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Evaluation of the Maryland All-Payer Model

First Annual Report

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EVALUATION OF THE MARYLAND ALL-PAYER MODEL

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LIST OF ABBREVIATIONS

AAMC	American Association of Medical Colleges
ACA	Patient Protection and Affordable Care Act
ACO	Accountable care organization
ACSC	Ambulatory care sensitive condition
AHA	American Hospital Association
AHRF	Area Health Resource File
AMC	Academic medical center
APR	All-patient refined
ARR	Admission-Readmission Revenue Constraint Program
CAH	Critical access hospital
CAH2	Method II critical access hospital
CCN	CMS Certification Number
CCW	Chronic Condition Warehouse
CG	Comparison group of hospitals
CMS	Centers for Medicare & Medicaid Services
CON	Certificate of Need
CPT	<i>Current Procedural Terminology</i>
CRISP	Chesapeake Regional Information System for our Patients
DHMH	Maryland Department of Health and Mental Hygiene
D-in-D	Difference-in-differences
DRG	Diagnosis-related group
DSH	Disproportionate share hospital
ECMAD	Equivalent case-mix-adjusted discharge
ED	Emergency department
FFS	Fee-for-service
FQHC	Federally qualified health center
FTE	Full-time equivalent
GBR	Global Budget Revenue
GME	Graduate medical education
GSP	Gross state product
HAC	Hospital-acquired condition
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Services
HCC	Hierarchical Condition Category
HCPCS	<i>Healthcare Common Procedure Coding System</i>
HPSA	Health professional shortage area
HSA	Hospital service area
HSCRC	Health Services Cost Review Commission
IBR	Intern-to-bed ratio
ICU	Intensive care unit
IPPS	Inpatient Prospective Payment System
IT	Information technology
LOS	Length of stay
MHA	Maryland Hospital Association
MHAC	Maryland Hospital-Acquired Condition

MHCC	Maryland Health Care Commission
NPPES	National Plan and Provider Enumeration System
NSP	Nurse Support Program
OP	Outpatient
OPPS	Outpatient Prospective Payment System
ORD	Office of Research and Demonstrations
PAC	Post-acute care
PAU	Potentially avoidable utilization
PBPM	Per beneficiary per month
PCP	Primary care physician
PHM	Population health management
PPC	Potentially preventable complication
QBR	Quality-based reimbursement
RHC	Rural health clinic
RRIP	Readmission Reduction Incentive Program
SNF	Skilled nursing facility
STAC	Short-term, acute-care
TIN	Taxpayer Identification Number
TPR	Total Patient Revenue
UCC	Uncompensated care
UMMS	University of Maryland Medical System
VBP	Value-Based Purchasing
VPSA	Virtual patient service area

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EXECUTIVE SUMMARY

On January 1, 2014, Maryland implemented its All-Payer Model for hospitals, which shifted the state's hospital payment structure to an all-payer, annual, global hospital budget that encompasses inpatient and outpatient hospital services. Maryland's All-Payer Model builds on the state's all-payer hospital rate setting system, which had operated since the 1970s. The All-Payer Model operates under an agreement with the Centers for Medicare & Medicaid Services (CMS) that exempts Maryland hospitals from Medicare's inpatient and outpatient prospective payment systems (IPPS and OPPS). Under the terms of its agreement with CMS, Maryland must:

- Limit all-payer per capita inpatient and outpatient hospital cost growth to the previous 10-year growth in gross state product.
- Generate \$330 million in savings to Medicare over 5 years based on the difference in the Medicare per-beneficiary total hospital cost growth rate between Maryland and that of the nation overall.
- Reduce its 30-day readmission rate to the unadjusted national Medicare average.
- Reduce the rate of admissions for potentially preventable conditions by nearly 30 percent over 5 years.
- Submit an annual report demonstrating its performance along various population health measures.

Although the agreement with CMS focuses on targets for hospital services, it includes provisions for implementing a corrective action plan and, if necessary, terminating the agreement if (1) the annual growth rate in per beneficiary total cost of care for Maryland Medicare beneficiaries in a single year is greater than 1.0 percentage point above the annual national Medicare per beneficiary total cost of care growth rate or (2) the annual growth rate for Maryland beneficiaries exceeds the national growth rate in two consecutive years.

This report describes findings from the first year of the evaluation of the All-Payer Model, conducted by RTI International. The evaluation of the Maryland All-Payer Model is based on a mixed-methods design, using both qualitative and quantitative methods and data to assess both the implementation and the outcomes of the model. Many of the quantitative analyses used a difference-in-differences design, comparing trends in Maryland before and after implementation of the All-Payer Model, with trends in matched comparison hospitals and market areas. The report covers the 18 months of the implementation of the All-Payer Model (January 2014–June 2015) and outcomes for five quarters (January 2014–March 2015). Claims-based outcomes in this report include those for fee-for-service Medicare beneficiaries. Future reports will include claims-based outcomes for Medicaid beneficiaries and the commercially insured population. Findings from each evaluation domain are summarized below.

ES.1 Implementation (Section 4)

- Maryland beat its planned timeline for transitioning hospitals to global budgets. By July 2014 all general acute-care hospitals in the state were operating under one of two variants of a global budget—Global Budget Revenue (GBR) or Total Patient Revenue (TPR).
- Some key policies had not been formalized by the Health Services Cost Review Commission (HSCRC), which administers the All-Payer Model, at the time the All-Payer Model was implemented. The HSCRC was able to build on its decades-long track record of working with hospitals on the all-payer rate setting system to maintain cooperation with the All-Payer Model despite the uncertainty about certain elements.
- To provide hospitals and the HSCRC with a transition period to learn how to operate within the new system, the requirement for hospitals to request permission to vary their established rates beyond the allowed 5 percent rate corridor and hospital penalties for revenue variance beyond the 0.5 percent budget corridor were delayed until FY 2015.¹
- Most stakeholders and hospital-based leadership and staff remained open-minded about the All-Payer Model. In addition to uncertainty about policies that were still under development, hospital leaders' concerns centered on aligning physician and hospital incentives and on financial constraints that limited their ability to make investments that they believed would, in the long run, allow hospitals to operate more effectively and efficiently.
- Hospitals varied in the extent to which they had implemented new strategies to adapt to the All-Payer Model and, for those that had, in the specific strategies adopted. The most common changes described were hiring new staff and creating divisions focused on improving quality and meeting the hospital's quality of care goals. All hospitals visited during site visits focused some strategies on reducing non-emergent emergency department (ED) use.

ES.2 Hospital Global Budget and Rate Adherence (Section 5)

- Ten of 46 hospitals had revenues that deviated from their budgets by more than 0.5 percent in FY 2014 and FY 2015.² The number of these with overruns fell from 7 in FY 2014 to 3 in FY 2015.
- Hospitals frequently exercised the option to adjust the rates charged during the course of the year. In FY 2015, the number of hospitals whose charged rates differed from their established rates by more than 5 percent routinely exceeded the number granted permission to do so, and many hospitals had greater than 10 percent rate variation, although this permission had not been granted. Hospitals also did not appear to comply with the requirement to change rates for all rate centers in tandem. However,

¹ Maryland's state fiscal year runs from July 1 through June 30.

² Although the All-Payer Model was implemented January 1, 2014, hospitals were subject to global budgets retroactively to the start of FY 2014.

average rates charged over the course of the year in FY 2015 were much closer to rate order amounts than were the rates charged in the individual quarters, suggesting that offsetting rate increases and rate decreases occurred over the course of the year.

ES.3 Market Dynamics (Section 6)

- Trends in market actions (ownership changes, renovation, construction, changing service lines, and hospital openings or closures) did not change substantially after the implementation of the All-Payer Model in January 2014.

ES.4 Service Mix (Section 7)

- We found some evidence that the level of severity of Medicare admissions in Maryland increased after the All-Payer Model implementation. We found modest increases in the probability of major/extreme admission and the probability of intensive care unit admission among Maryland hospitals relative to those probabilities among comparison hospitals.
- We observed modest increases (\$200 or about 1.5%) in Medicare case-mix-adjusted charge per discharge among Maryland hospitals relative to comparison hospitals after All-Payer Model implementation.
- Findings on changes in use of new medical technologies after implementation of the All-Payer Model were mixed.

ES.5 Service Utilization and Expenditures (Section 8)

- For the first five quarters of All-Payer Model implementation overall, our analyses found no difference in the change in total per-beneficiary-per-month (PBPM) expenditures in Maryland relative to the comparison group, likely because we did not find reductions in inpatient admissions or expenditures for the overall time period (Table ES-1).³ However, there were significant reductions in Medicare beneficiaries' utilization, expenditures, or both relative to those in the comparison group in all categories of hospital services in one or more quarters. We did not find evidence of substitution of nonhospital for hospital services.
- The likelihood of having had an outpatient ED visit declined less relative to that in the comparison group, resulting in 8,868 more outpatient ED visits for Medicare beneficiaries in Maryland during the implementation period (Table ES-1). However, ED PBPM expenditures and payments per ED visit declined relative to those in the comparison group, indicating that All-Payer Model implementation was associated with a decrease in the costliness of ED visits that resulted in an aggregate \$35 million reduction in Medicare payments.

³ A *negative* value in Table ES-1 corresponds to a *greater decrease* or a *smaller increase* in probability of use or expenditures 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 probability of use or expenditures in Maryland relative to the comparison group.

- Hospital outpatient expenditures declined by approximately \$86 million more for Medicare beneficiaries in Maryland than for beneficiaries in the comparison group after implementation of the All-Payer Model (Table ES-1).

Table ES-1. Pre-post differences in key outcomes for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in- differences	95% confidence interval	
		Lower limit	Upper limit
Aggregated changes in utilization			
Acute inpatient admissions	-3,695	-8,129	739
Outpatient ED visits	8,868***	3,695	13,672
ACSC admissions	-739	-2,587	1,478
Unplanned 30-day readmissions	-303	-1,513	756
Aggregated changes in expenditures (\$)			
Total	-87,797,667	-264,944,980	89,460,501
Inpatient facility	37,358,351	-88,795,368	163,622,925
Outpatient ED	-35,141,238***	-43,455,411	-26,827,065
Other hospital outpatient department	-85,913,121***	-117,174,411	-54,762,686
Change in probability of utilization			
Probability of an acute inpatient admission	-0.001	-0.0022	0.0002
Probability of an outpatient ED visit	0.0024***	0.001	0.0037
Probability of admission for ACSCs	-0.0002	-0.0007	0.0004
Probability of unplanned readmission within 30 days of discharge	-0.002	-0.010	0.005
Change in PBPM expenditures (\$)			
Total PBPM	-7.92	-23.9	8.07
Inpatient facility PBPM	3.37	-8.01	14.76
Outpatient ED PBPM	-3.17***	-3.92	-2.42
Other hospital outpatient department PBPM	-7.75***	-10.57	-4.94

NOTES: ACSC = ambulatory care sensitive conditions; ED = emergency department; PBPM = per beneficiary per month. A linear probability model was used to obtain estimates of the difference in probability of use for inpatient admissions, ED visits, ACSC admissions, and 30-day unplanned readmissions. A generalized linear model with an identity link and normal distribution was used to obtain estimates for differences in expenditures. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in probability of use or expenditures 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 probability of use or expenditures in Maryland relative to the comparison group. Aggregated results for 30-day unplanned readmissions were obtained by multiplying the per admission change by the total number of admissions for Maryland beneficiaries in the All-Payer Model period (Q1 2014–Q1 2015), N=151,256. Aggregated results for the utilization beneficiary-level measures were obtained by multiplying the per-member change by the total number of person-quarters for Maryland beneficiaries in the All-Payer Model period (Q1 2014–Q1 2015), N=3,695,188. Aggregated results for the expenditure outcomes were obtained by multiplying the per-member-per-month change by the total number of person-months for Maryland beneficiaries in the All-Payer Model period (Q1 2014 – Q12015), N=11,085,564 *p<0.10; **p<0.05; ***p<0.01.

SOURCE: Medicare fee-for-service claims in the Chronic Conditions Data Warehouse.

ES.6 Quality of Care (Section 9)

- We did not find evidence that implementation of the All-Payer Model was associated with improvement in care coordination. The probability of a Medicare beneficiary having a follow-up visit within 14 days after hospital discharge did not change in Maryland relative to that in the comparison group after implementation of the All-Payer Model.
- There was no evidence that implementation of the All-Payer Model was associated with positive or negative changes in avoidable or reducible utilization for Medicare beneficiaries, as measured by the probability of an admission for an ambulatory care sensitive condition (Table ES-1), the probability of an unplanned readmission within 30 days after hospital discharge (Table ES-1), or the probability of an ED visit within 30 days after hospital discharge.

ES.7 Spillover Effects (Section 10)

- We did not find changes in the behavior of Maryland hospitals with regard to transferring patients to other hospitals or post-acute care settings.
- We found no evidence that hospital services were shifted to nonregulated settings, as measured by shifts in ED visits to urgent care centers and shifts in hospital outpatient department primary care services to other sites of care for Medicare beneficiaries, after implementation of the All-Payer Model.
- Border crossing, as evidenced by admission of out-of-state Medicare beneficiaries to Maryland hospitals and admission of Maryland's Medicare beneficiaries to out-of-state hospitals, did not change after the All-Payer Model implementation.

ES.8 Transformation of Maryland's Health Care Workforce (Section 11)

- The baseline profile of Maryland's health care workforce showed that Maryland's supply and demographic profile of physicians and nurses were similar to national averages.
- During the first year of implementation, Maryland convened stakeholders and began developing a plan for graduate medical education to align medical education with health care transformation.

ES.9 Comparison to the Inpatient Prospective Payment System (Section 12)

- Both before and after implementation of the All-Payer Model, we found a substantial Medicare payment differential between Maryland and the comparison group hospitals for the same mix of diagnosis-related groups (DRGs), ranging from 21 to 26 percent higher inpatient payments in Maryland, depending on the year. We found similar differences for individual DRGs, with the range in inpatient payments for the highest five DRGs by volume, ranging from 14 to 43 percent higher in Maryland.

- These findings may be biased upward by less complete coding of diagnoses on Medicare claims in Maryland, which results in assigning higher complexity cases to lower resource intensity DRGs in Maryland hospitals than in IPPS hospitals. Future analyses seek to address these biases.

ES.10 Discussion

By several measures, this evaluation found the first 18 months of Maryland All-Payer Model implementation was a success. Acute-care hospitals in the state transitioned to global budgets more quickly than projected, and most hospitals successfully managed their revenues to remain within the narrow 0.5 percent corridor around their global budgets. Stakeholder and key informant interviews indicated support for the model remained high despite delays in formalizing some key policies.

During its first year of operation (January–December 2014), the All-Payer Model performed well against the four major terms of Maryland’s agreement with CMS (Patel et al., 2015). CMS’s monitoring of the agreement terms found Maryland restricted the all-payer per capita hospital growth rate to 1.47 percent, generated an estimated \$116 million in savings to Medicare by reducing Medicare per capita hospital cost by 1.08 percent (compared with a 1.07 percent increase for Medicare nationwide), reduced the incidence rate of potentially preventable complications by 26 percent, and made modest progress in bringing its Medicare readmission rate to the national average.

This evaluation also found encouraging impacts for a number of outcomes, although our findings are not as strong as those based on performance against the terms of the agreement with CMS. Difference-in-differences analyses found significant reductions relative to the comparison group in Maryland Medicare beneficiaries’ utilization, expenditures, or both in all categories of hospital services in one or more quarters during the first five quarters of All-Payer Model implementation. However, we did not find evidence that the All-Payer Model was associated with significant reductions in total Medicare PBPM payments during the first five quarters of implementation overall, likely because we did not find reductions in inpatient admissions or expenditures for the overall time period relative to the comparison group. Unlike the finding for performance on the CMS agreement terms, we did not find a reduction in the probability of having an unplanned readmission within 30 days after hospital discharge relative to the comparison group. These disparate findings are likely due to methodological differences in the analyses, particularly the comparison with hospitals selected for comparability to Maryland in our difference-in-differences analyses, rather than comparison with hospitals nationwide.

Overall, the results to date from this evaluation provide modest evidence that the All-Payer Model is succeeding in reducing hospital expenditures without shifting costs to other parts of the health care system outside of the global budgets or resulting in adverse impacts on patient outcomes. These findings are particularly notable because they reflect early experience with the All-Payer Model, when hospitals were just beginning to adjust to the new system. Discussions with hospital leaders during site visits indicated that in most cases hospitals were in the early stages of developing strategies to respond to the incentives of the All-Payer Model. In particular, strategies that require changes outside the hospital’s direct control—such as aligning hospital and

physician incentives and reducing patient demand for hospital services by improving population health and altering care-seeking patterns—were in the nascent stages.

Moving forward, it will be important to see whether hospitals are able to forge necessary external partnerships and implement strategies to make harder-to-achieve changes in underlying determinants of utilization. Early findings suggest that small hospitals face greater challenges in operating within their global budgets, a result that also bears monitoring, as does evidence of significant rate fluctuations during the year. The findings in this report represent only a partial picture of All-Payer Model impacts because they mainly reflect the Medicare population, whereas the All-Payer Model is intended to affect hospital utilization for all Maryland residents, including Medicaid and commercially insured individuals. Our evaluation to date has focused primarily on impacts in the Medicare population because of longer lags in Medicaid and commercial insurance data availability. Future evaluation reports will provide a broader picture of model impacts by expanding analyses to assess changes in the Medicaid and commercially insured populations.

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ES-8

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SECTION 1 INTRODUCTION

1.1 Rationale for the All-Payer Model

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 Inpatient Prospective Payment System (IPPS) and Outpatient Prospective Payment System (OPPS). Until the All-Payer Model⁴ took effect in 2014, Maryland maintained this exemption from IPPS/OPPS by meeting the requirement that cumulative growth in Medicare inpatient payments per admission since January 1981 remain below cumulative growth nationally. However, in recent years, the cost per admission began growing at a faster rate in Maryland than in the rest of the nation, leading to concerns that, absent a change in this cost trajectory, Maryland's longstanding waiver could be in jeopardy. Furthermore, the focus on cost per admission was poorly aligned with other health care delivery system reforms under way in Maryland and nationally that focus on comprehensive, coordinated care across delivery settings.

In response to these concerns, Maryland proposed a new hospital payment model that gradually would shift the emphasis from controlling payments per inpatient admission to controlling total payments for hospital services. Maryland has adopted annual hospital revenue targets (global budgets) encompassing inpatient and outpatient services as the first step toward a population-based payment model that would hold hospitals responsible for use of all health care services by the populations they serve.

Under its new agreement with the Centers for Medicare & Medicaid Services (CMS), which became effective January 1, 2014, Maryland is committed to holding all-payer per capita inpatient and outpatient hospital cost growth to the previous 10-year growth in gross state product (GSP; set at 3.58% annually for the first 3 years of the model, with an opportunity to adjust the rate for Years 4 and 5 based on more recent data). Maryland also guaranteed \$330 million in savings to Medicare over 5 years based on the difference in the Medicare per beneficiary total hospital cost growth rate in Maryland compared with that of the nation overall. In addition to hospital payment targets, Maryland's model is required to meet two quality targets:

- Reducing its 30-day readmission rate to the unadjusted national Medicare average, which will require Maryland to outperform hospitals nationwide by 2 percentage points over 5 years.
- Reducing the rate of admissions for potentially preventable complications (PPCs) by nearly 30 percent over 5 years.

Maryland is also required to submit an annual report demonstrating its performance along various population health measures. Although the agreement with CMS focuses on targets for hospital services, it includes provisions for implementing a corrective action plan and, if necessary, terminating the agreement if (1) the annual growth rate in per beneficiary total cost of

⁴ In this evaluation we use All-Payer Model to refer to the new hospital payment system implemented in January 2014. We refer to Maryland's prior system as all-payer rate setting.

care for Maryland Medicare beneficiaries in a single year is greater than 1.0 percentage point above the annual national Medicare per beneficiary total cost of care growth rate or (2) the annual growth rate for Maryland beneficiaries exceeds the national growth rate in two consecutive years.

Maryland originally proposed a gradual transition, with at least 50 percent of hospital revenue under a global budget by the end of the model's second year, ramping up to a minimum of 80 percent by the end of the fifth year. However, Maryland surpassed this timeline; by July 2014 all 46 general acute-care hospitals in the state⁵ were operating under one of two variants of a global budget, with global budgets encompassing 95 percent of hospital revenue. The state committed to moving from a model that has spending targets focused only on hospital services to a population-based model with a total per capita cost of care spending test by Year 6 of the model.

Most hospitals in the state operate under the Global Budget Revenue (GBR) model; 10 rural hospitals continue to operate under the Total Patient Revenue (TPR) model.⁶ There is substantial common ground between these global budgeting variants. In both cases, individual hospital total approved revenues (the annual budget) are reviewed and approved at the start of the fiscal year. Total annual revenue is based on historical revenue for a base period adjusted forward to the relevant budget year for factors including inflation, change in volume levels, quality performance, uncompensated care (UCC), and any retroactive (plus or minus) payment adjustments. The key difference is the definition of a hospital's market area, which is the basis for establishing the expected patient volume on which the annual budget is based. Hospitals under GBR typically operate in competitive markets and have service areas that overlap with those of other hospitals. As a result, a methodology for defining hospital market area and market share is a key component of the GBR model. This is less relevant for the TPR model, as hospitals in rural areas have more clearly defined and separated hospital catchment areas.

1.2 Description of the All-Payer Model

1.2.1 All-Payer Model Overview

Under the Maryland All-Payer Model, the Health Services Cost Review Commission (HSCRC) establishes an annual global budget, or allowed revenues, for each hospital. The annual budget is built from allowed revenues during a base period (Maryland Department of Health and Mental Hygiene, 2013), which are adjusted for future years using a number of factors, both hospital specific and industry wide (HSCRC, 2014b). The HSCRC then sets rates for services that Maryland hospitals use to bill all payers so that total payments (based on expected utilization) will just match the global budget. As under Maryland's previous hospital

⁵ An additional general acute-care hospital, Holy Cross Germantown, opened in October 2014.

