient facility services, ED visits, observation stays, and other hospital outpatient department services.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

APPENDIX K:
DATA VALIDATION

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K.1 Validating Diagnosis Data in Medicare Claims

Payment for inpatient admissions to Maryland hospitals is not based on the DRG as in the IPPS. As such, there are concerns that diagnosis codes are underreported in Maryland Medicare claims, and MS-DRG[40] weights are therefore lower than in states where hospitals are paid under IPPS. To test the completeness of diagnosis codes and accuracy of DRGs in Maryland Medicare claims, we compared diagnosis information contained in Maryland's hospital discharge data to the diagnosis information in Medicare claims data. The hospital discharge dataset contains discharge medical record abstract and billing data for all inpatient admissions in the state annually. Because the diagnosis information comes directly from abstracted medical records, the diagnosis codes are expected to be accurate in the discharge dataset. In the Third Annual Report, we reported the findings for the baseline period and first 3 years of the All-Payer Model (2011 through 2016). In this report, we add the findings for 2017 and 2018 (using data for January 2017 through June 2018). To make the comparison, we first linked data from the two datasets together using a set of common variables. We then compared the diagnosis codes and MS-DRG values reported for the same inpatient admissions. This appendix details the data merge and results of the diagnosis code and DRG validation.

K.1.1 Linking Medicare Claims and HSCRC Discharge Data

There are no unique identifiers common to both Medicare claims data and Maryland's hospital discharge data. We therefore linked the two databases using variables common to both datasets. To do so, we used a deterministic linking method—that is, we required the discharges to match exactly on the set of common variables. Using the deterministic method may result in fewer matches than a "fuzzy matching" approach; however, the matches are more accurate. We used this approach because the accuracy of the match (specificity) was more important for validating the diagnosis codes than being able to match the complete set of records (sensitivity). That is, although we needed to be able to link a representative sample of discharges to validate the diagnosis codes, we did not need to link all the discharges to validate the diagnosis data. We subset (or "blocked") each dataset first because blocking has been shown to improve accuracy when linking data without unique identifiers. We subset the hospital discharge data to cases where Medicare fee-for-service was expected to be the primary payer and the patient was a Maryland resident, and we subset the Medicare claims to inpatient admissions at Maryland hospitals where the patient was a Maryland resident. We then linked the data based on the following six variables common to both datasets: hospital identifier, admission date, discharge date, date of birth, gender, and beneficiary ZIP code.

Of the 1,714,653 records in the Medicare claims during the 7.5 years of data, 71 percent (n=1,222,276) linked to discharges in the discharge dataset. We tested the accuracy of the link by manually reviewing a subset of cases that linked to validate that they were true matches. We found that 100 percent of the cases tested by the "gold standard" of manual review were valid matches. Records that did not link were because one of the six fields listed above did not match

[40] Maryland hospital discharge data provide both the APR DRG and the MS-DRG weights. To ensure comparability with the Medicare claims data, we used the MS-DRG weight from the discharge data to make the comparison.

exactly. As such, we expect no systematic difference between records that linked and those that did not because inexact matches are random rather than systematic.