⁶ Although TPR has been an option since the early years of Maryland's original waiver, for many years it was adopted by only one hospital. A second hospital transitioned to TPR in FY 2008, and eight more transitioned in FY 2011. The following hospitals operate under TPR: Meritus Medical Center, University of Maryland at Dorchester, Garrett County Memorial Hospital, Western Maryland Regional Medical Center, University of Maryland Shore Medical Center at Chestertown, Union Hospital of Cecil County, Carroll Hospital Center, University of Maryland Shore Medical Center at Easton, Calvert Memorial Hospital, and McCreedy Memorial Hospital.

payment system, hospitals bill payers for services provided using their established service-specific rates. Unlike the previous system, the global budget establishes a ceiling on hospital revenues.

Equation 1.1 is a simplified description of the relation under the All-Payer Model between revenues (left-hand side of the equation) and the annual global budget (right-hand side of the equation) for hospital h in year t .

$$\sum_s (1-d_g) \bullet CH_{h,s,t} \bullet RC_{h,s,t} = TR_{h,b} \bullet [(1+INF_t + ADJ_t) \bullet (1+\Delta VOL_{h,t})] \quad (1.1)$$

- d_g = discount on allowed charges for payer g ; commercial payers = 0, Medicare and Medicaid = 0.06.
- $CH_{h,s,t}$ = allowed charges per unit in the s^{th} revenue center in hospital h in year t .
- $RC_{h,s,t}$ = units in the s -th revenue center in hospital h in year t .
- $TR_{h,b}$ = total allowed inpatient and outpatient revenue in the base period (2013) for hospital h .
- INF_t = the hospital industry's allowed rate of inflation in the cost of producing services from the base period to year t .
- ADJ_t = additional update adjustments to hospital allowable revenues.
- $\Delta VOL_{h,t}$ = the forecasted (allowed) rate of growth in hospital h volumes, based on population demographics, changes in market share, and reductions in potentially avoidable utilization (PAU).

Public payers (Medicare and Medicaid) are allowed a 6 percent discount on charges, which was also in force before the implementation of the All-Payer Model. With the exception of certain hospitals,⁷ the global budget cap applies to services provided to both Maryland residents and nonresidents. In addition to services provided to nonresidents at hospitals with an exemption for nonresident services, hospitals are permitted nonregulated revenues for other specified services (for example, home health, outpatient renal dialysis, and skilled nursing facility services). If actual utilization deviates from the expected utilization on which the budget was based, within prescribed corridors or with approval from the HSCRC, hospitals can adjust the rates they charge payers during the course of the year so that total revenues equal their budgets. Hospitals have an incentive to ensure that revenues do not fall short of or exceed their budgets. If total revenues overrun or underrun a hospital's budget by more than a narrow margin, penalties are applied to the hospital's budget for the subsequent year. Procedures for updating base period

⁷ In FY 2014, the exception applied to four hospitals: University of Maryland Medical Center, Johns Hopkins Hospital, Johns Hopkins Bayview, and Johns Hopkins Suburban. The University of Maryland Medical Center Shock Trauma Center had a separate revenue cap, which also excluded services to Maryland nonresidents. Beginning in FY 2015, the University of Maryland facilities dropped their nonresident exemption.

hospital revenues to set hospital budgets in future years are described in **Section 1.2.2**. Additional information on rate adjustments and penalties for budget overruns and underruns is provided in **Section 1.2.3**.

1.2.2 Procedures for Setting Hospital Budgets

Hospital global budgets are based on hospital utilization and revenues in the base period, 2013. Each year the hospital's global budget is updated to reflect an allowed rate of hospital cost inflation; approved changes in the hospital's volume; and additional adjustments related to PAU, quality performance, and UCC. Each of these factors is described below.

Inflation. The allowed rate of inflation is calculated annually, based on a weighted average of the estimated growth in a hospital market basket of inputs and estimated growth in capital costs. This estimated growth in hospital costs is then reduced by expected productivity gains (HSCRC, 2014d).

Volume Adjustment. The volume adjustment is the major change from Maryland's previous hospital payment system to the new global budget system. Because volume adjustments are based on the size and characteristics of the population in the hospital's market area, hospitals are at risk for unjustified per capita increases in hospital service use. Under Maryland's previous system, volume was controlled only indirectly using variable cost factors for "excess" services, which effectively reduced rates per service. There are several components of the volume adjustment: (1) adjustments for population demographics, (2) adjustments for changes in market share, and (3) adjustments for reductions in PAU.

The demographic adjustment updates the hospital budget to account for changes in the age profile of the population in a hospital's market area (Calikoglu, 2014). The main difference between TPR and GBR is the definition of the hospital market area that is the basis for the population demographics adjustment. The market area for hospitals operating under TPR is defined at the county level. Markets for hospitals operating under GBR, which have overlapping market areas, are defined based on a virtual patient service area (VPSA). The VPSA is based on a hospital's aggregated inpatient and outpatient service volume in cohorts defined by patient age and ZIP code. Inpatient and outpatient services are aggregated by calculating equivalent case-mix-adjusted discharges (ECMADs). A hospital's ECMADs are equal to its case-mix-adjusted discharges (total discharges multiplied by the hospital's average case-mix weight), which are then increased by a factor based on the ratio of total outpatient revenue to total inpatient revenue. A hospital's market share within each age/ZIP code cohort is the ratio of its ECMADs for that cohort to total ECMADs for the cohort summed across all hospitals.

Volume from the base year is updated based on the projected change in the population in each age/ZIP code cohort in a hospital's VPSA. Instead of treating all increases within each age/ZIP cohort the same, each cohort's fractional increase is adjusted upward or downward by the relative costliness of hospital services for each age group. The age weights are based on the ratio of statewide per capita hospital revenue for the age cohort to statewide per capita hospital revenue for all age groups combined during the base year.

Hospital budgets may also be adjusted for changes in a hospital's market share. The HSCRC's market shift adjustment policy, which was announced in September 2015, permits adjustment of hospital budgets for market share changes only when there are offsetting volume changes at other hospitals in the market area (HSCRC, 2015d). Revenue adjustments for growth in market share are subject to a 50 percent variable cost factor (i.e., hospital budgets are increased by an amount equal to only half of the revenues for allowed volume increases) to reduce incentives to increase market share.

The volume adjustment based on population demographics is reduced by a hospital-specific percentage of total revenue that reflects revenue from PAU (Calikoglu, 2014). PAU includes services that could be avoided—either unnecessary admissions or, in the case of PPCs, extra inpatient services that are necessary because of inappropriate care. The definition of PAU is updated annually. In FY 2014 and FY 2015,⁸ the PAU definition encompassed most of the quality-based goals of the new system:

- 30-day all-cause readmissions (unplanned).
- Emergency department (ED) and observation visits within 30 days of admission.
- Potentially avoidable admissions based on Agency for Healthcare Research and Quality prevention quality indicators.
- Admissions for PPCs defined by Maryland Hospital Acquired Conditions (MHAC) policy.

Because they are reported as quantity indicators, the PAU measures must be converted into payment adjustments using a costing methodology. The PAU-adjusted growth for each hospital is further reduced as needed by a constant factor to meet the allowed statewide annual per capita growth in expenditures.

Quality Performance. Maryland introduced its quality-based reimbursement (QBR) program in July 2009, 4 years before CMS introduced its similar Value-Based Purchasing (VBP) program. The two programs are similar in several aspects. Medicare's VBP began with two domains: clinical process measures and patient experience measures. CMS subsequently added two more domains: outcome measures (e.g., mortality) and efficiency (i.e., hospital cost per admission). Maryland's QBR program is based on clinical process of care measures, patient experience measures, and, beginning in 2015, mortality. The HSCRC assumed that the other rate-setting features of the global budget model address efficiency issues. Hospitals achieve a QBR score based on a weighted average of total scores across the domains. Measure domain weights are updated as more domains are added and their relative importance changes. A hospital's score within a domain is based on the maximum of its performance relative to a benchmark threshold and its performance relative to its own base-year score.

Uncompensated Care. The Maryland rate-setting system has always recognized UCC and has adjusted hospitals' payment rates to cover these costs. Failing to allow for sharp

⁸ Maryland's state fiscal year runs from July 1 through June 30.

differences in charity care and bad debts in hospitals' rates would create incentives to triage nonpaying patients to other facilities. Each hospital's allowable UCC percentage is based on a simple average of the hospital's own 2-year UCC percentage (3-year percentage before FY 2015) and the hospital's predicted UCC percentage based on a linear regression model (HSCRC, 2014c). The linear regression model and the pool of funds available for UCC were adjusted to reflect the expansion of insurance coverage as a result of the Patient Protection and Affordable Care Act (ACA).

1.2.3 Penalties for Budget Variances and Charge Adjustments to Meet Current Year Budget

As shown in *Equation 1.1*, each hospital's revenues (allowed charges per unit of service times units of service provided, summed over all rate centers) are expected to equal the annual global budget. The HSCRC sets rates for each hospital's services, so that aggregate revenues based on *projected* utilization will match the hospital's budget. To the extent that actual utilization deviates from projected utilization and hospital revenues vary from the global budget, a one-time adjustment to the approved budget for the following year is made to compensate hospitals for charges less than the approved budget (underages) and to recoup charges in excess of approved revenues (overages). However, hospital revenues are expected to conform closely to the global budgets and penalties are applied to the portion of overages and underages that exceeds 0.5 percent of the hospital budget to discourage patterns of overcharging or undercharging (HSCRC, 2014b). Table 1 shows the penalties by level of underage or overage. For charges that differ from the budget amount by up to 0.5 percent, the full amount is debited from (overage) or credited to (underage) the budget for the following year. For the portion of any overage or underage falling between 0.51 and 1 percent, a 20 percent penalty is applied. In the case of an underage, the hospital is credited only 80 percent of the amount in the following year budget; in the case of an overage, the full amount of the overage plus an additional 20 percent is deducted from the next year's budget. Similarly, for charges over 1 percent, a 50 percent penalty is applied to the portion of the overage that is greater than 1 percent. For any portion of an underage between 1.01 and 2 percent, a 50 percent penalty is applied, and a 100 percent penalty is applied to the portion of an underage in excess of 2 percent. As an example, for an overage greater than 2 percent, the deduction in the following year's budget would be calculated according to the following equation:

$$\begin{aligned} \text{Deduction} = & \text{overage amount} + (\text{budget amount} * 1.00 - \text{budget amount} * 1.0051) * 0.20 + \\ & (\text{budget amount} * 2.00 - \text{budget amount} * 1.01) * 0.50 + (\text{overage amount} - \\ & \text{budget amount} * 2.01) \end{aligned}$$

The HSCRC recognized that actual utilization is unlikely to perfectly match the projected utilization on which the global budget is based. To compensate for some amount of deviation from the underlying utilization assumptions, hospitals are permitted to adjust their rates during the course of the year to reach their global budgets. However, there are limits on the size of adjustments that are permitted, and rate adjustments must be applied uniformly to all services. Hospitals are permitted to vary their charges from the approved rates by plus or minus 5 percent

Table 1
Penalties for revenue variation from approved budget by percent variation

Portion of revenue variation that differs from approved budget by	Penalty, revenue-approved budget	
	Less (underage)	Greater (overage)
0.0%–0.5%	No penalty; full amount carried over to following year budget	No penalty; full amount deducted from following year budget
0.51%–1.0%	20% penalty; 80% carried over to following year budget	Full amount plus 20% penalty deducted from following year budget
1.01%–2.0%	50% penalty; 50% carried over to following year budget	Full amount plus 50% penalty deducted from following year budget
>2%	100% penalty; no carryover to following year budget	Full amount plus 50% penalty; deducted from following year budget

without permission. Up to 10 percent variation is allowed but requires permission from the HSCRC. The HSCRC will consider variation beyond 10 percent under special circumstances—for example, to avoid penalizing hospitals for reductions in PAU and to provide continued support for investments required to achieve these reductions (HSCRC, 2014a). The HSCRC monitors hospitals’ charges and service volume using monthly reports to ensure compliance with the global budget of each hospital. Although there is no specified penalty for charge adjustments greater than the allowed percentage, if the charges in a rate center vary from the approved rate by more than the allowed percentage over the entire rate year, a noncompliance penalty is applied to the hospital’s budget in the subsequent year.

1.3 Overview of Evaluation Design

The evaluation of the Maryland All-Payer Model addresses a broad set of design, implementation, and outcome issues, organized in 10 domains:

- **Design and implementation of the new model:** What are the key features of the All-Payer Model? How are global budgets and other features of the All-Payer Model operationalized? How are they modified over time? How do hospitals and hospital systems respond to the new model?
- **Hospital revenue, volume, costs, and profits:** Do trends in hospital revenue, patient volume, operating costs, profits, and UCC change after implementation of the All-Payer Model? Do these trends differ by type of hospital (e.g., bed size, teaching status, whether the hospital operates under GBR or TPR, whether the hospital is part of a system)? To what extent do hospitals adjust their rates during the year to remain within their budgets? To what extent do hospitals experience penalties as a result of revenue variation from their approved budget?

- **Service utilization and expenditures:** Do trends in inpatient utilization and expenditures, ED utilization and expenditures, hospital outpatient department expenditures, professional service expenditures, and total expenditures per capita change after implementation of the All-Payer Model? Do changes in trends differ by payer (Medicare, Medicaid, and commercial insurance)? How do changes in per capita utilization and expenditure trends in Maryland compare with trends for populations in comparable hospital market areas in other states?
- **Service mix:** How does hospital patient mix change after the implementation of the All-Payer Model? How does utilization of specific hospital services and revenue centers change? Do the changes differ by payer? How does the change in Maryland compare with changes for hospitals and populations in comparison hospital market areas? What are the impacts of the model on adoption of new technology?
- **Market dynamics:** To what extent does hospital market share change after implementation of the All-Payer Model? Do trends in hospital consolidations, acquisitions, and expansion or contraction of services lines change? Do these changes differ by type of hospital? What types of providers and services are affected by these changes? To what extent are new hospitals opened and hospitals closed, and where is this occurring?
- **Quality of care:** How do care coordination, avoidable or reducible utilization, health outcomes, and beneficiary experience of care change after the implementation of the All-Payer Model? How does the change in Maryland compare with changes for populations in comparison hospital market areas?
- **Spillover effects:** Does the All-Payer Model result in the avoidance of complex or costly inpatient cases, unbundling of inpatient care, shifts in ED and outpatient clinic services to nonregulated settings, or increases in border crossing by both Maryland residents and nonresidents in obtaining inpatient care? Do these consequences differ by payer? How do changes in Maryland compare with changes for hospitals and populations in comparison hospital market areas?
- **Transformation of the health care workforce:** How do the characteristics of the health care workforce in Maryland change after the implementation of the All-Payer Model? What models of workforce training and development are implemented to support the All-Payer Model?
- **Comparison with IPPS:** How do inpatient payment rates for Medicare, Medicaid and commercial insurers in Maryland compare with payment rates in other states? Are Medicare and Medicaid payment rates higher in Maryland than in other states as a result of all-payer rate setting? Are payment rates for commercial insurers lower in Maryland than in other states as a result of higher Medicare and Medicaid payment rates and explicit adjustments for UCC in Maryland?

- **Comparison of the All-Payer Model with other state innovations:** How do outcomes of the Maryland All-Payer Model compare with those under other health care transformation innovation initiatives?

The evaluation of the Maryland All-Payer Model is based on a mixed-methods design, using both qualitative and quantitative methods and data to assess both the implementation and the outcomes of the model. Qualitative and quantitative analyses are complementary components of the evaluation, in many cases addressing the same issues from alternative perspectives. Qualitative analyses are used to provide insight into barriers and facilitators to implementing the new hospital payment model; hospital and other provider responses to the new model, including efforts to improve care coordination and quality of care delivered, unintended consequences of the model and impacts on market power, and impacts on the health care workforce. Quantitative analyses examine changes associated with the implementation of the Maryland All-Payer Model in hospital revenue, cost, and volume; patient-level service utilization and costs; hospital service mix; hospital market dynamics; quality of care; spillover effects of the new payment model; and characteristics of Maryland's health care workforce.

The Annual Report addresses all of the evaluation domains except the comparison of the All-Payer Model with other state innovations. That domain will be addressed in future reports covering time periods when the All-Payer Model is more established. This report also does not address every evaluation question in each domain. Most importantly, the current claims-based analyses use Medicare data only. Data for commercially insured and Medicaid populations will be incorporated in future reports. In addition, audited financial data were not available for the analyses of hospital revenue, volume, costs, and profits. For that domain, this report includes only analyses of hospital adherence to global budgets and approved rates.

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SECTION 2 DATA AND METHODS

2.1 Primary Data Collection and Analysis

The RTI evaluation team conducted two groups of qualitative interviews—hospital site visit interviews and key informant interviews. Hospital interviews used one of five protocols to guide and organize the conversations. These guides were designed for five broad stakeholder categories: (1) hospital management; (2) hospital financial staff; (3) quality and innovative initiative staff; (4) hospital-based physician leaders; and (5) hospital-based nursing leaders, social workers, and discharge coordinators. All protocols were based on the project’s evaluation research questions. Protocols are included in *Appendix A*.

Hospitals across the state were selected to participate in the first round of site visits. In an effort to capture the broadest possible picture of the initial implementation of the model in diverse settings, the final site-visit list comprised an equal mix of urban and rural facilities. Hospital selection also considered how big the hospital was and whether the hospital was affiliated with a system. Hospital site visits took place over 1 to 2 days. Two to four RTI staff participated in each site visit by either conducting the interview or taking summary-level notes. After each site visit, the site visit team summarized key observations that were common, or that differed, among hospitals visited in a debriefing document, which became the basis for the findings presented in *Section 4* of this report.

Table 2 shows the number of interviews and site visits conducted from March through July 2015. In this round, RTI interviewed 63 senior hospital leaders at 10 hospitals; senior hospital leaders included the chief executive officer, chief operating officer, chief financial officer, chief medical officer, chief nursing officer, and chief quality officer. RTI also conducted 11 key informant interviews with state staff, hospital advocacy groups, and selected payers.

Table 2
Interviews and site visits conducted as of July 2015

Category	N
Key informants	11
Hospital site visits	10
Hospital leaders	63

Interviews were complemented by focus group discussions with physicians and bedside nurses—a total of 19 at 10 hospitals. Focus group discussions included physicians who (1) have been working at the hospital for 5 years or more; (2) have a primary role of providing patient care, as opposed to teaching or working in laboratories; and (3) have a patient volume in the top 50 percent of physicians at their hospital. Clinical nursing staff, who included both floor staff and nurse managers that provide at least some direct clinical care, were recruited for separate focus groups. Hospitals assisted in identifying and recruiting health care providers for the focus

group discussions. We used the evaluation research questions to develop focus group protocols. We then used these protocols to guide discussions with providers. Focus group protocols are included in *Appendix B*.

Table 3 shows the number of physicians and nurses that participated in each focus group. RTI conducted 10 focus group discussions with a total of 101 nurses and nine focus groups with a total of 58 physicians. We conducted one nursing staff and one physician focus group in each hospital we visited, with the exception of one where we were unable to schedule a physician focus group. We attempted to recruit 10–12 participants for each focus group; the number of actual participants varied by session according to scheduling and willingness of clinical staff to participate. The size and number of focus groups did not vary according to the size of the hospital facility. By their nature, focus groups are descriptive and are not statistically representative of clinical staff in any given facility. Our goal in focus group discussions was to identify both common and unique perspectives from the experiences of a convenience sample of clinical staff.

Table 3
Focus groups completed as of July 2015

Hospital	Physicians (N)	Nurses (N)
A	7	14
B	10	12
C	3	7
D	11	10
E	4	10
F	9	17
G	3	9
H	5	11
I	—	7
J	6	4
Total	58	101

2.2 Secondary Data

To estimate the impact of the Maryland All-Payer Model on a broad range 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 eight of the evaluation domains: (1) hospital revenue, cost, and volume; (2) market dynamics; (3) service mix; (4) service utilization and expenditures; (4) quality of care; (6) spillover effects; (7) transformation of the Maryland health care workforce; and (8) comparison with IPPS/OPPS. All outcome measure specifications are included in *Appendix C*. In this report, we present

claims-based measures for the Medicare population. Results for commercial and Medicaid populations will be provided in future annual reports.

2.2.1 Data Sources

The secondary data sources used for this report are listed by domain in Table 4 and described in detail below. Additional detail about each data source is included in *Appendix D*.

Table 4
Secondary data sources

Domain	Data source
Comparison group selection	IPPS Impact file, AHA survey data, AHRF, and the state/county report for all Medicare beneficiaries
Hospital revenue, cost, and volume	HSCRC financial data, IPPS Impact file, and the MHCC annual report
Market dynamics	HSCRC financial data, CON data, MHCC annual report, and wage and salary survey data
Service mix	Medicare Part A and Part B FFS claims and enrollment files in the CCW data enclave
Service utilization and expenditures	Medicare Part A and Part B FFS claims and enrollment files in the CCW data enclave
Quality of care	Medicare Part A and Part B FFS claims and enrollment files in the CCW data enclave
Spillover effects	Medicare Part A and Part B FFS claims and enrollment files in the CCW data enclave
Transformation of Maryland health care workforce	Physician licensure and NPPES data
Comparison with IPPS/OPPS	Medicare Part A and Part B FFS claims and enrollment files in the CCW data enclave

AHA = American Hospital Association; AHRF = Area Health Resource File; CCW = Chronic Conditions Data Warehouse; CON = Certificate of Need; FFS = fee-for-service; HSCRC = Health Services Cost Review Commission; IPPS = Inpatient Prospective Payment System; MHCC = Maryland Health Care Commission; NPPES = National Plan and Provider Enumeration System; OPPTS = Outpatient Prospective Payment System.

Medicare Data. We used Medicare claims data provided by CMS in the Chronic Conditions Data Warehouse (CCW) to derive expenditure, utilization, quality of care, service mix, and spillover outcomes for Medicare beneficiaries in Maryland and the comparison group. Medicare data were also used to compare inpatient payment rates under the All-Payer Model with IPPS 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 (SNF), home health agency, hospice, and durable medical equipment claims; and (4) a health care characteristics file, which contains the Hierarchical Conditions Category (HCC) risk score⁹ 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 the first quarter of 2011 through the second quarter of 2015. 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 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.

HSCRC Financial Data. We used the HSCRC¹⁰ Experience Report to assess changes in rates charged by rate center. The Experience Reports include monthly revenue and volume data by rate center for each acute care hospital in Maryland.¹¹ These data are submitted monthly by hospitals within 30 days of the end of a month and, among other purposes, are used to monitor whether hospitals are charging rates in compliance with their rate corridors. Experience Report data are made available on a quarterly basis. These data were used in the hospital rate adherence analyses and in the market dynamics analyses. Finally, information on hospital rate orders and global budgets, obtained from the HSCRC, was used in the hospital revenue and rate adherence analyses.

Health Care Provider Licensure Data. The physician licensure data from the Maryland Board of Physicians was used in conjunction with the National Plan and Provider Enumeration System (NPPES) data to create a baseline profile of Maryland's physician workforce. The profile contains the total number of physicians in Maryland as of the end of the baseline period (2013). In addition, the profile contains the number and percentage of physicians by specialty and gender for physicians who were also included in the NPPES data.

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 include information on U.S. hospitals from the AHA's Annual Survey of Hospitals, AHA

⁹ The HCC grouping is based on the average of all beneficiaries' health risk scores, which is 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).

¹⁰ The HSCRC is responsible for monitoring hospital financial affairs in Maryland. The 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 (DHMH).

¹¹ Additional information on hospital financial databases maintained by the HSCRC is available at http://www.hsrc.state.md.us/hsp_Data2.cfm.

membership data, and U.S. Census Bureau identifiers. We used data on hospital ownership status from the AHA in the selection of comparison hospitals.

IPPS Impact File. The IPPS Impact file was used as an additional source of information for selecting the comparison group and for categorizing hospitals in the revenue, cost, and volume analyses. The IPPS Impact file contains data elements by provider that CMS uses in calculating the final IPPS rates and estimating payment impacts 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 Impact file to obtain data on hospital characteristics, including disproportionate share hospital (DSH) percentages, number of beds, number of residents, transfer-adjusted case mix, and Medicare days as a percentage of total inpatient days.

Area Health Resource File (AHRF). The AHRF comprises data collected by the Health Resources and Service Administration (HRSA) 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.

Medicare State/County Report. 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 fee-for-service (FFS) population. These data were used in selecting the comparison group.

Certificate of Need (CON) Data. The Maryland Health Care Commission (MHCC) requires a CON application when a new health facility is built, an existing facility is moved, bed capacity changes, the type or scope of health services offered changes, or a health facility makes capital expenditures that exceed a threshold established in Maryland statute. We used CON information from 2013 to describe hospital consolidation activity and to identify and categorize hospital market actions.

Annual Report on Selected Maryland Acute Care and Special Hospital Services. This report, produced each fiscal year by the 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. These data were used to analyze market actions and to categorize hospitals in the revenue, cost, and volume analyses.

Wage and Salary Survey Results. The HSCRC wage and survey results provide staffing data for 75 categories of hospital workers. The data were used to characterize hospitals undertaking market actions.

2.2.2 Comparison Group Selection

Overview. National trends in payment methodologies and provision of health care also 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, the evaluation uses comparison groups wherever possible to isolate effects of the Maryland All-Payer Model from those of other changes in the health care environment. Adding comparison groups controls for confounding factors as long as the comparison groups provide an accurate estimate of the trend that Maryland would have experienced without the implementation of the All-Payer Model. However, there are multiple challenges to selecting a comparison group for the 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 All-Payer Model, Maryland hospitals operated in a very different environment from and faced different financial and regulatory pressures than hospitals elsewhere in the country. Given Maryland's unique history, it is difficult to identify a comparison group that reflects the counterfactual of what would have happened in Maryland in the absence of the All-Payer Model.

Second, the comparison group for the evaluation must be drawn from outside Maryland because the All-Payer Model is 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 is unlikely that a single state provides the ideal comparison. Selecting the comparison population from multiple states and hospital market areas can reduce 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 focuses on a wide variety of research questions and specific areas of interest. Multiple comparison groups are necessary to adequately address these questions. The evaluation includes analyses at several different levels. Some analyses, conducted at the population level (e.g., per capita health care expenditures, hospital admission rates in a population), include all residents within a hospital market area. Other analyses are conducted at the admission level (e.g., hospital length of stay (LOS), hospital readmission rate). A small number of analyses are conducted at the hospital level (e.g., hospital proportion of revenue from inpatient expenditures, hospital surgical-to-medical admission ratio).

Having acknowledged difficulties in identifying credible comparison groups, we now turn to describing our comparison group identification strategy. The comparison group is used as a counterfactual to the Maryland All-Payer Model. Therefore included hospitals and hospital market areas from which the comparison population is drawn should closely resemble Maryland hospitals and the populations residing in their market areas. RTI 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 population residing in these areas. This two-stage selection process allowed us to create equitable comparison groups for both hospital admission-level and population-level outcomes.

As described in the following sections, we matched Maryland hospitals with comparison hospitals using hospital and market characteristics during the baseline period and also balanced

individual and market area characteristics at the person level in our analyses 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 All-Payer Model implementation period. Although these changes can be viewed as the counterfactual against which Maryland is being compared, some might affect the comparability of these groups. For example, Illinois, where a large number of comparison hospitals are located, participates in a demonstration in which dually eligible beneficiaries in selected counties are enrolled in capitated managed care for both Medicare and Medicaid services, although they can 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 somewhat in the first quarter of 2015. Dual eligible status is one of the characteristics used in propensity score weighting, which allows us to adjust for changes in the proportion of dually eligible beneficiaries over time. However, the dually eligible beneficiaries in Illinois who opt out of the demonstration and remain in FFS Medicare may be systematically different from the overall dually eligible population in unobservable ways, and this difference could potentially bias the comparison. The impact of the decline in the comparison group dually eligible population on the results in this report is minimal because it affects only one of five quarters of the implementation period, and dually eligible beneficiaries are a relatively small portion of the overall Medicare population. Furthermore, Illinois is only one state from which the comparison group is drawn, although it does comprise a disproportionately large share. If this reduction in the proportion of dually eligible beneficiaries continues or other important external changes occur during the All-Payer Model implementation period, we will explore including covariates in outcome regression models to control for their impacts.

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 *Appendix E*.

Hospital Selection. Hospitals in all states except Maryland in the IPPS Impact file were considered as potential comparison hospitals. We used variables from the IPPS Impact file, HRSA's AHRF, the AHA survey, and the state/county report for all Medicare beneficiaries to select comparison group hospitals.

We considered variables in four broad domains: (1) hospital characteristics; (2) baseline market area demographics; (3) baseline Medicare costs; and (4) baseline 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 limited. Therefore, we used least absolute shrinkage selection operator (LASSO) regression estimation to identify a robust list of observed covariates to select comparison group hospitals and achieve balance with Maryland hospitals. The final covariates and domains, which include hospital and market area characteristics, are as follows:

- Hospital characteristics (hospital-level variables):
 - Bed size.

- Resident physicians per bed.
- Proportion of hospital discharges that are Medicare beneficiaries.
- 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 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).

Maryland has substantial diversity within its 47 short-stay acute care hospitals. However, we felt it was critical to achieve an exact match to comparison hospitals on two characteristics: whether the hospital is the sole hospital in the county and teaching status. All sole county hospitals in Maryland are nonteaching hospitals. Therefore, we stratified Maryland and all potential comparison hospitals into three groups: (1) sole county hospital (15); (2) nonteaching hospitals that are not sole county hospitals (19), and (3) teaching hospitals (13). Sole county hospitals were defined as those in a county with no other hospitals. Teaching hospitals were those with a ratio of residents to beds greater than 0.05. We required an exact match on this hospital classification and then matched Maryland to potential comparison group hospitals within each stratification.

In a preliminary approach, we implemented logistic regression to generate propensity scores and various propensity score matching strategies to select comparison hospitals. Another preliminary approach utilized a hybrid propensity score Mahalanobis distance strategy. However, neither of these approaches produced acceptable covariate balance on observed characteristics. We then implemented a computer-assisted algorithm to facilitate comparison group selection. 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 (Diamond and Sekhon, 2012). We selected up to two comparison hospitals for each Maryland hospital. Each comparison hospital could match with more than one,

but a maximum of three, Maryland hospitals. A standardized difference 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. The standardized differences for covariates for Maryland hospitals compared with the final matched comparison hospitals are shown in *Appendix E*. The standardized difference for each covariate was less than 0.25. The final set of 48 selected comparison hospitals was drawn from 12 states (see *Appendix E*).

Market Area Selection. The Maryland All-Payer Model includes a commitment to focus on population health, and Maryland hospitals, to some extent, are expected to have a positive impact on population health. For the purposes of this evaluation, the hospital market area is defined to be an area where the population could reasonably be expected to be impacted by the hospital. We expect that hospitals will have the greatest influence on population health in the geographic areas located nearest them because they are likely to provide a larger proportion of hospital services to this population.

To create the hospital market areas, we considered several options based on proximity to the hospital and percentage of hospital admissions originating from the geographic area. The options considered and their performance along these two dimensions are described in *Appendix E*. Ultimately, we used the hospital service areas (HSAs) defined in the *Dartmouth Atlas of Health Care*. HSAs are locally defined markets for receipt of hospital care. Each HSA is a collection of ZIP codes in 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 (*Dartmouth Atlas of Health Care 1999*, n.d.). The 48 selected comparison hospitals were located in 46 different market areas. We defined the comparison group individuals as those who resided in the HSA where a comparison group hospital was located. We identified Medicare beneficiaries' area of residence from the Medicare denominator file.

2.2.3 Analysis

Propensity Score Weights and Balance Diagnostics. After selecting comparison hospitals and hospital market areas, we constructed person-level propensity score weights using Maryland and comparison group residents to balance the groups on individual and market area characteristics. Propensity weights were derived from logistic regressions for the probability of being a Maryland resident. Unlike in the comparison hospital selection, where we were constrained by the small number of Maryland hospitals, there are many Maryland residents so we were not limited in the number of covariates that could be included in a conventional propensity score model using logistic regression. Logistic regressions were calculated for three populations corresponding to three different levels of analysis: (1) all residents of Maryland and the comparison group hospital market areas; (2) residents of Maryland and the comparison group hospital market areas who had at least one inpatient admission during the year; and (3) residents of Maryland and the comparison group hospital market areas who had at least one ED visit during the year.

We included the following covariates in the logistic regression models:

- Age.

- Race (White=1).
- Dually eligible status.
- Gender.
- Originally entitled to Medicare because of disability status.
- End-stage renal disease status.
- HCC score.
- County population density.
- County unemployment rate.
- County percentage of persons 25+ years of age with a high school diploma.
- County percentage of persons 25+ years of age with four or more years of college.
- County uninsured rate among individuals under age 65.
- County short-term general acute care beds per 1,000 residents.
- County primary care physicians (PCPs) per 1,000 residents.
- County urban area indicator.
- County health professional shortage area for primary care indicator.

The propensity score is the predicted probability of the dependent variable's 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 and a weight of propensity score/(1-propensity score) for individuals in the comparison group. We limited the propensity score weights to a range of 0.05 to 20 by recoding any values outside of that range. Failure to restrict propensity score weights in this way may result in individual observations having excessive influence on outcome regression models. Furthermore, excessively large weights challenge the tenability of the exchangeability assumption in the counterfactual model—that is, excessively small or large weights challenge the idea that the comparison group is actually exchangeable with the treated 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. A conventional threshold for acceptable covariate balance is an absolute standardized difference ≤ 0.10 (Austin, 2011). However, exceptions are typical for small sample sizes and very small or very large proportions. Researchers also point out that critical variables in determining selection into treatment (e.g., those with significant effects in the propensity score equation) should have greater balance,

whereas indicators with minor importance in determining treatment selection do not require optimal balance. We found that all covariates had a standardized difference of less than 0.10, with the exception of the county uninsured rate among individuals under 65 and the county percentage of persons 25+ years of age with a high school diploma, which had standardized differences of 0.13 and 0.28, respectively. The full covariate balance details are shown in *Appendix E*. 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.

Using a 2:1 ratio of comparison hospitals to Maryland hospitals with replacement, we allowed several non-Maryland hospitals to be selected as comparison hospitals up to three times. Similarly, we used the corresponding HSA as a comparison market area up to three times. To account for this repetition in outcome regression models, we created HSA weights (1/number of times the HSA was used). The final propensity weights were the propensity score weights for each of the three propensity score models estimated, multiplied by the HSA weights.

Descriptive Analyses. In this report, we present results of both descriptive trends and D-in-D analyses. For the descriptive analyses of key utilization, expenditure, and quality of care trends, we present graphs of quarterly averages for Maryland and the comparison group Medicare beneficiaries for the baseline period (2011–2013) and the first five quarters of the All-Payer Model period (first quarter 2014 through first quarter 2015). The denominators for the key outcomes are included in *Appendix F*.

The quarterly averages were weighted by the product of two factors: (1) the fraction of the quarter during which the beneficiary was eligible for the analyses (the eligibility fraction), and (2) the beneficiary's propensity score. Because some individuals were not enrolled in Medicare throughout an entire period, we calculated eligibility fractions for each individual. The eligibility fraction is defined as the total number of months the person was enrolled in a given period divided by total number of months in the period. For example, an individual enrolled in Medicare for 2 months of a quarter has an eligibility fraction of 0.66 for that 3-month period. The eligibility fraction was used to inflate outcomes, such as expenditure and utilization data, if an individual was not enrolled for an entire period for any reason, including death.¹² Inflating these outcomes provides comparability to those for individuals who are enrolled for the full quarter. The eligibility fractions are also used to calculate weighted average outcomes. The eligibility fractions downweight observations for beneficiaries who are not eligible for the full period because there is greater uncertainty about the information, so they exert less influence on the analyses.

In addition to comparing trends in quarterly averages for Maryland and the comparison group, we conducted descriptive pre-post analysis for Maryland only for some outcomes that were available or pertinent only for Maryland hospitals. For these outcomes, we examined

¹² We chose to not prorate people who died in a time period differently because we did not expect there to be a difference in the death rate between Maryland and comparison areas. The impact of inflating outcomes for decedents is more modest for outcomes measured over quarterly rather than annual periods.

whether trends in Maryland changed after the All-Payer Model was implemented, and we present graphs of trends in the baseline and post periods for Maryland.

Regression Model. As described earlier, the evaluation uses a D-in-D quasi-experimental design to estimate impacts in Maryland relative to the comparison group after the implementation of the All-Payer Model. The following sections describe the baseline analysis we conducted to inform the model specification, the final model specification details, and an explanation of the interpretation of the model results shown in subsequent sections.

Baseline Analyses. A quarterly fixed-effects model considered for the evaluation is shown in **Equation 2.1**:

$$y = \alpha_0 + \alpha_1 I \sum \beta_n Q_{n,b} + \delta_0 Post + \sum \phi_t Q_{t,p} \bullet I + \delta X + \mu, \quad (2.1)$$

where

- y = a performance measure (e.g., total per-beneficiary-per-month [PBPM] cost per quarter) 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).
- $Post$ = a 0,1 indicator (0 = base period, 1 = post [All-Payer Model] period).
- X = a vector of patient and hospital characteristics.
- $Q_{n,b}, Q_{t,d}$ = 0,1 indicator of the n -th or t -th calendar quarter in the base (b) or post (p) period (n starts counting at first baseline period, whereas t starts with first All-Payer Model quarter).
- μ = error term.

The model in **Equation 2.1** assumes that, except for an intercept difference α_0 , the outcomes for beneficiaries in Maryland and beneficiaries in the comparison groups 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 the D-in-D model in **Equation 2.1**—that is, whether the outcome trends for beneficiaries in Maryland and in the comparison group were similar during this period. Because we have 12 baseline quarters, it is possible to assess whether baseline outcome trends were, in fact, similar across groups.

One option for testing the assumption that Maryland and the comparison group had similar baseline trends is to estimate the model in **Equation 2.1** for the baseline period only and expand the model by including a set of interactions between I_j (the Maryland indicator) and the indicators for the baseline quarters on the right-hand side of the model. Statistically significant interaction coefficients would indicate whether the outcome difference between Maryland and the comparison group increased or decreased in particular baseline quarters. However, it is

difficult to make a judgment about a trend on the basis of a large number of interaction coefficients because it is not clear how to interpret the many sequences of significant and insignificant coefficients that could arise.¹³

As an alternative, simpler approach to testing the similarity of baseline trends, we used a model with a linear trend during the baseline period. We tested whether this trend differed for Maryland beneficiaries relative to comparison group beneficiaries. Specifically, the model for the outcomes may be written as follows.

$$y = \alpha_0 + \alpha_1 I + \theta \bullet t + \lambda I \bullet t + \delta X + \mu. \quad (2.2)$$

In **Equation 2.2**, y , I , X , and μ are defined as in **Equation 2.1**. The variable t is linear time ranging from 1 to 12. The linear time trend in the comparison group is $\theta \bullet t$, whereas for Maryland beneficiaries ($I = 1$) it is $(\theta + \lambda) \bullet t$. Hence, λ measures the difference in linear trends and the t-statistic for this coefficient can be used to test the null hypothesis of equal trends ($\lambda = 0$). In other words, rejecting the null hypothesis would suggest that the assumption of equal trends underlying our outcome models is not met.

The parameters of **Equation 2.2** were estimated using weighted least-squares 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).

Tables 5 and 6 show estimates of the baseline trend differences for the following outcomes:

- Total Medicare expenditures.
- Medicare expenditures for short-stay, acute care hospitalizations.
- Medicare expenditures for outpatient ED visits.
- Medicare expenditures for other hospital outpatient department care.
- Medicare payments per acute inpatient stay.
- Medicare payments per outpatient ED visit.
- Probability of any acute inpatient stay.
- Probability of any outpatient ED visit.
- Probability of any ambulatory care sensitive condition (ACSC) admission.
- Probability of readmission within 30 days after an inpatient discharge.

¹³ For example, suppose that the interactions coefficients for quarters 2, 5, and 8 are statistically significant. From such a pattern, it would be difficult to conclude whether outcome trends during the baseline period were similar or not.

- Probability of a follow-up visit within 14 days after an inpatient discharge.
- LOS for an acute admission.

Table 5
Differences in average quarterly PBPM Medicare expenditures and expenditures per admission and per ED visit during the baseline period, Maryland Medicare FFS beneficiaries and comparison group beneficiaries

Parameter estimate	Total (\$)	Acute care (\$)	ED (\$)	OP (\$)	Payment per acute admission (\$)	Payment per ED visit (\$)
Maryland–CG trend difference	−0.50 (0.82)	−2.10*** (0.59)	0.64*** (0.032)	1.12*** (0.14)	−20.86** (10.21)	19.46*** (9.67)

NOTES: CG = comparison group; ED = outpatient emergency department; FFS = fee for service; OP = other hospital outpatient department; PBPM = per beneficiary per month. Baseline is the period January 2011–December 2013. The trend (slope) is the quarter-to-quarter change in PBPM Medicare expenditures or probability of use. Standard errors are given in parentheses. *p<0.10; **p<0.05; ***p<0.01.

Table 6
Differences in probability of use and length of stay during the baseline period, Maryland Medicare FFS beneficiaries and comparison group beneficiaries

Parameter estimate	Any inpatient	Any ED visit	Any ACSC admission	Any 30-day readmission	Any 14-day follow-up after discharge	Length of stay
Maryland–CG trend difference	0.000037 (0.000029)	−0.00032*** (0.000033)	−0.000024* (0.000014)	−0.00010 (0.00030)	0.00010 (0.00020)	0.012** (0.0050)

NOTES: ACSC = ambulatory care sensitive conditions; CG = comparison group; ED = outpatient emergency department; FFS = fee for service. Baseline is the period January 2011–December 2013. The trend (slope) is the quarter-to-quarter change in probability of use or length of stay. Standard errors are given in parentheses. *p<0.10; **p<0.05; ***p<0.01.

Relative to the comparison group, there was no statistically significant difference in the baseline trend for total Medicare expenditures. This overall result masks differences in the subcategories, however; acute inpatient expenditures declined faster in Maryland than in the comparison group (−\$2.10 PBPM per quarter), whereas outpatient ED and other hospital outpatient department expenditures increased slightly faster in Maryland than in the comparison group (\$1.12 and \$0.64 PBPM per quarter, respectively). The payment per acute admission decreased at a faster rate in Maryland than in the comparison group over the baseline period (−\$20.86 per admission per quarter), but the payment per outpatient ED visit increased faster in Maryland than in the comparison group over the same period (\$19.46 per ED visit per quarter).

Relative to the comparison group, there was no statistically significant difference in the change in the probability of having an acute inpatient stay in Maryland, whereas the probability of having an outpatient ED visit increased slightly more slowly (0.032 percentage point slower gain in the probability of an ED visit per quarter, Table 6). In addition, over the baseline period, ACSC admissions had a marginally significant ($p < 0.10$) faster decline in Maryland relative to the comparison group, no statistically significant difference was seen in the trend in probability of a 30-day readmission or 14-day follow-up visit after an acute inpatient discharge, and the length of an acute inpatient stay increased 0.012 days faster per quarter in Maryland.

In summary, there were statistically significant differences in baseline trends for several of the selected payment and utilization outcomes; 7 of the 12 measures we assessed had a statistically significant difference in their baseline trend at the $p < 0.05$ level, and one additional outcome had a difference at the $p < 0.10$ level. Nonetheless, the magnitude of the differences was generally quite small, and the statistical significance may be due in part to the large sample size. In other words, we have the power to detect very small changes in trends between Maryland and the comparison group over the baseline period. Although baseline trends did appear similar, we concluded that we cannot assume that Maryland and the comparison group were on the same trajectory before the implementation of the All-Payer model.