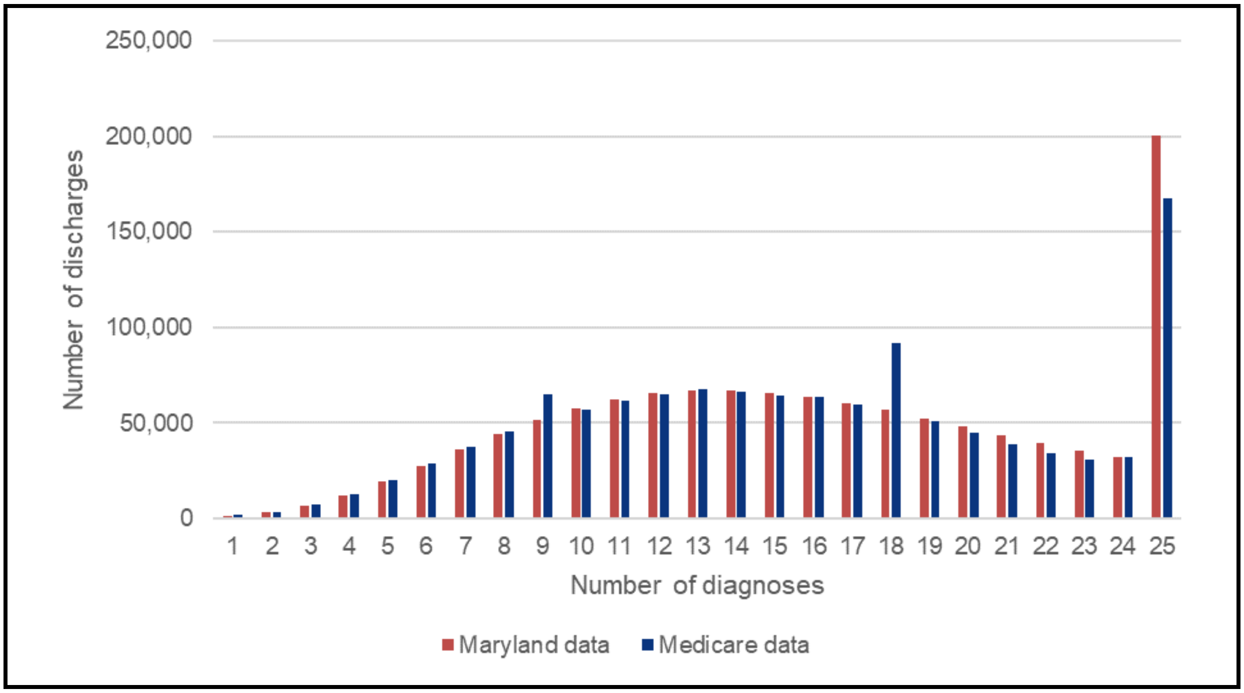
K.1.2 Validation Results

We expect that if diagnosis codes are underreported in Medicare claims data, that there will be more diagnosis codes per discharge in the discharge data than in the Medicare claims data. We found that the average number of diagnosis codes per discharge in the discharge data was higher than the average number in the Medicare data from 2011 through 2016, although the magnitude of the difference was small and decreased over time (***Table K-1***). The number of diagnoses per discharge increased over time in both discharge data and Medicare claims, but the number increased more in Medicare data. As a result, by 2017 the average number of diagnosis codes in the Medicare claims data exceeded the average number of diagnosis codes in the discharge data. The distribution of the number of diagnosis codes per discharge shows that, with a few exceptions, the distribution of the number of diagnosis codes per discharge was similar between the two datasets (***Figure K-1***).

Table K-1
Average number of diagnosis codes per discharge for Maryland discharge data and Medicare claims by year

Year	N	Discharge data	Medicare claims
2011	174,336	15.3	13.9
2012	162,994	15.5	14.8
2013	162,433	15.7	15.2
2014	163,977	16.0	15.5
2015	162,554	16.3	16.0
2016	162,167	16.4	16.2
2017	156,310	17.2	17.7
2018	77,505	17.7	18.2
Overall		**16.3**	**15.9**

Figure K-1
Distribution of the number of diagnosis codes per discharge for Maryland hospital discharge data and Medicare claims data



Diagnosis codes in Maryland claims may also be undercoded or inaccurate. In addition to testing whether the number of diagnosis codes was different, we also tested whether the diagnosis codes and MS-DRG values were the same in the hospital discharge data and the Medicare claims data. We found the primary diagnosis code and the MS-DRG value were the same in approximately 96 percent and 95 percent of the discharges, respectively, for the 7.5 years overall. The percentage of discharges where the primary diagnosis code and the MS-DRG value was the same increased to 98 percent and 97 percent of the discharges, respectively, by 2018. Likewise, the case-mix severity index, as measured by the MS-DRG weight, was similar in the two datasets (1.52 vs. 1.50). These findings taken together indicate that the bias from underreporting diagnoses in claims data is minimal.

K.2 Commercial Data Comparison

A comparison of Maryland's commercially insured population with a similar commercially insured population in other states is an important component of the Maryland All-Payer Model evaluation. However, there is not an ideal data source for outcomes for the commercially insured population. To ensure comparability between groups, we used MarketScan data for both Maryland and the comparison group. However, MarketScan is a convenience sample that is not representative of the entire commercially insured population. Because the data overrepresent large employers, employer-sponsored insurance is not necessarily accurately represented for each state. As such, the results from the MarketScan analyses may not be generalizable to all commercially insured populations in Maryland.