Specification. Despite the relatively small changes in trends over the baseline period, we opted to take a conservative approach that allows us to generate impact 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. The linear time trend controls for differences between Maryland and the comparison group over time. As such, the D-in-D interaction term measures the deviation of the difference between Maryland and the comparison group in the post period from the trend line. This model specification allows for differences in estimates in Maryland and the comparison group during the baseline period, and it allows for a straightforward interpretation of the D-in-D coefficient.

The D-in-D model is shown in **Equation 2.3**. The model includes the quarterly interaction terms from **Equation 2.1** along with the linear time trend in **Equation 2.2**. As in **Equation 2.1**, Y_{ijt} is the outcome for individual i in state (MD or comparison group) j in quarter t ; I_{ij} ($=0,1$) 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 17, where $t=1$ in the first calendar quarter (first quarter 2011) and 17 in the last calendar quarter (first quarter 2015). The term that interacts the MD indicator and time ($I_{ij} * t$) measures differences in trends between Maryland and the comparison group over the entire period. Q_t is a series of quarter dummies for the post quarters ($t=13$ to 17). The interaction of the Maryland indicator and Q_t ($I_{ij} * Q_t$) measures the difference in the pre-post change between Maryland and its comparison states. With this model specification, the post quarter*Maryland interactions measure any deviation from the trend line in the post period.

$$Y_{ijt} = \alpha_0 + \beta_1 I_{ij} + \alpha_1 t + \beta_2 I_{ij} * t + \alpha_2 Q_t + \gamma I_{ij} * Q_t + \lambda X_{ijt} + \varepsilon_{ijt} \quad (2.3)$$

Table 7 illustrates the interpretation of the D-in-D estimate from this model. The coefficient β_1 in **Equation 2.3** is the difference in the measure between individuals in Maryland and the comparison group at the start of the baseline period, holding constant other variables in the equation. For individuals in the comparison group, the baseline time trend is captured by α_1*t , whereas for individuals in Maryland, it is $(\alpha_1 + \beta_2)*t$. The α_2 coefficient captures any deviations from the time trend line during each post quarter. The coefficient of the interaction term between Q_t and Maryland (I) measures any deviations from the trend line in the post period that are different for Maryland relative to the comparison group. Thus, in the post period, the comparison group mean is captured by $\alpha_0 + \alpha_1*t + \alpha_2$, whereas the Maryland mean is captured by $(\alpha_0 + \beta_1) + (\alpha_1 + \beta_2)*t + (\alpha_2 + \gamma)$. In other words, the between-group difference changes from $\beta_1 + \beta_2*t$ during the baseline years to $\beta_1 + \beta_2*t + \gamma$ during the post period. The D-in-D parameter, γ , shows whether the between-group difference increased ($\gamma > 0$) or decreased ($\gamma < 0$) after the All-Payer Model was implemented. If the All-Payer Model was successful in reducing expenditures or utilization in Maryland relative to the comparison group, then $\gamma < 0$.

Table 7
Difference-in-Differences estimate

Group	Pre period	Post period	Pre-post difference
Maryland	$(\alpha_0 + \beta_1) + (\alpha_1 + \beta_2)*t$	$(\alpha_0 + \beta_1) + (\alpha_1 + \beta_2)*t + (\alpha_2 + \gamma)$	$\alpha_2 + \gamma$
Comparison	$\alpha_0 + \alpha_1*t$	$\alpha_0 + \alpha_1*t + \alpha_2$	α_2
Between group	$\beta_1 + \beta_2*t$	$\beta_1 + \beta_2*t + \gamma$	γ

All of the population-based regression models were estimated with the beneficiary quarter 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 quarter on the basis of date of service. For the utilization outcomes, we converted quarterly utilization counts into binary outcomes (1 = any use) and used weighted linear probability regression models. Count models are not appropriate because of the low occurrence of multiple hospitalizations and ED visits for individual beneficiaries in any quarter. We chose to use the linear probability model rather than a logistic regression model because the estimates are consistent and easy to interpret. For expenditure outcomes, we used weighted generalized linear models with a normal distribution and identity link.

Control Variables. Control variables included individual-level variables (age, gender, race, dual status, original reason for Medicare entitlement based on disability, presence of end-stage renal disease, HCC risk score, number of chronic conditions) and county-level variables (urban/rural, percentage uninsured, percentage with high school and college educations, percentage in poverty, and supply of hospitals and other providers). In addition, admission-level models for service mix (**Section 7**) and spillover effects (**Section 10**) controlled for the hospital's resident-to-bed ratio, number of short-term acute beds, area wage index, and DSH percentage, as well as a measure of case mix (diagnosis-related group [DRG] weight for the admission for the spillover effects models and case-mix severity index for the service mix models). In addition, the

service mix models controlled for the percentage of the county population that is enrolled in Medicare. Hospital-level models for service mix controlled for resident-to-bed ratio, number of short-term acute beds, and DSH percentage.

Weighting and Clustering. All of the regression models were estimated using weighted least squares. Person-level models were weighted by the propensity score times the eligibility fraction times the HSA weight; admission-level analyses were weighted by the propensity score times the HSA weight. The HSA weight accounts for any hospitals or market areas that appear more than once in the comparison group. In addition, all of the person-level models and admission-level models in *Sections 6* and *9* took into account nested clustering at the beneficiary and ZIP code levels to account for multiple observations per person and per ZIP code. Hospital-level models and admission-level models in *Sections 7* and *10* took into account clustering at the hospital level.

Interpreting the Findings. The adjusted D-in-D estimate answers the question, “What is the average difference in the pre-post change in the outcome measure between Maryland and its comparison group?”

- A nonsignificant result indicates that, after adjusting for observed covariates, there was no statistically significant difference in the change in the outcome measure in Maryland compared with the change in the comparison group.
- A significant negative value corresponds to one of the following scenarios:
 - A slower rate of increase in the measure in Maryland relative to the comparison group.
 - A faster rate of decline in the measure in Maryland relative to the comparison group.
 - A decline in the measure in Maryland and an increase in the comparison group.
- A significant positive value corresponds to one of the following scenarios:
 - A faster rate of increase in the measure in Maryland relative to the comparison group.
 - A slower rate of decline in the measure in Maryland relative to the comparison group.
 - An increase in the measure in Maryland and a decline in comparison group.

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SECTION 3 DESIGN OF THE ALL-PAYER MODEL

3.1 Comparison of All-Payer Model With Previous Maryland Waiver and Medicare Prospective Payment Systems

Maryland's All-Payer Model builds on the state's longstanding Medicare waiver, retaining or only slightly modifying some features of the hospital payment system while changing others in fundamental ways. Similarly, the All-Payer Model differs from the Medicare IPPS and OPPS in many respects, but has some comparable features. Understanding the commonalities and differences between these payment systems provides a framework for identifying expected impacts of the All-Payer Model and the features of the All-Payer Model design that may be driving any impacts identified in the evaluation or may help explain the absence of impacts. Table 8 summarizes key elements of the All-Payer Model design and contrasts these with Maryland's previous hospital payment system and Medicare's IPPS/OPPS. These design features are discussed in greater detail below.

Table 8
Comparison of design of Maryland's All-Payer Model with previous Maryland hospital payment system and Medicare IPPS/OPPS systems

Design feature	Maryland All-Payer Model	Previous Maryland hospital payment system	IPPS/OPPS
Participating payers	All payers	All payers	Medicare
Participating providers	Hospitals	Hospitals	Hospitals
System financial performance criteria	<ul style="list-style-type: none"> All-payer per capita total (inpatient and outpatient) hospital cost growth must remain below the previous 10-year growth in gross state product (3.58% for first 3 years) \$330 million in savings to Medicare over 5 years based on the Medicare per beneficiary total hospital cost growth rate in Maryland compared with the national growth rate 	Cumulative growth in Medicare inpatient payments per admission since January 1981 must remain below cumulative growth nationally	None
Limits on overall hospital revenues	Limited to annual hospital revenue target (global budget) with penalties for overages and underages	None, except for hospitals operating under TPR model	None

(continued)

Table 8. (continued)
Comparison of design of Maryland’s All-Payer Model with previous Maryland hospital payment system and Medicare IPPS/OPPS systems

Design feature	Maryland All-Payer Model	Previous Maryland hospital payment system	IPPS/OPPS
Unit of payment	<ul style="list-style-type: none"> • Revenue center rate x volume • Hospital-specific rates based on hospital’s historical costs trended forward • Rates can be adjusted within limits to meet hospital’s revenue target 	<ul style="list-style-type: none"> • Revenue center rate x volume • Hospital-specific rates based on hospital’s historical costs trended forward • Rates can be adjusted within limits to meet hospital’s episode/case limits 	<ul style="list-style-type: none"> • Prospective case-based payment • National base rates
Uncompensated care	Average of hospital’s historical actual and projected charity care and bad debt percentage	Average of hospital’s historical actual and projected charity care and bad debt percentage	Disproportionate patient percentage (based on sum of Medicaid days and Medicare Supplemental Security Income days)
Pay-for-performance initiatives	<ul style="list-style-type: none"> • Readmissions reductions • MHAC reductions • Quality-based reimbursement • Must meet national Medicare performance standards with flexibility to experiment with alternative designs • Must meet quality targets related to readmissions and admissions for PPCs 	<ul style="list-style-type: none"> • Readmissions reductions • MHAC reductions • Quality-based reimbursement • Must meet national Medicare performance standards with flexibility to experiment with alternative designs 	<ul style="list-style-type: none"> • Readmissions reductions • HAC reductions • Value-based purchasing
Population-based payment	<ul style="list-style-type: none"> • No, but expected to transition to population-based model with total per capita cost of care test by Year 6 • Maryland must submit annual report demonstrating performance on various population health measures 	No	No

NOTE: HAC = hospital-acquired condition; IPPS = Inpatient Prospective Payment System; MHAC = Maryland HAC; OPPS = Outpatient Prospective Payment System; PPC = potentially preventable complication; TPR = Total Patient Revenue.

3.1.1 Participating Payers

Unlike IPPS and OPPS, which govern hospital payments for Medicare patients only, Maryland’s All-Payer Model and the previous hospital payment system encompass Medicare, Medicaid, and commercial payers. A goal of Maryland’s all-payer rate setting system has been to

reduce cross-subsidization of publicly insured patients by commercial payers. As a result, Medicare and Medicaid payment rates in Maryland may be relatively higher than those in other states, but commercial insurer payment rates may be relatively lower.

3.1.2 Participating Providers

All three payment systems are limited to hospital providers. Hospital utilization is a large component of health care expenditures and controlling hospital costs is critical to reducing overall health care expenditure growth. However, it may be difficult for hospitals to alter some of the key drivers of hospital utilization, including population health and the decision to admit a patient, without partnerships with community providers.

3.1.3 System Financial Performance Criteria

The financial performance criterion in Maryland's previous waiver was based on Medicare payments per inpatient admission. A per admission requirement focuses on the price and intensity of inpatient services, but not the volume. Without requirements related to the volume of hospital admissions and outpatient hospital services, even if the per admission criterion was met, total hospital expenditures for Medicare patients could increase faster than under IPPS/OPPS and still satisfy the financial performance criterion. In addition, there were no requirements related to Medicaid or commercially insured patients. Maryland's agreement with CMS for the All-Payer Model has more encompassing financial performance criteria, which include both inpatient and outpatient hospital expenditures and are based on per capita, rather than per admission, expenditure growth. The per capita expenditure growth criterion captures the intensity, price, and volume of services. Furthermore, unlike Maryland's previous waiver, the All-Payer Model agreement has two financial performance criteria—one related to all-payer per capita expenditure growth and one related to Medicare per beneficiary expenditure growth. As in Maryland's previous waiver, the Medicare growth criterion is tied to Medicare expenditure growth nationally. The all-payer growth criterion is tied to Maryland's GSP. The impact of these criteria depends on where they are set. If they are set too high, it is possible that hospital expenditure growth will be no less—and could even be more—than it would be in the absence of the All-Payer Model. Hospital operating margins might also increase. Growth criteria that are too low may force excessive restrictions in hospital budgets, leading to lower quality hospital care or declining operating margins.

3.1.4 Limits on Overall Hospital Revenues

Of the three payment systems, only the All-Payer Model incorporates direct limits on overall revenues for all hospitals through prospectively established annual budgets. IPPS/OPPS does not directly limit overall revenues and hospitals have incentives to increase volume to increase their revenues. This was also the case for most Maryland hospitals under the state's previous hospital payment system. Maryland's previous payment system only weakly limited the volume of hospital services through the variable cost factor. The exception was the 10 hospitals that operated under TPR and already had fixed annual budgets that limited their overall revenues. The transition to the All-Payer Model represents a less fundamental change for these 10 hospitals than other hospitals in Maryland. With a few exceptions, the hospital budgets in the All-Payer Model encompass all hospital services, including services to non-Maryland residents, which limits opportunities to expand hospital revenues by increasing utilization of services outside the

budget cap. Hospital budgets are based on hospitals' historic utilization and costs, with adjustments for inflation, changes in market share and population demographics, expected reductions in unnecessary utilization, quality performance, and UCC trends. Hospital budgets provide a mechanism for Maryland to meet the system financial performance criteria of the All-Payer Model. Similar to the system financial performance criteria, it is not known how annual budgets will affect hospital behavior. Fixed hospital budgets are expected to provide incentives to limit both the volume of hospital services provided and the cost per service (e.g., the cost per admission). If they are set too high, they may not result in meaningful changes in hospital behavior or may lead to increases in hospital operating margins. Budgets that are too low may reduce the availability or quality of hospitals' services or may undermine hospital financial performance. The extent to which the fixed budget affects hospital behavior is likely to vary across hospitals.

3.1.5 Unit of Payment

Both the All-Payer Model and Maryland's previous system pay hospitals using rates for a universe of 51 revenue centers (HSCRC, 2012) and the units of service provided. Under both the previous system and the All-Payer Model, payment rates are based on hospitals' historical costs, which are trended forward. Unlike Maryland's previous system, hospital payments under the All-Payer Model are limited by their fixed annual budget constraint. Under the All-Payer Model, hospitals can vary their rates within a limited corridor to meet their budgets, but the hospital is at risk for any overages or underages if revenues exceed or fall short of the fixed budget. Under the previous payment system, hospitals could vary their rates to meet per-case or per-episode charge limits. In contrast, the IPPS and OPps do not use revenue centers as the basis for payment; they categorize inpatient admissions or outpatient visits into one of 746 Medicare Severity Diagnosis-Related Groups or 324 Ambulatory Payment Classifications. These groupings are then used as a payment weight, with more costly conditions being assigned a higher weight. Weights and base payment rates are established using national data. Unlike the All-Payer Model system and Maryland's previous hospital payment system, which pays for each unit of service provided, the intent of the prospective payment mechanisms is to limit the incentive to increase testing, procedures, LOS, and overall increased intensity of services where it is unwarranted. Hospitals under the IPPS and OPps have incentives to increase overall volume (outside of readmissions penalties), but they have a stronger incentive than hospitals under the All-Payer Model to control within-case intensity. Although Maryland's previous payment system was based on payments per unit of service provided, it incorporated payment limits that created volume incentives similar to those of the IPPS and OPps. Under the All-Payer Model, incentives to limit volume and intensity come through the fixed annual budget rather than through the unit of payment.

3.1.6 Uncompensated Care

Hospitals that treat a disproportionate share of low-income patients receive adjustments to the federal portion of the operating cost DRG payment, excluding outlier payments. This includes a DSH payment, tied to the proportion of Medicaid and Medicare Supplemental Security Income inpatient days, and a UCC payment tied to the aggregate number of applicable low-income patients as a share of the national total. UCC is included in the hospital payment rates under both the All-Payer Model and Maryland's previous payment system. The UCC pool of funds is determined on the basis of two equal factors: (1) historical percentage of gross

revenues made up of charity care and bad debt and (2) a regression-predicted amount. As of May 2013, Maryland exercised the option under the ACA to expand its Medicaid program. This expansion will likely decrease the amount of uncompensated hospital care. Maryland's UCC adjustment differs from that of the IPPS system, which is calculated using only the percentage of applicable low-income patients and not the share of revenues from these patients. It is not immediately clear if Medicare's DSH and UCC payments or Maryland's UCC adjustment to payment rates is more generous and would thus encourage less "dumping" of uninsured patients. However, Maryland's adjustment accounts for variation across hospitals in the costs associated with low-income, uninsured populations. Unlike in the IPPS system, the UCC adjustments in Maryland apply to all payers, which limits cost-shifting across payers.

3.1.7 Pay-for-Performance Initiatives

As part of the ACA reforms of 2010, Medicare's IPPS incorporated quality-based payment incentives for readmissions reductions, VBP, and hospital-acquired condition (HAC) reductions. The CMS readmissions measures calculate excess readmissions ratios for acute myocardial infarction, heart failure, pneumonia, total hip arthroplasty and total knee arthroplasty, and chronic obstructive pulmonary disease, compared with the national average, for the hospital's set of patients with those applicable conditions. These readmissions are risk adjusted using age, gender, comorbidities, and patient frailty. The readmissions measure is a one-sided savings mechanism, whereby CMS will recover the losses from excess readmissions (up to 3%); providers can only maintain the full base operating DRG payment and cannot earn a bonus for reducing readmissions. The incentive of the VBP program gives hospitals the potential to earn additional payments or be penalized depending on whether they meet certain quality benchmarks. In FY 2014, the maximum bonus factor is 1.37 percent of the wage-adjusted base DRG payment, and the maximum penalty is a 1.25 percent downward adjustment. CMS also imposes a penalty on hospitals that perform poorly with regard to patient safety. Under the HAC reduction program, hospitals that fall in the lowest performing quartile are paid 99 percent of what otherwise would have been paid under IPPS. This applies to the hospital's total Medicare payment, including adjustments for indirect medical education and DSH, which will disproportionately affect teaching hospitals.

Maryland hospitals are subject to similar programs, including a 30-day all-cause readmissions penalty, the MHAC program, and the QBR program. Under both the agreement with CMS for the All-Payer Model and the previous waiver, Maryland is required to meet national Medicare performance standards; however, the state is granted flexibility to experiment with alternative designs. The All-Payer Model agreement with CMS incorporates quality requirements related to reductions in the 30-day all-cause readmission rate and admissions for PPCs. Maryland's readmissions program has several differences from the IPPS program. The Maryland readmissions program is not condition specific. Rather than calculating excess readmissions spending against the national average, it uses case-mix-adjusted, statewide, required reductions in readmissions. There is a reward for achieving the readmissions reductions (up to 0.5% in FY 2015, increasing to 1% in FY 2016) and a penalty in terms of downward adjustments to the future budgets based on hospital-specific percentages of revenue from PAU. The potential losses in the Maryland program are smaller in magnitude than under IPPS, but the program also includes rewards for achieving readmissions targets that are not included for IPPS hospitals. The MHAC program identifies 65 PPCs compared with a smaller number of patient

safety measures in Medicare. Hospitals in Maryland are at risk for up to 2 percent of revenues, but there is also an upside incentive, unlike in Medicare. Maryland's QBR program has payment incentives similar to those in Medicare's VBP program, although there are some differences in the quality measures, which address a wider set of patients. CMS requires the maximum penalties in the Maryland All-Payer Model to be similar to the Medicare IPPS levels in aggregate. The aggregate maximum at risk level in Maryland for FY 2015 was 5.22 percent, compared to 5.50 percent under IPPS. In FY 2016 Maryland raised the amount to 7.95 percent, which exceeded the IPPS level of 5.75 percent. Additionally, payment adjustments are applied to all-payer revenue in Maryland, which increases the impact of these adjustments relative to IPPS, where they are applied only to the Medicare payments.

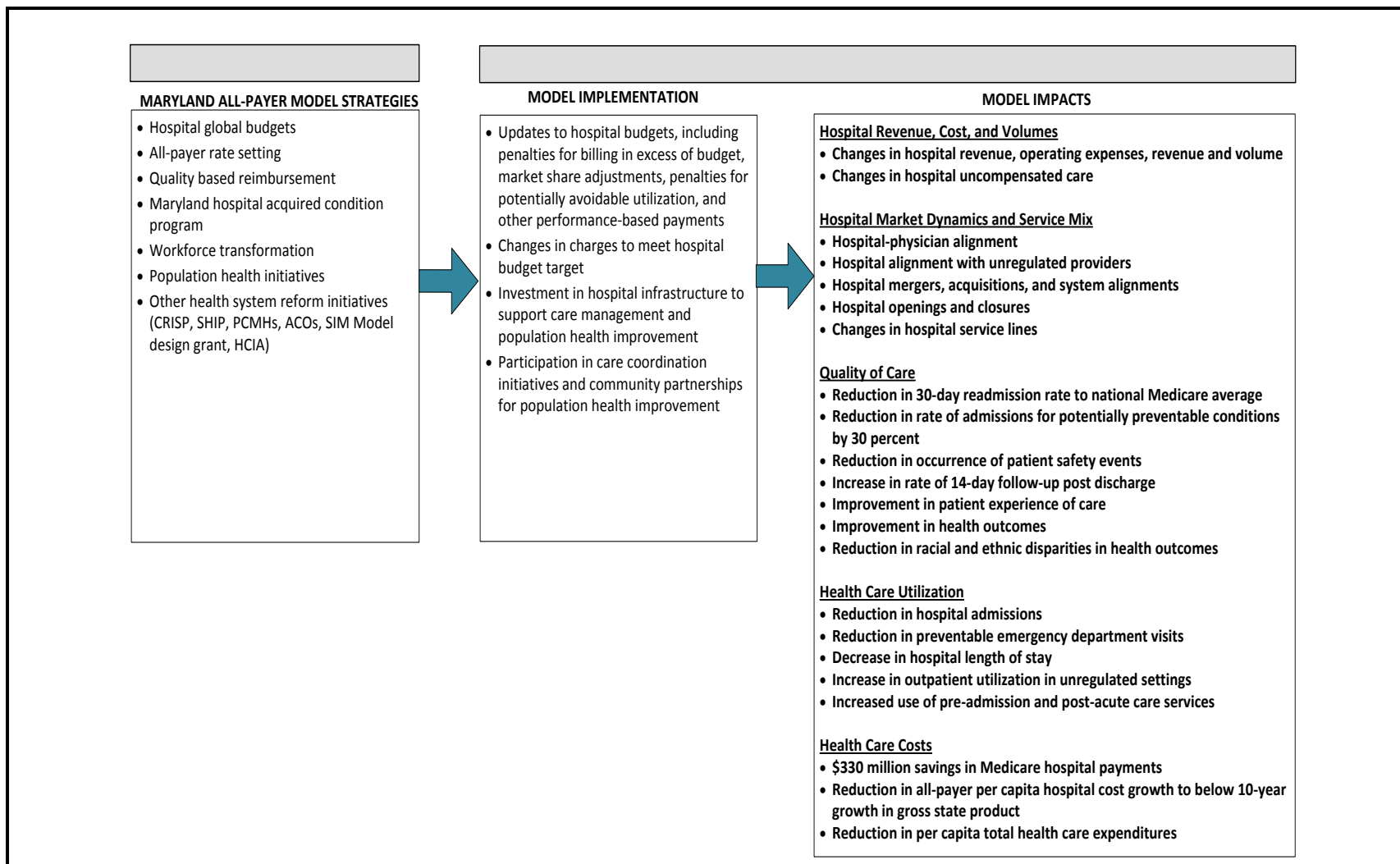
3.1.8 Population-Based Payment

Population-based payment with accountability for total costs of patient care is not a feature of Medicare's IPPS/OPPS, Maryland's previous hospital payment system, or the current All-Payer Model. As noted earlier, these payment models do not directly address drivers of health care spending outside the hospital in the way that population-based initiatives, such as accountable care organizations, do. However, Maryland's All-Payer Model includes provisions to move toward population-based payment for total cost of care. The state must report annually to CMS on performance on population health measures. In addition, by the sixth year of its agreement with CMS for the All-Payer Model, Maryland is expected to transition to population-based payment for total per capita cost of care.

3.2 Conceptual Framework for the All-Payer Model Evaluation

Figure 1 portrays the conceptual framework for the evaluation of Maryland's All-Payer Model. The first box shows key features of Maryland's model, including hospital global budgets, all-payer rate setting, and the QBR and MHAC programs. Maryland's strategy for achieving the goals of its agreement with CMS incorporates a number of complementary health system reform efforts, including development of the state's health information exchange (the Chesapeake Regional Information System for our Patients [CRISP]); the State Health Improvement Process, which has led to the development of local population health initiatives; activities under the state's State Innovation Models Model Design award and a number of Health Care Innovation Awards; and workforce development initiatives through development of innovative medical education strategies. Delivery models such as patient-centered medical homes and accountable care organizations are also expected to support the goals of the All-Payer Model. The remaining boxes describe outcomes of the All-Payer model, organized around the main domains of the evaluation. The middle box displays key implementation issues for the All-Payer Model, such as hospital budget updates, changes in rates charged by hospitals to meet their budget targets, hospital infrastructure investments to meet goals of the All-Payer Model, and hospital participation in community initiatives. The right-hand box shows expected impacts of the model on hospital revenue, cost, and volume; hospital market dynamics and hospital service mix; quality of care, including population health; health care utilization, including spillover effects on non-hospital providers; and health care costs.

Figure 1
Conceptual framework for Maryland All-Payer Model evaluation



The adoption of Maryland's All-Payer Model changed hospital incentives from the previous hospital payment system in several key ways:

- The old system set limits on costs per admission, but it only weakly limited the volume of admissions through the variable cost factor. Global hospital budgets provide incentives to limit both volume and costs per admission.
- The old system applied only to inpatient services and did not limit outpatient hospital expenditures. The new global budgets encompass both inpatient and outpatient revenues, which creates incentives to limit overall hospital expenditures and provides flexibility for shifting services between hospital inpatient and outpatient settings.
- Tests under the old waiver were based only on experience in the Medicare population. The All-Payer Model includes a test that applies to the overall Maryland population, as well as tests specific to the Medicare population. Through the global hospital budget, the new model provides incentives to limit hospital expenditure growth for the overall population.

Compared with global budgets, which are new to hospitals under the All-Payer Model (with the exception of hospitals already operating under TPR), the pay-for-performance aspects of the All-Payer Model (QBR and MHACs) were components of Maryland's hospital payment system under the previous hospital payment system. However, the adjustments to hospital budget updates for reductions in PAU under the All-Payer Model may create stronger incentives to reduce PPCs among admitted patients as defined by MHAC policy. While the unit of payment is also unchanged from the previous payment system, the introduction of global budgets creates incentives to limit service volume that did not exist under the previous hospital payment system. Rate adjustments for UCC are also unchanged from the previous system, although there have been some modifications to reflect the impact on UCC of insurance coverage expansions as a result of the ACA.

As described in **Section 3.1**, the All-Payer Model differs from IPPS/OPPS in several fundamental ways including participation by Medicaid and commercial payers, in addition to Medicare; limits on hospital revenues through the global budget; and the unit of payment for hospital services. On the other hand, although the pay-for-performance initiatives and adjustments for UCC vary somewhat between the All-Payer Model and IPPS/OPPS, these are more subtle differences and may have less marked impacts on outcome differences between Maryland and other states.

The following sections describe the implications of the incentives in the All-Payer Model for hospital service utilization, the mix of services provided by hospitals, market dynamics, quality of care, and spillover effects on other providers.

3.2.1 Implications for Hospital Service Utilization

Although the All-Payer model has stronger incentives to limit per capita hospital spending, these incentives are dampened in several ways. Perhaps most fundamentally, physician services are outside of the All-Payer Model. Unlike hospitals, physicians, who are compensated

based on a fee-for-service system, continue to have incentives to increase their patient volume, including admitting patients to the hospital. The lack of alignment between physician and hospital incentives may limit hospitals' ability to control utilization, as physicians are drivers of hospital admissions. However, hospitals may be able to influence physicians either through their role as employers or through their partnership agreements with accountable care organizations (ACOs).

Furthermore, hospital budgets are derived using base period revenues (and, hence, utilization), adjusted for a number of factors. Hospitals must bill for services to receive their budgeted revenue. Hospitals can retain some savings due to utilization reductions by increasing the rates charged within a prescribed range. Hospitals can also retain a small amount (0.5%) of their overall budget if revenues fall below the expected amount, as well as a prorated share of savings up to 2 percent of their budgets. In addition, hospitals can retain a portion of the savings due to reductions in PAU. Likely by design, to allay concerns about skimping, the incentives to reduce utilization in order to retain savings are relatively limited and hospitals have an incentive to provide enough services to receive their full budget and maintain the market share on which future budgets will be set. However, penalties associated with PAU and QBR are intended to ensure that the "right" services are provided. Although incentives to reduce utilization below the levels on which the budget is based are limited, penalties for billing in excess of the hospital's budget create a strong disincentive to increase utilization.

Despite the limited incentives to reduce overall utilization during a given budget year, the All-Payer Model includes features to reduce utilization over time. As described earlier, the calculation used to update hospital budgets includes a negative adjustment for productivity improvements that will drive down utilization. Penalties for PAU will also drive this portion of utilization out of hospital expenditures. Furthermore, the HSCRC is permitted to adjust hospital budgets to meet the statewide annual per capita expenditure growth allowed under the model. In addition to reducing the number of hospital admissions and ED visits, LOS for hospital admissions may fall. On the other hand, LOS might increase if incentives to reduce hospital admissions increase case-mix severity.

The All-Payer Model may also encourage other health system reform initiatives that better align physician and hospital incentives, such as ACOs, other gainsharing arrangements between hospitals and physicians, and meaningful health information exchange. Such reforms are expected to reduce utilization. Eventually, Maryland is expected to move to a model that focuses on per capita total cost of care, which will make alignment of physician and hospital incentives even more critical. Anticipation of the eventual transition to a total cost of care model may further encourage broader health system reforms.

3.2.2 Implications for Hospital Service Mix

Under the All-Payer Model, hospital budgets are adjusted for changes in the population demographics of the hospital market area and market shifts, but there are no explicit adjustments for the case mix of the patient population. However, hospitals bill for services provided, which reduces incentives for patient skimming and dumping. Nonetheless, rate center categories necessarily encompass patients whose costliness varies. To the extent that this variation is predictable, hospitals have an incentive to avoid more costly patients within a rate center

category. For example, to the extent that less acute patients who are less expensive to care for are shifted to intensive care units (ICUs), services billed to the ICU rate center will be more “profitable.” However, restrictions on overall revenues limit incentives to increase billing for high-cost services.

Overall hospital patient mix may become more severe over time. Patient severity may increase if initiatives to reduce admissions of patients who could be treated outside of the hospital are successful. Increases in case-mix severity could increase the likelihood that an admission involves an ICU stay.

Initiatives to reduce PAU may decrease the share of hospital revenues from inpatient and ED services and increase the share from hospital outpatient clinic services. Within the inpatient setting, the share of medical admissions may fall relative to surgical admissions because of avoidance of unnecessary hospitalizations, which are more likely to be medical admissions.

3.2.3 Implications for Market Dynamics

The implications of the All-Payer Model for hospital market dynamics are ambiguous and will likely differ by market areas within the state depending on the competitiveness of the market and the extent to which there is excess hospital capacity. Strategies to increase market share are more likely to be observed in areas with excess capacity and where there are competitors from which patients can be drawn.

As noted, there are strong penalties for billing in excess of the hospital’s annual budget, which should limit hospital incentives to expand their market share. At least in the short run, the incentives of the All-Payer Model are to maintain the status quo in hospital market share. However, the All-Payer Model is designed to reduce growth in hospital revenues over time. Hospitals that wish to maintain or increase their revenues in the long run may sacrifice a short-run loss from rate reductions in the current year and the overage penalty in the subsequent year in order to have greater revenues in future years by expanding their market share. However, under the market shift adjustment policy, hospitals receive only 50 percent of the cost of allowed volume increases (see **Section 4.1.1**), which may reduce incentives to increase market share.

To the extent that hospitals are interested in increasing their long-run revenue, they may seek to expand their market share through consolidation with other hospitals, introduction of new service lines, or acquisition of physician practices that can serve as feeders for hospital patients. Hospitals may seek greater alignment of physician and hospital incentives by purchasing physician practices and putting referral agreements in place or by incorporating productivity incentives in physician contracts. The HSCRC reviews changes in hospital volume to determine whether they will be considered in calculating hospital market share updates. This uncertainty may discourage hospitals from attempting to expand their market share. In addition, CON and other review requirements may limit hospitals’ ability to make such changes.

Apart from expanding their market share, hospitals may seek to acquire providers whose services are outside the regulated environment in order to increase their nonregulated revenues. Acquisition of providers that offer a continuum of care can also facilitate transition of patients out of the hospital to lower-cost post-acute care (PAC) settings. Hospitals might also decide to

eliminate service lines, for example behavioral health services, that may attract more costly populations. Hospital systems may pursue strategies that move patient volume and shift services among their member hospitals.

3.2.4 Implications for Quality of Care

An ongoing concern about cost-containment initiatives such as Maryland's All-Payer Model is that they create incentives to skimp, resulting in poorer quality of care and worse patient outcomes. The All-Payer Model incorporates features to offset incentives to skimp. Unlike in IPPS, hospitals are paid on the basis of individual units of service provided. Furthermore, the QBR program, one of the factors that determines hospitals' payment adjustment, creates incentives for hospitals to improve performance on the measures included in the QBR program. Similarly, the adjustment to hospital budgets for PAU provides incentives to improve quality of care and reduce certain types of inappropriate utilization. In addition, the HSCRC provides monthly reports to hospitals on readmissions and admissions for PPCs, as well as quarterly reports on in-hospital mortality. A quarterly report on a composite patient safety indicator (PSI-90) is planned. Hospital budgets under GBR include an adjustment to provide funding for infrastructure investments to support care management and population health improvements, among other requirements of GBR. Hospitals submit reports on these investments to the HSCRC annually and when they apply for rate changes in excess of 5 percent.

The All-Payer Model includes a number of goals related to improving population health. Improving population health is consistent with the goal of reducing hospital expenditures. It becomes even more important with eventual transition to a total cost of care model. Hospitals alone have limited ability to affect aspects of population health such as obesity and smoking that are underlying drivers of morbidity and mortality. The All-Payer Model encourages hospitals to develop community partnerships (e.g., with tobacco cessation centers) to address these issues. However, particularly for hospitals operating under GBR that serve overlapping patient populations, the incentives to invest in activities to improve population health may be limited as the benefits may not accrue to the hospital. Nonetheless, concurrent health system reform activities and the prospect of a total cost of care model in the future may encourage hospital efforts to improve population health.

3.2.5 Implications for Spillover Effects

Although the All-Payer Model extends the scope of services subject to control, all services outside of hospitals remain unregulated. Hospitals may have incentives to shift services to unregulated settings, to the extent that doing so does not jeopardize their ability to reach their target budgets. This can include moving patients from the ED to urgent care centers or transitioning patients to PAC sooner. Such changes may be desirable or undesirable, depending on whether patients can be appropriately treated in these settings. Others, such as shifting patients to out-of-state hospitals or avoiding complex patients, may reflect unintended consequences such as an increase in barriers to accessing care. The hospitals whose budgets exclude nonresidents may also try to increase admissions of out-of-state patients in order to increase their revenues.

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SECTION 4

IMPLEMENTATION OF THE ALL-PAYER MODEL

This section of the report describes the implementation of key features of Maryland's All-Payer Model during approximately the first 18 months of operation. The section begins with a discussion of key policies underlying the All-Payer Model, including updates on implementation and modifications to policies since its implementation in January 2014. Information on policies and implementation status is based on review of documents, primarily from the HSCRC. We then discuss perspectives on these policies and their implementation, gathered through stakeholder discussions and focus groups during site visits conducted from March through July 2015.

The information from these two sources (policy documents and site visits) is presented separately to differentiate clearly between official policy and the perspectives of stakeholders. Often there is no conflict between these two sources, and the stakeholder interviews and focus group discussions simply provide context from varied viewpoints. However, in some cases, participants in the stakeholder and focus group discussions may have reported to us perspectives that represent departures from—or, potential misperceptions of—All-Payer Model policy and how it is being implemented. These perspectives are described without correction, as they represent the understanding of hospitals and key stakeholders even when they may be inaccurate.

4.1 Overview of All-Payer Model Policies

The Maryland Department of Health and Mental Hygiene (DHMH) and the HSCRC first discussed the state's plans to seek a new agreement with CMS to continue Maryland hospitals' exemption from the Medicare IPPS and OPPS in a report they delivered to the General Assembly in December 2012 (Kasemeyer and Conway, 2012). After 3 months of development, Maryland submitted an initial proposal to CMS that focused on limiting inpatient and outpatient hospital costs to Maryland's GSP using a variety of delivery reforms, including (1) gain-sharing; (2) ACOs; (3) readmission reduction programs; and (4) global budgeting tailored for rural, urban, and suburban hospitals. In addition, the DHMH and the HSCRC proposed a "shared savings lockbox," where a portion of savings from these various reforms would be used to lower overall expenditures and support financial stability within the state's broader health care system (Sharfstein, 2013).

After 6 months of stakeholder engagement and discussions with federal officials, Maryland submitted an updated proposal based on a 5-year model limiting annual hospital cost growth to 3.58 percent (the state's 10-year compound annual GSP growth rate) and guaranteeing \$330 million in savings for Medicare over 5 years (HSCRC, 2014f). Under this proposal, Maryland also agreed to reduce the readmission rate for Medicare fee-for-service (FFS) beneficiaries to the national readmission rate or lower as well as to reduce PPCs by 30 percent cumulatively over the first 4 years of the model. To achieve these requirements, Maryland continued its focus on global budgeting and ACOs while also proposing new reforms for coordination of care initiatives, performance-based payments for reductions in HACs, and medical homes. After another round of negotiations and revisions, the Center for Medicare and Medicaid Innovation approved Maryland's application for a new agreement exempting Maryland from IPPS and OPPS.

Effective January 1, 2014, Maryland implemented the All-Payer Model, which retained all-payer rate setting, but shifted the hospital payment structure to an all-payer annual hospital revenue target (or global budget) that encompasses inpatient and outpatient services. After Phase I of the All-Payer Model, which is scheduled to take place over 5 years, Maryland is expected to move to a model that focuses on the total cost of care, not only hospital services (HSCRC, n.d.-e). A proposal for Phase II of the All-Payer Model is due at the end of the third year of Phase I (12/31/2016).

Within Phase I of the All-Payer Model, the HSCRC further subdivided activities into four implementation phases. Implementation Phase I, which concluded at the end of FY 2014 (July 1, 2013–June 30, 2014), brought all hospitals under state-negotiated global budget contracts. The HSCRC also established an advisory council on the Maryland All-Payer Model and six workgroups: (1) Care Coordination, (2) Consumer Engagement, (3) Data and Infrastructure, (4) Payment Models, (5) Performance Measurement, and (6) Physician Alignment and Engagement. These groups included more than 100 appointees representing payers, providers, employers, hospitals, and consumers (HSCRC, 2015e). The results of these workgroups were 18 publicly shared technical white papers informing policy creation and implementation of the model (HSCRC, 2015e).

Implementation Phase II, which mostly occurred during the first three quarters of FY 2015, focused on formalizing essential policies to guide the implementation of the All-Payer Model; the market shift adjustment methodology was announced slightly later, in September 2015 (FY 2016). These policies included adjusting global budgets to account for market shifts and interhospital transfer rates, setting rates for new hospitals, and allowing hospitals the flexibility to reduce PAUs without forfeiting revenues under TPR or GBR. The HSCRC's plans for Implementation Phase III, from the fourth quarter of FY 2015 through the third quarter of FY 2016, included implementing additional population-based and patient-centered strategies guided by recommendations from the workgroups, and modifying strategies for alignment between hospitals and physicians to move toward total cost of care in anticipation of Phase II of the All-Payer Model. Beginning in the fourth quarter of FY 2016, Implementation Phase IV calls for engaging with stakeholders to develop a total cost of care proposal for Phase II of the All-Payer Model that expands the hospital global budget methodology and goals to the broader Maryland health care market.

4.1.1 Setting Global Budget Revenue Contracts

Maryland's global budget model was designed based on both the state's long-standing all-payer hospital rate-setting system (operational since 1977) and the existing TPR system (which as of 2010 consisted of 10 rural hospitals). As of calendar year 2015, 10 rural Maryland hospitals continue to operate under the TPR system. Maryland set goals for transitioning all non-TPR hospitals to global budgets, which they exceeded because of the strong financial incentives (reduction in the variable cost factor to 50%). As of 2014, 95 percent of Maryland's total hospital revenue is subject to a global budgeting system (TPR or GBR). The remaining 5 percent

represents revenues for out-of-state patients that were excluded from global budgets for a small number of hospitals.¹⁴

Table 9 displays the global budgets for FY 2014 and FY 2015 by hospital. Global budgets and actual revenues stratified by hospital characteristics are presented in **Section 5.3.1**. Hospitals that deviate from their budgets are subject to penalties that depend on the magnitude of the deviation and on whether revenues exceed or fall short of the hospital's budget. Penalties for budget overages and underages are described in **Section 1.2.2**. In FY 2014, the HSCRC decided not to apply overage and underage penalties using the rationale that a transitional period was necessary for both hospitals and the HSCRC to learn how to operate within the new regulatory system. Information on actual penalties based on FY 2015 performance is presented in **Section 5.3.1**. Overall, hospital budgets increased by 2.6 percent from FY 2014 to FY 2015. Changes in hospital budgets from year to year varied substantially among hospitals. As described below, there are many components to the annual budget determination process, in addition to penalties for overages and underages in the preceding year. We were not able to obtain information from the HSCRC in time for this report on how these other components were applied to each hospital; as a result, it is not possible to identify factors that might explain this variation.

Table 9
Maryland hospital global budget, FY 2014–2015

Hospital	FY 2014, \$ global budget	FY 2015, \$ global budget	Change, FY 2014–2015, % global budget
Total hospitals	14,689,953,489	15,089,526,291	2.7
Anne Arundel Medical Center	553,115,271	563,439,445	1.9
Atlantic General Hospital	101,754,333	102,666,124	0.9
Bon Secours Hospital	129,643,966	127,585,212	–1.6
Calvert Memorial Hospital	142,402,619	144,671,999	1.6
Carroll Hospital Center	252,621,323	254,832,546	0.9
Doctors' Community Hospital	221,771,821	226,150,921	2.0
Edward McCready Memorial Hospital	15,715,821	15,153,481	–3.6
Fort Washington Hospital	46,796,285	48,546,599	3.7
Frederick Memorial Hospital	338,085,814	345,677,609	2.2
Garrett County Memorial Hospital	45,163,111	44,535,999	–1.4
Greater Baltimore Medical Center	427,071,053	433,177,253	1.4
Holy Cross Hospital	472,185,907	482,542,953	2.0
Howard County General Hospital	281,634,848	286,680,087	1.8
Johns Hopkins Bayview Medical Center	554,499,811	566,052,477	2.0
Johns Hopkins Hospital	1,636,470,792	1,664,165,537	1.7

(continued)

¹⁴ These hospitals are University of Maryland Medical Center, Johns Hopkins Hospital, Johns Hopkins Bayview, and Johns Hopkins Suburban. The University of Maryland Medical Center Shock Trauma Center has a separate revenue cap, which also excludes services to Maryland nonresidents. The University of Maryland facilities no longer have an out-of-state exemption as of July 1, 2015.