We calculated selected outcomes (total, total hospital, inpatient, emergency department [ED], and other hospital outpatient per member per month [PMPM] expenditures; inpatient admissions per 1,000 population; and ED visits per 1,000 population) for the Maryland commercially insured population included in Maryland's Medical Care Data Base (MCDB) and compared them with outcomes from MarketScan data. The MCDB is the private insurer portion of Maryland's all-payer claims database. The MCDB excludes self-insured Employee Retirement Income Security Act (ERISA) health plans beginning in 2015 because of the Supreme Court ruling in Gobeille v. Liberty Mutual Insurance Company.[41] Because MarketScan data overrepresent self-insured plans from large employers, there may not be much overlap in the commercially insured populations included in the MCDB and MarketScan datasets after 2014. One notable difference is that a substantially larger portion of the MarketScan sample (95%) was enrolled in a non-capitated payment plan relative to the commercially insured population included in the MCDB (18%). Comparison with the MCDB can help inform our interpretation of the MarketScan analysis. To have a comparable population to MarketScan, we excluded any commercially insured members over the age of 64 from the MCDB analysis.

The MCDB did not include revenue codes in the 2011 or 2012 data. As such, we were only able to calculate ED visits, ED PMPM expenditures, and total hospital PMPM expenditures for 2013 through 2017. Because not all commercially insured members included in the MarketScan database have their pharmacy claims included in the data, we excluded pharmacy expenditures from the total expenditures calculation for both MarketScan and the MCDB.

As shown in ***Table K-2***, the number of commercially insured members under age 65 in the MCDB is larger than the number of commercially insured members in the MarketScan data. As expected, the number of commercially insured members included in the MCDB data declines after 2015. The sample size for MarketScan also declines with time, which is due to decreases in the number of payers who contribute data to the MarketScan database.

Table K-2
Sample size for MarketScan and Maryland's Medical Care Data Base, 2011–2017

Year	MarketScan data, N	MCDB data, N
2011	401,057	3,278,443
2012	387,502	3,247,169
2013	344,909	3,233,464
2014	412,226	3,219,396
2015	309,353	3,103,250
2016	311,227	2,555,791
2017	277,130	2,511,914

41 Department of Health, Maryland Health Care Commission. (2018, September 19). Health data and quality: MCDB. Retrieved from https://mhcc.maryland.gov/mhcc/pages/apcd/apcd_mcdb/apcd_mcdb.aspx

Figures K-2 through ***K-5*** show, for MarketScan and the MCDB, total PMPM expenditures, total hospital PMPM expenditures, the unadjusted rate of inpatient admissions per 1,000 commercial plan members, and inpatient expenditures by year.

- For commercial plan members in both MarketScan and the MCDB, average total PMPM and total hospital PMPM expenditures remained fairly constant during the baseline period then increased during the All-Payer Model implementation period. Total PMPM expenditures were consistently higher for commercial plan members in MarketScan relative to commercial plan members in the MCDB from 2011 to 2017, although the values were very similar from 2011 through 2013 and again in 2017. In contrast, commercial members in MarketScan consistently had lower total hospital PMPM expenditures than commercial plan members in the MCDB from 2013 through 2017.

- The rate of acute inpatient admissions for commercial plan members declined during the baseline period and the implementation period for the populations included in both MarketScan and the MCDB. The values were almost identical for all years except for 2015, although the admission rate was consistently slightly higher for commercial plan members in MarketScan relative to commercial plan members in MCDB.

- Throughout the baseline and implementation periods, average inpatient facility PMPM expenditures remained relatively flat for commercial plan members in MarketScan and the MCDB. Inpatient expenditures were consistently higher for commercial plan members in MarketScan relative to the MCDB from 2011 through 2017.

Figure K-2
Unadjusted average total PMPM expenditures for commercial plan members in MarketScan and the MCDB, 2011 through 2017