Table 9 (continued)
Maryland hospital global budget, FY 2014–2015

Hospital	FY 2014, \$ global budget	FY 2015, \$ global budget	Percent change FY 14–15 global budget
Laurel Regional Hospital	122,799,110	123,487,059	0.6
MedStar Franklin Square Medical Center	485,365,423	490,414,524	1.0
MedStar Good Samaritan Hospital	299,617,955	302,450,591	0.9
MedStar Harbor Hospital	204,950,821	206,891,159	0.9
MedStar Montgomery Medical Center	167,907,266	174,201,069	3.7
MedStar Southern Maryland Hospital Center	260,984,437	261,930,578	0.4
MedStar St. Mary's Hospital	161,151,064	167,521,822	4.0
MedStar Union Memorial Medical Center	415,215,133	419,083,569	0.9
Mercy Medical Center	487,981,390	495,628,440	1.6
Meritus Medical Center	304,582,765	313,184,783	2.8
Northwest Hospital Center	250,019,982	254,842,172	1.9
Peninsula Regional Medical Center	416,052,547	422,028,699	1.4
Prince George County Hospital	261,425,366	263,731,420	0.9
Shady Grove Adventist Hospital	376,588,971	389,097,142	3.3
Sinai Hospital of Baltimore	702,036,456	719,067,827	2.4
St. Agnes Hospitals	410,965,902	420,102,137	2.2
Suburban Hospital	257,152,521	261,422,362	1.7
Union Hospital of Cecil County	157,033,246	156,915,598	-0.1
University of Maryland Baltimore Washington Medical Center	393,555,942	404,295,047	2.7
University of Maryland Charles Regional Medical Center	144,514,525	147,995,649	2.4
University of Maryland Dorchester	59,041,893	56,231,528	-4.8
University of Maryland Harford Medical Center	103,938,097	104,409,474	0.5
University of Maryland Medical Center	1,192,843,953	1,325,699,532	11.1
University of Maryland Medical Center Midtown	221,712,408	227,964,551	2.8
University of Maryland Rehabilitation & Orthopaedic Center	118,349,207	120,213,142	1.6
University of Maryland Shore Medical Center at Chestertown	61,107,776	61,769,326	1.1
University of Maryland Shore Medical Center at Easton	187,789,174	192,678,547	2.6
University of Maryland St. Joseph Medical Center	362,064,196	391,842,706	8.2
University of Maryland Upper Chesapeake Medical Center	305,743,020	319,410,477	4.5
Washington Adventist Hospital	254,864,220	256,326,454	0.6
Western Maryland Regional Medical Center	319,393,103	322,519,888	1.0

Under the TPR and GBR models, each hospital's annual revenue is calculated using a historical base period (CY 2013), which is then updated using a number of factors including inflation, volume changes (driven by population demographics and reductions for PAU), quality and efficiency-based performance, UCC, and population health infrastructure requirements (for GBR hospitals only). Further considerations are made for changes in services, changes in market share, or services' shifting to unregulated settings.

Adjustments for each hospital are made according to the following formula:

$$\begin{aligned} & ((\text{Permanent Revenue Before Update}) * (\text{Update Factor} + 1) \\ & \quad * (\text{Change in Markup} + 1) * (\text{Population Adjustment} + 1) \\ & \quad * (\text{Infrastructure Adjustment} + 1)) + (\text{Other Permanent Adjustments}) \\ & \quad + (\text{Current Year's One Time Adjustments}) = \text{New Global Budget} \end{aligned}$$

The previous year's one-time adjustments are reversed to establish the permanent revenue base to which adjustments are applied. The Change in Markup factor is based on hospital payer mix and a combination of the previous 2-year average of UCC and the predicted UCC in the next year. UCC includes both charity care and bad debt. Because UCC is built into the rates of all hospitals, this pool acts as an equalizing methodology to account for inequitable distributions of UCC across facilities. The Population Adjustment factor is based on changes in population growth by age cohort for a hospital's VPSA. The Infrastructure Adjustment is built into a hospital's rates to encourage investments for the improvement of health information technology (IT), care coordination, and patient-centered treatments. The Other Permanent Adjustments are hospital-specific additions to or reductions from permanent revenue for projects such as HSCRC-approved new capital investments, or the establishment or elimination of a hospital service. The one-time adjustment factor includes adjustments for supporting Maryland's state-wide health information exchange (the Chesapeake Regional Information System for our Patients [CRISP]), population health testing, fee agreements, quality and hospital acquired conditions, among others.

A number of the adjustments are complex. We provide some additional detail on the policy for four major adjustments below.

UCC Adjustment. In Maryland, UCC is funded through a statewide pool of funds. The total amount of funds available in this pool is determined by the previous year's total percentage of gross patient revenue resulting from UCC for hospitals under global budgets. Hospital payment rates are adjusted to cover UCC costs. The HSCRC calculates the UCC adjustment for each hospital by combining historical UCC percentages (average of the previous 3 years) with estimated percentages from predictive modeling. These predicted percentages are calculated using a regression model developed and continually evaluated by the HSCRC and the Payment Models workgroup. Individual hospital rate adjustments for UCC are then balanced to ensure that the aggregate expected payments do not exceed the state's UCC pool.

During the implementation of the All-Payer Model, the Payment Models workgroup identified significant changes in Maryland's health insurance market as a result of the ACA and the state's decision to expand its Medicaid program. This decision extended coverage to

approximately 164,000 individuals and was expected to significantly reduce UCC in the state. As a result, the HSCRC modified the methodology for calculating UCC and reduced the aggregate rate adjustment for UCC in FY 2015 by 1.09 percentage points, or approximately \$164 million. Taking into account other adjustments, the overall UCC adjustment fell from 6.86 percent to 6.15 percent. The HSCRC and its Payment Models workgroup planned to continue working with the state's hospitals and data providers to further study these insurance coverage trends to determine the appropriate levels of UCC funding for future years.

Market Shift Adjustment. Although the HSCRC identified the need for a market shift adjustment policy and held frequent public meetings to discuss the issue, the specifics of the methodology to adjust global budgets for market shifts across hospitals were not announced until September 2015. The market shift adjustment establishes criteria by which approved regulated revenues are increased or decreased yearly to reflect shifts in patient volume independent of overall market volume changes. The HSCRC's market shift policy identifies utilization patterns by clinical service area at the ZIP-code level to determine which hospitals are gaining or losing patient volumes. (In less densely populated areas, market shift adjustments are determined at the county level.) Hospitals receive a market shift adjustment only when there are offsetting volume changes at other hospitals in the market area. For example, hospitals with increasing volume would be allowed a revenue increase only if other hospitals in the market area experienced a larger volume decrease. The aggregate allowed increase in market volume cannot exceed the aggregate decrease in volume at hospitals with declining volumes. Hospitals with increasing market volume are allocated a share of the allowed volume increase proportional to their share of the total increase. Hospitals gaining volume receive 50 percent of the costs associated with their allowed volume increase, whereas hospitals with diminishing volumes lose 50 percent of the revenue associated with their lost volume.

The market shift adjustment policy was applied to make a midyear adjustment in FY 2014 for the University of Maryland St. Joseph Medical Center, which was granted a 5.5 percent increase in total revenue (\$20.4 million) based on its growth in market share and out-of-state patient volumes. This increase was funded in part by negative adjustments from other University of Maryland Medical System (UMMS) hospitals that had corresponding declines in patient volumes.

Transfer Adjustments. Similar to the market shift adjustment policy, a formal policy to account for interhospital transfers was still under development when the All-Payer Model was implemented. The need for a formal transfer policy grew from the HSCRC's concerns that the structure of the global budgeting system might encourage hospitals to transfer their most complicated cases to the state's academic medical centers (AMCs) to contain their own costs. The HSCRC determined that the state's two AMCs—Johns Hopkins Hospital and the University of Maryland Medical Center—have a different role from other hospitals because they treat a large proportion of highly acute cases, accept regional referrals, and serve as centers for clinical and technological innovation. The HSCRC was concerned that continued appropriate functioning of AMCs and even the success of the entire All-Payer Model might depend, in part, on having different regulatory treatment for specific areas of service at these AMCs that would allow them to function effectively within the new payment structure. The final transfer adjustment policy was presented at the January 2015 HSCRC meeting (HSCRC, 2015g). Transfer adjustments will

be made according to this policy for the global budgets in 2016, based on FY 2014 data compared to a FY 2013 transfer baseline.

The HSCRC and its Payment Models workgroup developed the transfer case adjustment policy based on an analysis of transfer rates using case-mix data and data from the CRISP. Under the policy, sending hospital transfer rates will be monitored quarterly by the HSCRC, and the global budget will be reduced annually by the increase in transfer cases weighted by the average adjusted cost per transfer case. The average adjusted cost for these increased transfer cases is determined based on historical data. For adjustments to be made against the 2016 global budgets, the HSCRC determined that the FY 2014 standard cost was \$13,000 from an ED transfer case and \$26,000 from an inpatient setting.

The level and timing of transfer adjustments will depend in part on the level of transfers experienced in the state.¹⁵ If cumulative payment adjustments to the AMCs exceed 5 percent of the base-year transfer charges, HSCRC staff may adjust the transferring hospital budgets during the course of the fiscal year. Otherwise, transfer adjustments will be implemented annually. Transfer adjustments are made only once the total number of transfers exceeds certain thresholds. In hospitals with increases in transfers above a 10 percent threshold and with at least 10 additional transfers, the cases above the 10 percent threshold will be charged to the transferring hospital's budget, reducing its global budget for the subsequent year. If the net amount of transfers for the entire state does not exceed an increase of 5 percent of the base transfers, then no reductions will be made for transfers below a 10 percent threshold. If the net transfer amount exceeds an increase of 5 percent, then the excess over 5 percent will be deducted on a per-case basis for those hospitals with increases in transfer cases of 5 through 10 percent.

Infrastructure Investment Adjustment. The HSCRC's budget-setting methodology allows hospitals to apply for an adjustment for infrastructure investments. Capital cost funding is limited to large projects for which rate efficiency must be demonstrated. Hospitals may submit CON applications for service expansions or major capital projects and, if approved, receive adjustments to their annual budgets. Under current policy, hospitals must prove that existing revenues are insufficient to fund any expansion of services or capital and must demonstrate the clinical necessity of the investment. The HSCRC evaluates such applications on a case-by-case basis and emphasizes that, to meet the terms of Maryland's agreement with CMS, any expansion of capital or services for one hospital necessitates revenue reductions at other hospitals.

4.1.2 Rate Setting

Despite the current focus on global budget targets, all-payer rate setting for Maryland hospitals is retained in the All-Payer Model. All-payer hospital rate setting, a hallmark of the Maryland model since its inception in the late 1970s, continues under the state's new agreement with CMS and is an integral component of the functioning of the global budgeting methodology. To control costs for services, the state establishes hospital-specific payment rates every fiscal

¹⁵ The transfer adjustment methodology is complex. The HSCRC included a sample calculation that may be helpful for some readers who desire additional explanation. See <http://www.hscrc.state.md.us/documents/pdr/PolicyClarification/2015/20150306-Transfer-Adjustment-Memo-PrelimData-02142018.pdf>

year for 65 revenue centers. For each revenue center, the HSCRC uses historical trends and a demographic adjustment to determine a budgeted volume of service units per fiscal year. These service-specific unit payment rates and budgeted volumes are used as the basis of hospital budgets.

Under the All-Payer Model, to be responsive to variations in the volumes of services used, hospitals are permitted to vary the rates charged per service unit to remain within prescribed corridors to achieve their approved global revenue. Both TPR and GBR agreements include rate charge corridor restrictions that limit how much hospitals can increase or decrease rates within each service line without permission (to 5 percent above or below the approved rates). Hospitals can request permission for rate adjustments of up to 10 percent above or below their approved revenue center rates. Under extraordinary circumstances, the HSCRC will consider adjustments of more than 10 percent from a hospital's approved revenue center rate. Permission applies to all unit rates across all rate centers. Permission is granted on a prospective basis and lasts one quarter. In FY 2014, because of delays in establishing rates for all hospitals, the HSCRC did not require hospitals to request permission to vary their rates. In FY 2015, permission was given to facilities to exceed unit rate orders up to 10 percent for the purpose of maintaining unit rate and global budget compliance as a result of volume fluctuations. The HSCRC monitors hospital rates using monthly reports to ensure compliance. Should the rates charged in a rate center vary from the approved amount by more than the allowed corridor (5% or up to 10% with permission) over the entire rate year, a noncompliance penalty is applied to the hospital's budget in the subsequent year, regardless of whether the hospital was in compliance with its global budget. Information on whether penalties were applied to FY 2016 hospital budgets was not available for this report. Deviation of charged rates from hospital rate orders is discussed in greater depth in **Section 5.3.2**.

On July 1 each year, the HSCRC updates the rates and revenues applied to each hospital service line to account for inflation and other policy, market area, and performance adjustments that occurred during the previous fiscal year. The HSCRC, with input from the Payment Models workgroup, drafts yearly rate update recommendations. Rates are updated to account for inflation; changes in markets, population, and community prosperity; infrastructure investments; price variances and penalties; assessments and fees; and quality measures. These update factors are incorporated into the rates and budgets presented to hospitals as part of their yearly global budget orders. Hospitals are issued rate orders by the HSCRC that detail unit rates, budgeted volumes, budgeted rate center revenues, and total global budgets. Hospitals are given 2 weeks to contest the determined unit rate per center and, therefore, the total global budget. In theory, this rate order is to be decided before the beginning of the fiscal year to adjust hospital behavior accordingly. However, the All-Payer Model went into effect two quarters into FY 2014, so FY 2013 rates were extended past the end of FY 2013 to the end of CY 2013.

4.1.3 Pay-for-Performance Provisions

The agreement with CMS for the All-Payer Model incorporates three pay-for-performance initiatives. Global budgeting for Maryland hospitals is based partly on a pay-for-performance methodology under which the maximum potential revenue each hospital may receive depends on its performance on three sets of measures: QBR, MHACs, and readmission rates. Pay-for-performance initiatives also include a shared savings program and adjustments

built into hospital global budgets for reductions in PAUs. The guiding principles for Maryland's performance-based programs are that the program must improve care for all patients regardless of payer; prioritize areas for improvement that are of national interest, that experience high volume and high cost, or both; have predetermined performance targets and financial impacts; offer hospitals the ability to track progress and performance on specific targets; and encourage cooperation and sharing of best practices across and within hospitals.

QBR Program. The QBR program¹⁶ is not a novel feature of the new agreement with CMS. Two years after CMS began developing pay-for-performance programs for Medicare in CY 2003, the HSCRC convened a pay-for-performance methodology workgroup whose focus was to develop a similar program within the unique all-payer context of Maryland (Calikoglu, Murray, and Feeney, 2012). The result of this work was the QBR program, which was launched in CY 2008. QBR links hospital payments to the performance of institutions on a set of core measures in four clinical domains: (1) heart attack, (2) heart failure, (3) pneumonia, and (4) surgical prevention. The measures are updated annually to reflect changes from CMS and the Joint Commission recommendations. This system of revenue-neutral, quality-tied incentives and disincentives is intended to encourage improvements in process of care measures. In 2012, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)¹⁷ survey scores were incorporated into the payment model.

A hospital's QBR score is determined by measuring clinical process measures; patient satisfaction through HCAHPS scores; outcome measures, including mortality; and, new for FY 2017 rates, patient safety indicators and central line-associated blood stream infections. In FY 2014 and FY 2015, hospitals with the highest QBR scores could earn up to 0.5 percent of their inpatient revenue applied to their budgets for the next FY. Conversely, hospitals with the lowest QBR scores could lose up to 0.5 percent of their inpatient revenues from their budgets. The amount at stake grows to 1 percent in FY 2016 and 2 percent in FY 2017 (HSCRC, 2015f). Information on hospital performance in the QBR program for FY 2014 and FY 2015 was not available for this report.

Maryland Hospital-Acquired Conditions. Also predating the All-Payer Model, the MHAC program¹⁸ was introduced in 2009 in an effort to apply CMS's pay-for-performance model within Maryland's rate-setting context. The MHAC program adopted a rate-based approach, which compared a given hospital's all patient refined (APR)-DRG and severity of illness risk-adjusted performance to the state's average on up to 65 identified PPCs using present-on-admission indicators. These conditions are defined as adverse events more likely to be a product of medical error than of an underlying illness. The identified number of PPCs for a given hospital is divided by the expected PPCs per hospital in Maryland to create a ratio of hospital performance for each PPC. The MHAC program incorporates state-specific and hospital-specific adjustments to improve measurement validity (HSCRC, 2015f). To meet the

¹⁶ Additional information about the HSCRC's QBR program is available at http://hsrc.maryland.gov/documents/HSCRC_Initiatives/QualityImprovement/QBR/2012/QBRwebinar2012-09-11.pdf.

¹⁷ The HCAHPS survey is developed by the Agency for Healthcare Research and Quality (AHRQ).

¹⁸ Additional information about the HSCRC's MHAC program is available at http://www.hsrc.state.md.us/documents/HSCRC_Initiatives/QualityImprovement/MHAC/Ry2016/MHAC-Webinar-Presentation-FINAL-05-08-REVISED.pdf.

terms of the agreement with CMS, Maryland must achieve an aggregate reduction of 6.89 percent annually in 65 PPCs for a cumulative total of 30 percent reduction at the end of the 5 years (CMS, 2015). Hospitals that fail to meet the statewide MHAC targets can lose up to 2 percent of their revenue in FY 2014, 3 percent of their revenue in FY 2015, and 4 percent of their revenue in FYs 2016 and 2017. Hospital-specific rewards and penalties are determined on the basis of hospital performance points earned relative to a scale established before the performance year. The HSCRC's monitoring report for the first year of the All-Payer Model showed that the MHAC incidence rate decreased by 33.60 percent from January 2014 to June 2015, outperforming the cumulative target of a 13.31 percent reduction (Maryland Hospital Association, 2016).

Readmission Reduction Incentive Program. In 2013, before the All-Payer Model's implementation, Medicare readmission rates in Maryland were 17.08 percent, far exceeding the national average of 15.78 percent (an 8.2% differential) (HSCRC, 2015a). Unlike the QBR and MHAC programs, the Readmission Reduction Incentive Program (RRIP) was specifically designed to support a goal of the new agreement with CMS to reduce the number of all-payer readmissions by CY 2018. To meet the terms of the agreement, over the course of 5 years Maryland must reduce its aggregate Medicare 30-day unadjusted all-cause, all-site hospital readmission rate to the national average. However, a precursor to RRIP did exist. Pursuant to the requirements of the ACA, CMS created the Medicare Hospital Readmission Reduction Program, which was designed to reduce Medicare readmissions in specified high-readmission conditions by decreasing Medicare payments. To maintain a federal exemption from this program, Maryland implemented the Admission-Readmission Revenue (ARR) Constraint Program, a voluntary program that incentivizes participating hospitals to reduce unnecessary readmissions by imposing a bundled charge per episode, which is applied to inpatient admissions and subsequent readmissions. Participating hospitals are at risk if the costs of admissions and subsequent readmissions exceed this bundled charge per episode, but they are allowed to retain the full savings if revenue from the entire episode (initial admission and any potential readmissions) exceeds the cost of care for that episode. To increase the savings gained through the ARR, and to meet the test in the new agreement, the HSCRC implemented the RRIP.

Readmission rates are based on admissions 30 days from discharge for all payers and all causes, and readmissions both within a hospital system or facility and across all systems and facilities are counted. However, planned readmissions, deaths, same-day transfers, and admissions to rehabilitation hospitals are excluded from the count of readmission events. Both the ARR and the RRIP are currently operational, although an effort is under way to align the measurement definitions of the two initiatives by calculating the ARR risk-adjusted readmission rate in accordance with the measurement specifications developed for the RRIP (HSCRC, 2015c).

Each year, the RRIP sets an annual target to reduce Medicare readmissions by one-fifth of the difference between the state's readmission rate and the national readmission rate in CY 2013 plus the estimated changes in the national readmission rate for that year. For example, the CY 2014 improvement target was to reduce Medicare readmissions by 6.76 percent (1.76% based on the reduction in the CY 2013 readmissions gap plus an estimated 5% reduction in readmissions nationally). These improvement targets were designed to meet the goals of the All-

Payer Model agreement to reduce the state's Medicare readmission rate to the national average within 5 years (CY 2018).

Hospitals that met this uniform readmission reduction target in CY 2014 could receive up to 0.5 percent of inpatient revenue applied to their FY 2016 budgets. However, no penalties were levied against hospitals that did not meet this target. By CY 2014, the state's Medicare readmission rate decreased by 0.84 percent, to 16.47 percent; the national average increased by 0.71 percent to 15.50 percent. The CY 2014 reduction was slightly better than its improvement target of 0.76 percent for closing the gap between the state's and national Medicare readmission rates. Despite this improvement in CY2014, readmissions penalties were added to the RRIP in CY 2015 to provide stronger incentives for hospitals to reduce readmissions after early concerns about meeting CY2014 targets.

4.1.4 Other Policy Provisions and Issues

Health IT and Data Sharing. Although not part of the global budgeting or rate-setting methodology, the use of health IT to collect and share data, as well as to enhance communication between providers, is considered vital to the success of the care coordination efforts under the All-Payer Model. It is thought that through state-level IT, providers can access the tools necessary to work toward comprehensive care coordination across different settings. To address this need for a communal data-sharing platform, the HSCRC has designated the CRISP as Maryland's health information exchange. Using this platform, providers are able to see essential information like test results and radiology and electronic reports (Maryland Care Coordination Workgroup, 2015).

To assist in meeting the terms of the agreement with CMS and to facilitate data monitoring and reporting, HSCRC staff recommended not only continuing but expanding the funding of the CRISP through 2019. The HSCRC believes that these additional resources will facilitate the analyses of Medicaid savings from the All-Payer Model; provide details and summary reports on case-level PAUs; identify high utilizers for care management planning; and support other population-based reports in a more efficient, effective, and transparent manner. This ability to generate timely information from different facilities across the state supports the planning and evaluation of the model as the state prepares to enter Phase II (HSCRC, n.d.-b). At this time, providers' uptake and integration of the CRISP is unclear.