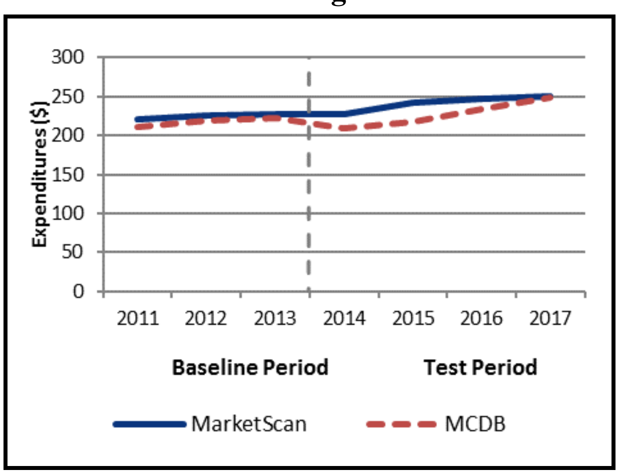
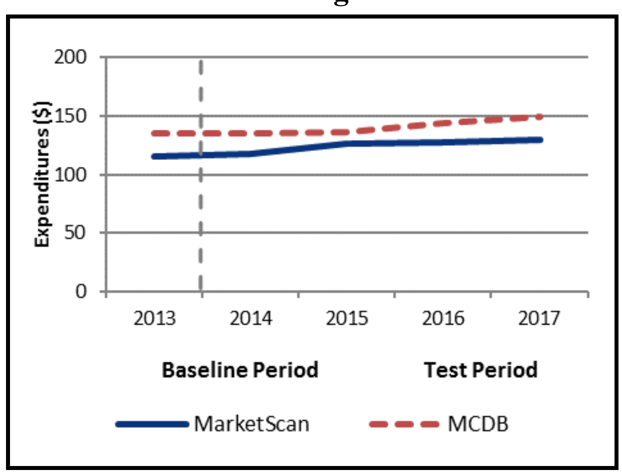


Figure K-3
Unadjusted average total hospital PMPM expenditures for commercial plan members in MarketScan and the MCDB, 2013 through 2017



MCDB = Medical Care Data Base; PMPM = per member per month.

Figure K-4
Unadjusted all-cause acute inpatient admissions per 1,000 commercial plan members in MarketScan and the MCDB, 2011 through 2017

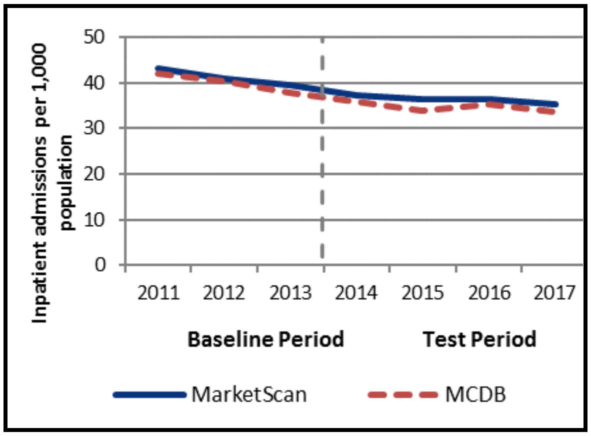
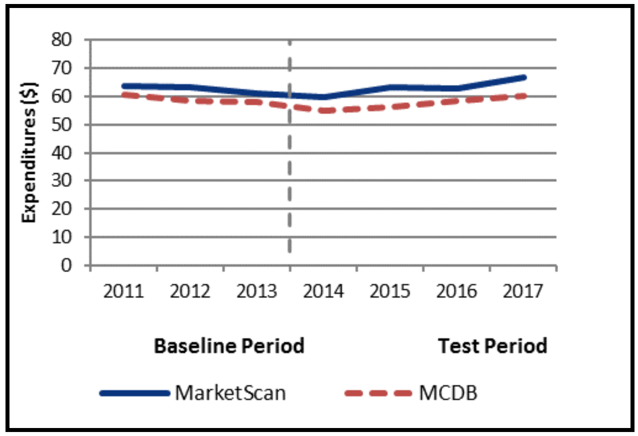


Figure K-5
Unadjusted average inpatient facility PMPM expenditures for commercial plan members in MarketScan and the MCDB, 2011 through 2017



MCDB = Medical Care Data Base; PMPM = per member per month.

Figures K-6 through ***K-8*** show, for commercial plan members in MarketScan and the MCDB, the unadjusted ED visit rate per 1,000 plan members, ED visit expenditures, and other hospital outpatient department expenditures by year.

- The ED visit rate decreased slightly from 2013 to 2017 among commercial plan members in MarketScan data. The ED visit rate for commercial plan members in the MCDB increased from 2014 to 2016 then declined in 2017. The ED visit rate was higher for commercial plan members in MarketScan from 2013 to 2015, then commercial plan members in the MCDB had a higher ED visit rate from 2016 to 2017.