Population Health. A departure from the old waiver test is a new focus on population health goals and performance. A central expectation of the new agreement with CMS is that an all-payer model accountable for the total cost of care creates incentives for population health improvements. Maryland is required to monitor the state's population health performance compared to various national population health measures and to report this performance to CMS annually. Maryland will measure life expectancy, hospitalizations for ACSCs, primary and secondary prevention for cardiovascular disease, and behavioral health emergencies, as well as racial and ethnic disparities in these measures. The HSCRC requires hospitals to submit a Community Benefit Report detailing the steps they have taken to improve population health in their respective service areas. The HSCRC and its convened Payment Models workgroup have developed a template for collecting information on individual hospital investments in care delivery, population health, and care management to help inform the types, amounts, and

effectiveness of various investments they are making to meet the goals of the All-Payer Model. Hospitals began reporting in July 2015 and are required to submit annual reports.

4.1.5 Annual Monitoring Report

Maryland is required to submit an annual report to CMS that monitors the All-Payer Model's performance on key requirements of the agreement with CMS, as well as on a variety of quality, financial, and population health measures. The monitoring report for the first year of the All-Payer Model (2014) showed that all-payer per capita hospital expenditures increased by 1.47 percent from 2013, well below the required limit of 3.58 percent. All-payer all-cause readmissions decreased from 13.9 percent to 13.4 percent (a 3.6% reduction), which was greater than the reduction for the Medicare population (see **Section 4.1.3**). As noted earlier, the incidence rate of PPCs decreased by more than 26 percent. Performance on population health measures was mixed. Maryland reported that the rate of hospitalizations for ACSCs decreased by 5.2 percent from 2013. Life expectancy for Black residents of Maryland increased from 2011 to 2014, whereas life expectancy for White residents remained constant. On the other hand, rates of hypertension-related, mental health-related, and substance abuse-related ED visits increased from 2012 to 2014, although the asthma-related ED visit rate declined.

4.2 Stakeholder Perspectives on All-Payer Model Implementation

4.2.1 Development of the All-Payer Model Policies

The process for the development of the All-Payer Model was discussed with both key informants and hospital leadership. In our discussions, we heard often that a key impetus for keeping the development of a new payment model moving forward came from Maryland state officials. Stakeholders indicated that the DHMH, HSCRC staff, and payers were independently anticipating that Maryland would not continue to meet the terms of its former Medicare waiver if expenditure and utilization trends continued. The old waiver required that Maryland maintain a cumulative growth in Medicare inpatient payments per admission that was below the cumulative growth nationally. In the struggle to continue to meet the old waiver terms, stakeholders described the HSCRC as dramatically limiting any increase in hospital rates in the 3 to 5 years before 2014. Hospital leadership told us that they were increasingly concerned that all-payer hospital rates were insufficient to support the provision of services and that hospitals' only option to increase revenue was to increase volume, which was not controlled under the terms of the old waiver. Also, state officials were increasingly concerned with relatively rapid upward trends in the volume of hospital services—particularly cardiac, cancer, surgical, and orthopedic care delivered in connection with newly established and marketed “centers.” Although not all stakeholders agreed on the factors contributing to the looming failure to meet the terms of the old waiver, there was a common understanding that a change in policy was inevitable.

Developing the specific approach adopted in the All-Payer Model took a considerable amount of time, up to 3 years by some accounts. Most stakeholders described the All-Payer Model development process as initially involving four main groups: the Maryland Hospital Association (MHA), the largest private payers (CareFirst BlueCross BlueShield and UnitedHealthcare), the HSCRC, and the Maryland health secretary. Multiple stakeholders told us that some hospitals and payers needed to be convinced that maintaining the all-payer provisions

originally granted through the old Medicare waiver was critical to the stability of the Maryland health system. Hospital and payer leadership that had not experienced the burden, cost, and complication of negotiating (and managing) payment rates with individual payers initially underestimated the potential impact of the loss of the all-payer waiver on hospital operations.

Stakeholder interviews and background documents indicated that the MHA began organizing meetings with hospital executives to develop various high-level payment policy alternatives as early as 2011. Hospitals generally were most concerned with obtaining payment rates that could support what they perceived to be important investments in infrastructure and clinical care. For example, in August 2012, the MHA circulated a proposal to Maryland legislators for reducing Medicare payment rates and offsetting these payments with increased private payer rates. Private payers resisted this kind of differentiated payment model and found proposals that focused on controlling hospital utilization volume more compelling. Private insurance stakeholders were very clear that, from their perspective, the preservation of all-payer rates and a strategy that would control growing hospital costs and volume were critical. Our discussions suggest that the HSCRC appeared focused on preserving the all-payer payment system while simultaneously addressing what they had come to believe were excessive increases in the volume of care that did not improve the health of Maryland citizens. The MHA and its member hospitals eventually agreed on the value of all-payer rates, recognizing the major disruption the loss of this payment system would cause. Maryland hospitals had not had to negotiate separate rates with payers in almost 40 years and were ill equipped for both these negotiations and the possible financial consequences. Thus, after much discussion, the major stakeholders reached consensus around the benefit of retaining the all-payer provisions.

The next hurdle was agreeing on the best approach to propose to CMS for the new agreement. When consensus did not emerge among these stakeholder groups, we were told that state staff—in particular the Maryland health secretary and the HSCRC board chair—drove the final development of the All-Payer Model. However, multiple stakeholders told us that without the strong leadership of the MHA, the All-Payer Model might not have been implemented. Others disagreed and felt that the main impetus for gaining consensus around a new model was the eventual recognition by all of the major stakeholders of the negative impacts of a loss of the all-payer payment system. One stakeholder told us that most Maryland hospitals resisted the All-Payer Model, in particular inclusion of a global budgeting element, until “they were standing at the cliff” and the loss of the all-payer payment system seemed a real possibility.

As the features of the new agreement were discussed, the MHA kept hospitals’ executive staffs informed of developments related to the All-Payer Model. MHA officials did not provide us the details of their internal discussions with their members, but our discussions with the officials suggested that the MHA eventually supported the new model and played a significant role in building hospital consensus around the all-payer global budgeting concept. Although the introduction of a global budget concept was not without risks, a willingness to “give it a try” was echoed by multiple hospital stakeholders. Mostly positive feedback from the subset of Maryland hospitals already operating under TPR apparently gave some confidence to hospitals that would be facing global budgets for the first time.

Once the general policy concepts were agreed upon, the MHA’s critical role appears to have been in negotiating workable details on behalf of its members. Specific terms of the global

budgets were complex and subject to long debate. For example, hospitals were not in favor of the shared savings lockbox concept proposed in early discussions; they contended that it would mute their incentives to achieve the maximum reductions in expenditures because they would not benefit from net savings that were achieved at the hospital level. The lockbox approach was abandoned. Other issues of debate at the MHA and state levels included the specific definitions of market shift adjustments between hospitals, an issue that was still not completely resolved at the time of our site visits in the spring and early summer of 2015. We heard repeatedly that no stakeholders, including the MHA and its member hospitals, got everything they wanted.

Eventual approval and implementation of the All-Payer Model were also credited to general respect for the HSCRC team throughout the state. The leadership of the HSCRC team changed during the negotiation of the conditions of the All-Payer Model, but we heard universally high regard for the new (and current) leader. Although there was not always complete agreement regarding the conclusions of HSCRC analyses, almost all stakeholders told us that HSCRC staff are fair and are straight shooters, although “tough.” Only 2 of the 10 hospitals we spoke with expressed concern over the core global budget-setting analyses conducted by HSCRC staff, specifically their ability to understand nuances of the operations of individual hospitals, their consideration for unique hospital system challenges, and their access to timely and accurate data to support critical analyses. Discussions with stakeholders reflected a willingness to experiment and to make the new payment model work despite a great deal of uncertainty. A private insurance stakeholder told us that once agreement around the All-Payer Model was achieved, hospitals did a remarkable job in moving quickly toward implementation.

Discussions with key stakeholders suggested that negotiations with CMS regarding the specifics of the All-Payer Model were complicated and at times required working through differences in focus. Maryland officials stressed the importance of testing all-payer models and integrated policy approaches that did not segment reform by payer. Even hospital leadership and stakeholders who expressed concerns over specifics of the global budgeting methodology agreed that the concepts of Maryland’s All-Payer Model had merit and were worth testing.

4.2.2 Setting Global Budget Revenue Contracts

The design of the new GBR contracts was based in part on experience with the existing TPR contracts. One difference described by a few of the new GBR hospitals included the lack of up-front funding to support infrastructure development. The existing TPR hospitals we spoke with told us that the up-front financial support available when TPR was first implemented (before the All-Payer Model) allowed them to invest in clinical and information systems, additional clinical support (including care managers and discharge planners), and primary care alternatives when these resources did not exist in the community. One TPR hospital told us that it received \$7 million for infrastructure development, which made a huge difference in its ability to prepare for and support a global budgeting model. In contrast, GBR hospitals cited a lack of funding for these types of infrastructure and other investments that they believed would, in the long run, allow hospitals to operate more effectively and efficiently. Some hospitals expressed concern that all-payer rates and global budgets were too conservative, particularly for the early years of transitioning to the new payment model; they favored providing more funding to hospitals through somewhat higher rates to make the changes necessary to operate under global budgets over time. For some facilities, the lack of up-front support was a major problem; other

hospitals raised this concern, but made investments in infrastructure and clinical staffing regardless of their apprehension.

The state first negotiated global budget contracts with the major hospital systems (University of Maryland, Johns Hopkins, and MedStar) and then negotiated with the smaller independent hospitals. Negotiations with hospitals were described as a primarily objective, analytically driven process; most hospitals said that the process was transparent and based on data rather than perceptions about individual hospitals. Although negotiations with each hospital were conducted with Maryland's overall hospital system in mind, stakeholders did share some changes that were incorporated in the contracts to address individual hospital concerns or issues. An example was the negotiated exclusion of out-of-state patients from the global budget cap for the two major AMCs. The rationale for these exceptions was that AMCs serve as tertiary care centers designed to attract out-of-state, regional, and, in some cases, international patients for targeted and specialized clinical care. The HSCRC understood these dynamics and did not want to create financial disincentives to continue to make these services available and maintain these types of out-of-state referral bases. The out-of-state exemption was considered critical by one of these two systems; it was less so to the second, which beginning in FY 2015 no longer claimed this patient exemption in its global budget. The volume of out-of-state patients was not viewed as a major issue or focus in other hospitals included in the site visits, even though their revenue caps did not exclude out-of-state patients.

A common perspective we heard regarding the global budget contracts centered on uncertainty about some methodological elements, particularly the specifics of the market shift adjustment. As of the time of our site visits and stakeholder interviews, the final method for making hospital market share volume adjustments was still under development. We heard a persistent perception, particularly among hospital-based clinicians, that many aspects of the details on how the All-Payer Model would work were either not determined or not made transparent to hospitals when the new payment system was implemented. As one stakeholder told us, "I think theoretically it is a good situation.... But when it was rolled out there weren't any rules, so it'd be, 'Today we're ready to play a new game, Monopoly Plus, but there are no rules'."

4.2.3 Rate Setting

Under the All-Payer Model, hospitals have flexibility to adjust their rates within prescribed corridors to meet their global budget targets. In this way, hospitals can in theory keep additional revenue while reducing volume. Although hospital leadership that we spoke with preferred this approach over a method in which there was no marginal financial return for continued volume reductions, they had concerns about the implications of this model for future budgets. They wanted to be successful and lower volumes, but they suspected that no matter what reductions they achieve, expectations will be set to continue to reduce utilization. A common concern raised among hospital leadership was that the HSCRC would remain very aggressive in controlling all-payer rates to ensure that Maryland would continue to meet, and even exceed, CMS savings targets.

We generally heard consensus that the all-payer rates under both the old payment system and the All-Payer Model represent a challenge for the financial underpinnings of many Maryland

hospitals. The global budget adds one more challenge. The leadership in all the facilities we visited were concerned about resources, in some cases to support current hospital services and in others to support infrastructure updates and investments in the future. One stakeholder told us, “You guys have seen this hospital.... It looks like an old country hospital.... Patients like new buildings.” A physician stakeholder told us, “We just built a 50-bed new [unit] here, it’s state of the art, it’s beautiful. We can’t open it because this global payment system does not allow for the hospital to add \$1 million plus for the cost for new nurses.... The people that put this in place don’t really understand... the issues from the ground floor and I wish they would come and visit.”

Both clinicians and hospital leadership in many of the hospitals we visited raised specific concerns about rising drug prices. High prices for certain chemotherapy drugs were a particular concern. According to hospitals, prices for certain drugs have been rising very quickly and there is no provision in HSCRC rates and global budget methodology to accommodate these rapid increases in the middle of the year. In one hospital, clinicians had been told that certain high-priced drugs would no longer be available to their patients. Another hospital was still providing these drugs, but at financial risk to itself.

Leadership at a minority of hospitals reported that their financial outlook had actually improved under global budgeting, although these were primarily facilities operating under TPR who had more long-standing experience. Despite almost universal concern regarding resources, some hospital organizations reported achieving operating margins in excess of 10 percent. A private insurance stakeholder clearly perceived that a number of Maryland hospital organizations have very strong net margins, an indicator that they might not be investing sufficiently in care management, care planning for complex patients, and community health care alternatives to the extent that was envisioned under the All-Payer Model.

4.2.4 Pay-for-Performance Provisions of the All-Payer Model

A number of hospitals expressed general concern over the pay-for-performance provisions, citing issues regarding the specifics of the readmission and quality metrics and of reliance on HCAHPS. None of our discussions focused on disagreement with performance-based payment per se—the concept seemed to have broad support—but rather on the specifics of the metrics applied.

The RRIP was clearly understood by hospital leadership and clinicians. Some clinicians we spoke with could cite current hospital statistics and targets related to it. Hospital leaders and clinicians were able to identify a variety of strategies that they were using to reduce readmission rates. These strategies included patient education, post-hospitalization support in the community, and, in a few cases, sending patients home with supplies and medications without charge. But awareness of the goals did not always translate into agreement with the program. For example, hospital leadership and stakeholders argued that a facility whose readmission rates were already relatively low would find it challenging to continue to reduce these rates compared with those of competitors who had higher rates and, therefore, more opportunity to improve.

Hospital leaders we spoke with were focused on improving HCAHPS scores. Some of the facilities we visited, where hospital staff were clearly expected to focus on certain aspects of the

patient experience, posted scores and highlighted positive performance in staff break rooms (and other locations in the hospital not accessible to patients). This focus on HCAHPS was not generally viewed favorably by clinical staff we spoke with. Both physician and nursing staff expressed frustration that they were being closely monitored on how happy patients were rather than on what the nurse interviewees perceived to be the actual quality of care. One clinician was frustrated that some patients rated the hospital poorly if staff were not always friendly, the food tasty, and the rooms quiet; it didn't matter if the hospital had actually saved their lives. One nurse commented, "I understand that patient satisfaction is now how we're getting paid.... But if you want me to have happy patients, you need to let me have time to sit next to your grandma and hold her hand for 10 minutes, but I can't do that when I'm getting 18 calls that I haven't given an aspirin in 24 hours." Nursing staff seemed particularly frustrated with patient satisfaction metrics that they felt did not necessarily value clinical care over amenities.

Both hospital leadership and clinicians were well aware of the MHAC metrics. Although the MHAC program predated the All-Payer Model, hospitals clearly understood the new financial implications of these metrics. And although there was general agreement that monitoring quality was a good thing and the right thing to do for their patients, clinicians often told us that they felt they were monitoring too many measures. The budget-setting process places more importance on meeting performance measures; as a result, tracking and meeting metric targets is now a major priority with increased emphasis. Nursing staff in particular felt that they spent so much time checking boxes and filling out fields to support MHAC and other quality metric reporting that they hardly had any time to see patients. One nurse commented, "We meet a benchmark and then the state comes back and says, 'OK, you did that; you did that so well so let's give you some more.' That's like kicking you in the gut."

4.2.5 Hospital Implementation Progress and Strategies

Implementation Progress. Stakeholders we spoke with tended to agree that implementation of the All-Payer Model at both the state and hospital levels had been a gradual process as opposed to a sudden change of focus. All stakeholders highlighted that it is early in the All-Payer Model implementation process, and assessing concrete implementation progress at this time is challenging. Hospitals have turned to TPR hospitals and staff with expertise in managing global hospital budgets, such as those who worked at the Department of Veterans Affairs, for lessons in adapting to the global budget model. Hospitals have organized site visits to TPR hospitals to learn more about operating under a global budget. Stakeholders suggested that, at least in theory, the implementation of this model has better aligned the interests of insurers and hospitals. Because of the global budget targets, hospitals—like insurers—have incentives to work toward reducing hospital utilization. Some hospitals were viewed as having more difficulty than others in implementing changes in response to the All-Payer Model. Some hospitals we visited had clearly anticipated the need for changes in clinical processes and patient care models to respond to the new model and were well into implementation of strategies to operate under global budgets. Other hospitals described planning processes that were still under way, with implementation of new strategies still in the future.

Part of this variation in hospital response seemed related to the underlying financial status of the organization before implementation of the All-Payer Model. Hospital systems that reported a generally more positive financial position in recent years told us that they had at least

some of the resources necessary to adapt to the new model. In addition, hospitals in rural areas who had participated in TPR budgeting reported that they were better prepared for the All-Payer Model's policy changes; these organizations had already made at least some investments in strategies such as discharge planning and care management, community alternatives to unnecessary ED visits and hospitalizations, and different relationships with physicians and other clinical staff.

Variation in readiness also seemed to differ according to the attitude regarding the All-Payer Model expressed by hospital leadership during the site visits. At one end of the spectrum, two hospital organizations we spoke with expressed significant enthusiasm for the changes implemented under the new model. These two hospitals were able to describe specific strategies both implemented and anticipated under the All-Payer Model. Clinical staff similarly reported enthusiasm for the changes and engagement in new strategies.

At the other end of the spectrum were two hospitals who had a negative view of the All-Payer Model as a concept, as well as major reservations regarding their specific all-payer rates and the pay-for-performance metrics. Leadership and clinical staff at these hospitals expressed skepticism that the new model would be effective and seemed willing to limit their organizational response because they saw a possibility that the All-Payer Model would be reconsidered by Maryland, CMS, or both. Leaders in one hospital admitted that they were "behind" in part because they had hoped the All-Payer Model would have been reconsidered already. These hospitals reported limited steps toward planning and implementing strategies to operate under the global budget and pay for performance. Clinical staff at these hospitals, similarly, reported limited to no engagement, and in some cases they expressed concern that clinical care might be negatively affected by the All-Payer Model.

Most hospital organizations we visited, however, were somewhere in the middle of this continuum. These hospitals expressed general agreement that the All-Payer Model was an important policy option to try and, although they had concerns about selected elements (the one most often cited was uncertainty regarding the market shift adjustment methodology), they also had obviously made progress in developing strategies to respond to it. Clinical staff had open minds and seemed to have forged a constructive working arrangement with hospital leadership.

Implementation Strategies. Each hospital we spoke with appeared to be customizing how it would respond to the new global budgeting payment incentives. Although there was commonality in the issues they faced—how to align physicians' and other clinicians' incentives with the hospital's, how to change patient behavior to reduce unnecessary hospital utilization and increase use of community-based care, how to manage limited resources, and how to identify resources for long-term investments to support global budgeting—each hospital was developing strategies to meet its own organizational and population characteristics. The remainder of this discussion section is organized by the different types of strategies described by hospitals and stakeholders.

Physician Alignment Strategies. Stakeholders described a broad range in physician understanding of the All-Payer Model, with some physicians aware of and fully engaged in it and others completely unaware. Because the HSCRC has no direct authority to regulate physician

payment, initiatives to forge new relationships with physicians and develop effective incentives must originate with the hospitals. Most hospital leadership viewed this as a significant challenge.

Across the board, hospitals struggled to appropriately align physician incentives with their own. Hospital organizations that had at least some hospital-employed physicians described more progress. Getting community-based physicians, particularly specialists, on board with reducing hospital utilization and taking on additional care of patients in the community was reported to be a challenge. Approaches to aligning hospital and physician incentives were often described in vague terms. Some hospitals revised contracts for staff physicians to include bonuses attached to quality and performance goals; other hospitals told us they have considered withdrawing hospital admitting privileges from physicians who do not meet quality improvement or volume reduction targets. Although few staff physicians had seen changes in their compensation from hospitals, the transition to a global budget had resulted in restrictions on purchasing new equipment and hiring new physicians. Some physicians said that their ability to practice “competitively” in the health care marketplace (i.e., to perform procedures that their patients ask for and that other physicians seem willing to offer) was challenged by the hospital’s global budget. One physician commented, “I’m working on projects that are basically decreasing my earning potential because we’re keeping people out of the facility.... It’s a big question. It’s hard looking down the line from my perspective as the partial owner of a [physician] group.” Sharing savings under a physician-hospital gainsharing model was noted by some hospital, physician, and industry stakeholders as a possible way to achieve greater alignment of physician financial incentives with hospitals operating under global budgets. A few hospitals were very enthusiastic about introducing a gainsharing component to the model.

Hospitals indicated a shift in perspective on recruiting and paying specialists. In the past, hospitals would enter into expensive contracts with specialists (particularly surgeons) that often lost money in the short run but increased volume and revenue in the longer term. Now, in an effort to expand outpatient health services, hospitals reported they are placing more emphasis on recruiting primary care and community physicians than on adding specialists.

Pay for Performance Strategies. To comply with the All-Payer Model’s pay-for-performance elements, hospitals used a variety of strategies to meet metrics and receive performance-based revenue. The most common strategy described was hiring new staff and creating divisions focused on improving quality and meeting the hospital’s quality and readmission goals. Some hospitals were focusing on specific MHACs, such as catheter-induced urinary tract infections, in which hospitals had performed more poorly and were reviewing every case to identify the cause and develop strategies for future prevention.