- Average PMPM expenditures for ED visits were consistently lower in MarketScan than in the MCDB. Expenditures for ED visits increased in both groups from 2013 to 2017, but the increase was steeper for the commercial population in the MCDB.

- Expenditures for other hospital outpatient department services increased slightly from the baseline to the implementation period for the commercially insured populations in both MarketScan and the MCDB but not always steadily. Other hospital outpatient expenditures were consistently higher for commercial plan members in the MCDB relative to MarketScan.

In summary, we found that with few exceptions, the trends for most spending and utilization outcomes went in the same direction for the commercially insured populations included in MarketScan and the MCDB. However, there were differences in the trends for the ED visit rate and ED PMPM expenditures. These findings suggest that the results for the ED outcomes for the MarketScan population may not be generalizable to the entire commercially insured population in Maryland. Even so, the MCDB is also not representative of the entire commercially insured population after the ERISA Supreme Court ruling in 2015.

Figure K-6
Unadjusted ED visits per 1,000 commercial plan members in MarketScan and the MCDB, 2013 through 2017

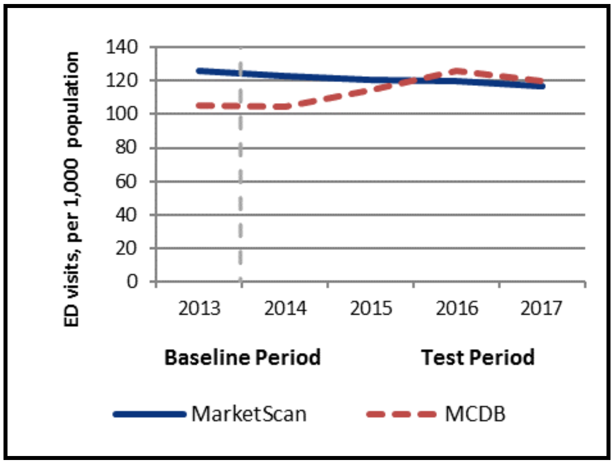


Figure K-7
Unadjusted average ED visit PMPM expenditures for commercial plan members in MarketScan and the MCDB, 2013 through 2017

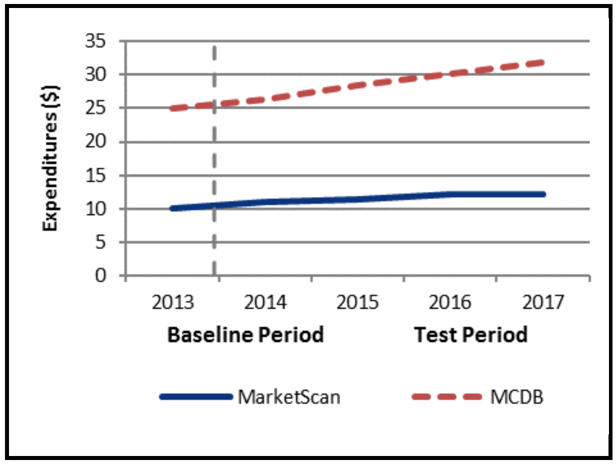
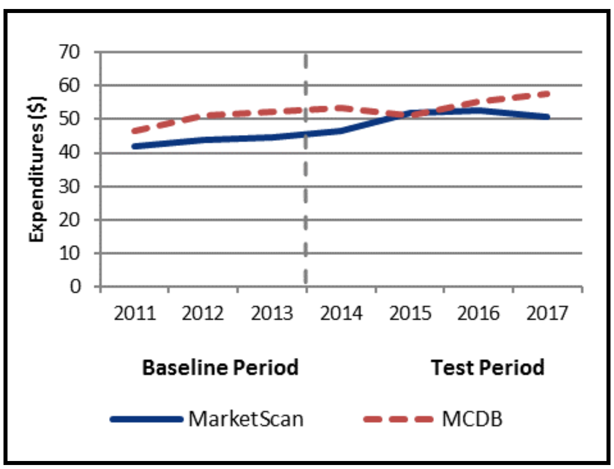


Figure K-8
Unadjusted average other hospital outpatient department PMPM expenditures for commercial plan members in MarketScan and the MCDB, 2011 through 2017



ED = emergency department; MCDB = Medical Care Data Base; PMPM = per member per month.

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