The All-Payer Model emphasizes reducing PAU as a pay-for-performance metric. At this point in the implementation process, hospitals appeared to be trying to identify and reduce avoidable admissions through their EDs. As an alternative to EDs, some hospital systems had invested in primary care clinics on their campuses (in a few cases offering services at these clinics free of charge to patients) to redirect patients and avoid ED use and potential admissions for noncritical conditions. Even though the expenditures for services in these services count against global budget targets (when these clinics operate in regulated space), hospitals reported that costs are lower than for similar care provided in their EDs. Providing care in these alternative settings also served to link patients with primary care providers rather than with

emergency physicians. Other hospital systems had developed referral alliances with urgent care centers and other primary care resources in their areas.

ED Diversion Programs. All hospitals we visited had focused some strategies on reducing non-emergent ED use. These strategies included placing staff in the ED to increase care coordination and to triage patients, establishing relationships with outpatient facilities so that patients can receive timely follow-up care outside of the hospital ED, and encouraging patients to establish relationships with primary care providers. Most hospitals had also changed their mindset from one of advertising the capacity and care their EDs can provide to one of encouraging only patients who need true emergency care to visit the ED. Some hospitals had developed ED diversion programs that target frequent ED users and provide care coordination and social services in an attempt to reduce or prevent future visits. Despite these changes, hospital leadership reported that changing patient behavior is challenging, and patients continue to seek care in EDs for noncritical health issues. Most clinical staff seemed able to identify their ED and hospital admission “frequent fliers.” Clinical staff and hospital leadership often expressed frustration that it was very difficult to refuse care for patients whom they perceived, in many cases, to be noncompliant with medical direction, to take no personal financial responsibility for their health care, and as a result to abuse the health care system.

Enhanced Provision of Community-Based Services. As noted, efforts to reduce readmissions and unnecessary ED utilization included an increased emphasis on community-based care. Some hospitals had begun partnering with community-based health care facilities to enhance coordination of care and shift some volume out of the hospital. For example, one hospital we visited was forging relationships with local urgent care centers and with primary care options offered by pharmacies in retail stores (e.g., in-store clinics, pharmacist consultations) for nonurgent care. Other hospitals had purchased or built new outpatient facilities—some in regulated space on the hospital campus, some in the community. A few hospitals indicated that they began buying primary care practices before the All-Payer Model began and continued to do so in an attempt to expand their reach within the community. Still other hospitals had increased their emphasis on home-based health care, whereby providers visit patients who were recently discharged from the hospital or who have chronic conditions or other ongoing medical needs. We noted variations in the progress hospitals had made in developing these strategies. Some hospitals had implemented community-based programs, although a few were still considering options and possible strategies.

Increased Palliative Care Initiatives. Some hospitals we visited had recently implemented or reinvigorated palliative care initiatives. In one case this approach predated the All-Payer Model but had been expanded in response to the global budget. In another facility, palliative care was a new approach developed in response to global budgeting. Some hospitals had allocated staff to work specifically on palliative care issues, whereas others had enhanced current staff’s emphasis on palliative care. For these latter hospitals, the enhanced emphasis included better integration of patient palliative care assessments and more emphasis on discussing and developing end-of-life plans with patients. These initiatives aimed not only to reduce patient care costs but also to prevent readmissions and encourage better home care. Although they did not have evidence that these strategies were effective in reducing hospital utilization, the few

hospitals that had made this investment believed it to be an important and necessary element of high-quality clinical care.

Improved Care Coordination. Almost all the hospitals we visited had implemented some form of care coordination or care management initiatives. Some initiatives focused on medications, including offering comprehensive medication management and providing a month's supply of medications for patients before they are discharged from the hospital. Some hospitals highlighted new programs to reduce readmissions through discharge management and care coordination. Hiring care coordination staff was the most common strategy among the hospitals we visited, although hospitals deployed these staff in different ways. Some hospitals located care managers in EDs. Others used care managers on selected clinical care floors. Private insurers in Maryland also employed care management staff to oversee care for their covered populations; these staff generally worked on location in major hospitals. One private insurance stakeholder perceived that hospital-based care managers hired by insurers (and present in hospital EDs and on hospital wards) were more active and effective than staff employed by hospitals, but he conceded that his ability to observe and evaluate them may be limited.

Internal Cost and Efficiency. We heard some positive feedback on the financial changes that occurred under the All-Payer Model. For example, one physician participant in our focus groups told us, "We were all asked to go and look at the contracts, take a look at when the last time that contract was reviewed and go back at it to see if we can renegotiate, and I think we did some really good things, especially in the lab area.... Maybe we could do better... and they did much better. So we're very lean and fiscally responsible."

Physician stakeholders reported to us that, compared with those in other states, Maryland physicians are underpaid. Recruiting and retaining physicians to practice in a Maryland had become even more of a challenge. We were told, "[Global budgeting] makes it hard to recruit providers here because, yeah, you come here and you want to do all the new and upcoming services.... But we're not going to buy the equipment because the equipment's too expensive and we don't want to add the volume to our services. It makes it difficult to recruit physicians." This was a particular issue regarding PCPs. Most hospital organizations, but particularly those in more rural areas, cited low pay and lack of other investments for primary care clinicians as a major impediment to expanding community resources. They perceived that major shifts toward care in the community rather than in hospital EDs will never fully occur as long as there are not enough PCPs in Maryland.

Increased Emphasis on Population Health. At this relatively early point in the implementation of the All-Payer Model, much of the emphasis on population health was implemented as helping patients and families take better care of themselves in the community. Some hospitals had made significant staff and resource commitments to this and in some cases had dedicated an entire department of the hospital to focus on defining population health metrics and developing strategies to implement them. Whether there had been progress in improving population health was unknown, as implementation was still quite recent.

Three hospitals we visited had experimented with community health workers. Patient acceptance of this approach had been mixed. One clinician told us, "It's very difficult for a person that they don't know to explain these things to them and it is the best thing for them

medically maybe, but they're not going to feel that way, especially with a stranger.... They're not going to trust this person because this is someone they don't know." One hospital leader told us that only a small proportion of patients were willing to allow community health workers (or any unfamiliar person) into their homes. Strategies not predicated on home-based health care were being also considered by facilities. A hospital leader told us that their strategy of opening a postdischarge follow-up clinic on the campus of the hospital was very successful in getting patients to take care of themselves and avoid unnecessary hospitalizations and rehospitalizations.

Hospitals had made significant investments in patient education to help patients take better care of themselves. All hospitals we visited had either established or expanded programs to educate patients about their diseases and ways to manage their conditions after they leave the hospital. For example, two hospitals were providing scales, toilet chairs, blood pressure monitoring cuffs, and other equipment to patients free of charge. Hospitals perceived that some patients are responsive to this effort, but others are resistant or are less able to process the information provided.

Providers expressed some frustration with the increased focus on population health. Although they agreed that improving patient health is important, clinicians often question patients' ability and willingness to accept responsibility for maintaining their own health. Clinicians understood the rationale for attempting to make this shift, but they felt that the current system offered no financial or other strong incentives for many patients to change their behavior. The feeling was that the burden was entirely on hospitals and clinical staff; patients could do as they pleased with no real penalty. A number of providers shared stories of patients with serious chronic diseases maintaining poor health habits, such as eating fast food even while still in the hospital. Providers also shared a sense of powerlessness to affect patient behavior outside of the hospital. It felt unfair to some providers that, even indirectly through the hospital budget, they could be held responsible for patient behavior that they could not control.

Uncompensated Care. Most stakeholders we interviewed did not describe changes in where and how UCC is managed as a result of the All-Payer Model. We heard a few comments that connected some small decreases in uninsured patient load with Medicaid expansion and insurance availability under the ACA. The exception was one urban hospital, which perceived that their UCC volume had increased. The perception of this organization (which was repeated by several staff in multiple interviews and focus groups) was that other Maryland hospitals were shifting poor, uninsured, and underinsured patients to this institution in response to the global budget incentives. Leadership at the Maryland Medicaid program did not express the same concerns. No other hospitals we visited expressed this degree of concern about uninsured or Medicaid patients' being shifted to them.

Health IT and Data Sharing. Overall, hospitals indicated that the All-Payer Model has forced them to become more data driven because global budgets requires more real-time monitoring of utilization and care outcomes (including readmissions). Most hospitals we visited had made some investments in data systems before the implementation of the All-Payer Model; changes since it was implemented tended to be enhancements to existing systems and improvements in analytics. The movement of the All-Payer Model to a global-budget-based payment system requires health IT infrastructure that can track patient care across facilities and providers. This type of fully functional health IT structure was a work in progress at hospitals we

visited. As one stakeholder shared, “Right now, we don’t have data to make [a population-based payment model] work because we only have access to our data.”

Maryland has relatively rich sources of data (including a timely all-payer claims database and the CRISP) from which to provide hospitals with feedback on performance. Stakeholders described the CRISP, which predates the All-Payer Model, as a “collaborative government model” and a “public-private partnership.” The system has been developed as a public utility to encourage cooperation across hospitals and hospital systems. Essentially, the CRISP helps link hospital electronic health records through a health information exchange that translates and helps distribute patients’ health information. However, the extent to which hospitals and hospital systems are mining these data varied. Most hospitals appeared to rely on HSCRC-provided reports. Some hospitals and providers found the CRISP not entirely accessible. The CRISP was also seen as a time-consuming system with limited analytics and a complex interface; as one provider shared, “[CRISP] is not quite there yet.”

Some physicians and hospital management staff indicated that they rely on the CRISP’s electronic notification system to inform them when their patients seek care at another Maryland hospital; hospital staff seemed to be attempting to manage and coordinate care for their patients. Hospitals emphasized that even when the electronic notification system data are available, ensuring that staff have the time to review them is key to making the information useful.

Stakeholders shared a number of challenges that the CRISP needs to overcome before it can be fully functional. Two major issues were (1) the legality of sharing patient-level data with health care providers across the state’s health care system and (2) the ability to link patient care across the system. The CRISP system requires, but currently lacks, the legal authority to release patient-level data to providers who may not be involved in the patient’s current episode of care but have been involved with treating the patient. Although the CRISP aims to link data on patient care across the health care system, to realize this goal the system needs both a method for identifying patients as they receive care from different providers, such as through unique patient identification numbers, and also the willingness and capacity of hospitals and their staff to both submit data to and use the system. As the CRISP works out these issues, some hospital systems were turning to consultants and developing their own health IT infrastructures to calculate patient per capita costs and to track their patients’ care throughout the health care system (in the case of patients treated at integrated delivery systems).

Capital Projects. Because of the global budgets and the limited (if any) financial return on increased volume, hospitals were more hesitant to apply for hospital improvement projects that require approval of a CON application. Stakeholders indicated that some capital investment projects that had been in the pipeline might undergo dramatic changes. Consistency of the capital investment proposals with the state’s longer-term vision for volume control is now necessary. Culling some hospital beds or converting them to alternative clinical uses is likely in the future. Hospital and state stakeholders highlighted the potential growth of ambulatory care centers, including the possibility that some hospitals would become ambulatory care centers. In Maryland, ambulatory care centers with only one or no operating room are not rate regulated. Thus, this alternative clinical setting provides an opportunity for a hospital to continue to operate outside of the global budget environment.

Workforce Transformation. We heard from most hospital leaders that hospital workforces are bound to change under global budgets over time; however, these changes did not appear to rise to the level of “transformation.” As noted above, most hospitals were increasing staffing for care coordinators, managers, and discharge planners to support quicker discharges and flows of patients through hospitals. A few hospital leaders seemed to be increasing staffing of hospitalists. But, the types of staffing changes occurring seemed to predate the All-Payer Model. Workforce transformation in a larger sense (i.e., drastically changing the mix of clinical and other staff supporting hospitals) may still be a future strategy as the model matures.

Regional Partnerships. We did not hear about large-scale shifts in partnerships of hospitals as they learn to operate under global budgets. This may reflect the fact that many Maryland hospitals are already part of large regional systems that predate the All-Payer Model. However, even within the large existing hospital systems (e.g., UMMS, MedStar), there appeared to be only limited coordination among individual hospitals.

4.3 Summary

Most stakeholders and hospital-based leadership and staff we spoke with during the Round One site visits, interviews, and focus groups remained open-minded about the All-Payer Model. Highly negative and skeptical perspectives were in the minority of opinions we heard. That said, there are challenges to making the All-Payer Model work in the long run.

As highlighted above, hospital leaders’ larger concerns centered on aligning physician and hospital incentives and having sufficient financial resources to support investments in physical infrastructure, health IT and analysis, new technology, new drugs, and staffing. Hospitals also perceived that their facilities will eventually need to be updated or replaced, and they will want to have access to new technology—all investments in the future—but they were unclear about where the resources to support these investments will come from. Most hospitals described having just enough resources under all-payer rates to support their operating expenses. In the past, increasing the volume of services, including building new specialized care centers, was theoretically an option to increase revenues. This option is now constrained under global budgeting. Whether this scarcity of resources is real or only perceived is unclear, as a few of the hospitals we visited were reporting very strong operating margins that might provide the resources that facilities assert they need. Other common concerns were related to uncertainty about future policy, particularly the market shift adjustment calculation and transitioning to a per capita total cost of care payment approach.

Our discussions during the site visits made clear that some technical elements of the All-Payer Model remained under development and discussion. These open issues created uncertainty and presented some difficulties for hospitals in planning their operations, even in the short term. Still, a general willingness to work through challenges, build on successful strategies, and make changes based on lessons learned seemed the dominant perspective at this relatively early stage in the implementation process.

SECTION 5 HOSPITAL GLOBAL BUDGET AND RATE ADHERENCE

5.1 Research Questions

A central goal of the Maryland All-Payer Model is controlling growth in hospital service expenditures and utilization in both inpatient and outpatient settings. Hospitals face penalties if their revenues vary from their allowed annual revenue (or global budget) beyond a narrow 0.5 percent corridor, which creates strong incentives to manage volume and revenue to meet the target budget. The rates each hospital is allowed to charge for its services (defined by rate center) are set each year by the HSCRC. Hospitals are permitted to vary the rates charged during the year to account for natural fluctuation from the utilization assumptions on which their budgets are set—although rates may change only within prescribed corridors (up to 5% without permission and up to 10% with permission from the HSCRC), and any rate changes must be applied uniformly to all rate centers. Because global budgets strictly control hospital revenues, depending on how hospitals are able to manage their volume and operating expenses, the All-Payer Model may affect hospital profitability.

The All-Payer Model includes provisions designed to ensure equitable treatment of patients. All-payer rates are intended to remove incentives to avoid treating publicly insured patients in favor of those with private insurance. Adjustment of hospital rates for UCC (UCC) is a long-standing component of Maryland’s all-payer rate-setting system, which was designed to discourage the shift of nonpaying patients to other facilities. On the other hand, hospitals have an incentive to provide services that are unregulated and outside of their annual budgets as a way to increase revenue. Examples of unregulated services include outpatient renal dialysis, home health, and SNF services. Although most hospitals’ budgets encompass services provided regardless of whether the patient resides in Maryland, services provided to nonresidents are not included in the budgets of a small number of hospitals.¹⁹ These hospitals also have an incentive to increase the volume of services provided to out-of-state patients as a way to increase revenue.

This section describes hospital compliance with global budgets and approved rates. In future reports, this section will also include trends in hospital revenue, costs, and volume before and after the implementation of the All-Payer Model as audited financial data become available. In this report, our analyses addressed the following questions:

- To what extent did hospitals’ revenues differ from their approved global budgets?
- How often and to what extent did hospitals adjust their rates to remain within their global budgets?

¹⁹ As noted in **Section 4.1.1**, four hospitals’ FY 2014 budgets excluded revenues from out-of-state patients: University of Maryland Medical Center, Johns Hopkins Hospital, Johns Hopkins Bayview, and Johns Hopkins Suburban. University of Maryland Shock Trauma has a separate budget that also excludes nonresident utilization. The University of Maryland facilities’ budgets stopped excluding out-of-state revenues beginning with FY 2015.

In future annual reports, analyses in this section also will address the following questions:

- How did hospital profits change after the implementation of the All-Payer Model?
- How did hospital revenues, operating expenses, and volume change after the implementation of the All-Payer Model?
- How did the amount of UCC provided by hospitals change after the implementation of the All-Payer Model?
- Did changes in hospital revenue and volume differ for Medicare and non-Medicare patients, and for residents and nonresidents of Maryland, after the implementation of the All-Payer Model?

5.2 Evaluation Methods

The analyses in this section examined the following measures:

- Percent variation of hospital revenues from the global budget.
- Percent variation of hospital charges from approved rates for clinic services, outpatient emergency services, and inpatient medical/surgical acute services.

Analyses examined trends during the All-Payer Model period only because variation of hospital revenues from the global budget and variation of hospital charges from approved rates are not relevant to the pre-implementation period.

Charged rates by rate center were calculated from Experience Reports from FY 2014 and FY 2015. Rate orders for rate centers in all facilities were taken from hospital rate orders for FY 2014 and FY 2015. Charged rates were calculated on a quarterly basis by dividing total quarterly revenues by total quarterly volumes for selected rate centers. We calculated the average charged rate for FY 2015 in the same manner. We did not calculate average rates for FY 2014 because hospitals operated under global budgets for only two quarters of the fiscal year. Hospital global budgets and the total revenue by hospital for FY 2014 and FY 2015 were obtained from the HSCRC. A list of hospitals granted permission to vary charges from their approved rates by more than 10 percent was obtained from the HSCRC. Adherence to global budgets was determined using global budget and total revenue data obtained from the HSCRC for FY 2014 and FY 2015. A list of hospitals receiving penalties for failing to adhere to their budgets in FY 2015 and the amounts of penalties was provided by the HSCRC. In these analyses, FY 2014 and FY 2015 are considered the All-Payer Model implementation period.

The analyses include information from 46 of the 47 Maryland acute care hospitals. Holy Cross Germantown, which opened in October of 2014, was excluded because its global budget had not been established during the time period covered by these analyses.

The analyses in this section subdivided facilities into five major hospital characteristic categories (Table 10). Hospital characteristics were defined using the 2014 Medicare Impact file and the MHCC's *Annual Report on Selected Maryland Acute Care and Special Hospital Services* for FY 2015. Data for the University of Maryland at Dorchester were combined with the University of Maryland Shore Medical Center at Easton in the Medicare Impact file, which was used to define teaching status and DSH percentage. Therefore, these hospitals are combined for the purposes of categorizing by teaching status and DSH percentage, and the total number of hospitals for these characteristics is 45.

Table 10
Number of Maryland hospitals by selected characteristics

Hospital characteristic	Number of hospitals ^a (percentage of all hospitals)
All Maryland hospitals	46 (100%)
Current regulatory system	
Global Budget Revenue	36 (78%)
Total Patient Revenue	10 (22%)
Number of inpatient beds	
<150	14 (30%)
150–349	23 (50%)
350+	9 (20%)
Teaching status ^b	
IBR ≤ 5%	32 (71%)
IBR > 5%	13 (29%)
DSH percentage ^b	
<20	18 (39%)
20–30	15 (33%)
>30	12 (26%)
System affiliation	
Affiliated	29 (63%)
Nonaffiliated	17 (37%)

^a 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 during the time period covered.

^b Intern-to-bed ratio (IBR) and disproportionate share hospital (DSH) percentage were based on data from the 2014 Medicare Impact file. Data for University of Maryland Medical Center at Dorchester are reported under University of Maryland Shore Medical Center at Easton in the Impact file. Therefore, these hospitals are combined for the purposes of categorizing by teaching status and DSH percentage, and the total number of hospitals for these characteristics is 45.

5.3 Results

5.3.1 Adherence to Global Budget

As described in *Section 1.2.2*, Maryland hospitals whose revenues vary from their approved budgets by more than 0.5 percent are subject to penalties that depend on the percent variation and on whether revenues exceed or fall short of the approved budget. As noted in *Section 4.1.1*, the HSCRC did not apply penalties in FY 2014. Seven hospitals received penalties in FY 2015, two for exceeding their budgets and five for falling short of their budgets. Of the hospitals receiving penalties, two operated under TPR (one with an overage and one with an underage) and five under GBR (one with an overage and four with an underage). Penalties applied to these hospitals ranged from \$48,301 to \$15,290,361, totaling \$22,380,851. One hospital, which underran its budget by almost 14 percent, received a penalty equal to 90 percent of its underage. Three hospitals received penalties that represented less than 3 percent of their budget variances. Penalties for the remaining three hospitals ranged from 21 percent to 43 percent of their budget variances.

Table 11 displays the number of hospitals by the categories of revenue variation used to determine penalties.²⁰ In FY 2014, 36 of 46 hospitals had revenues within 0.5 percent of their global budgets and thus were not subject to any penalties. Seven hospitals exceeded their budgets by more than 0.5 percent, with two hospitals exceeding their budgets by more than 1 percent. Three hospitals had revenues that were more than 0.5 percent less than their budgets, and one hospital fell short of its approved budget by more than 2 percent. Nine of 36 GBR hospitals had revenues outside 0.5 percent of their budgets, whereas 1 of the 10 TPR hospitals did not fall within the 0.5 percent budget corridor. Five of 14 hospitals with under 150 beds had revenues outside 0.5 percent of their budgets, compared with 2 of the 23 medium-sized hospitals with 150–349 beds and 3 of the 9 hospitals with 350 or more beds. Nonteaching hospitals and teaching hospitals were about equally likely to comply with their budgets—25 of 32 nonteaching hospitals and 10 of 13 teaching hospitals had revenues within 0.5 percent of their budgets. Hospitals that varied from their budgets by more than 0.5 percent represented the largest share of total hospitals for high DSH percentage hospitals (4 of 12 hospitals, compared with 3 of 18 hospitals with low DSH percentage and 3 of 15 hospitals with moderate DSH percentage). Seven of 29 affiliated hospitals varied from their budget by more than 0.5 percent, whereas 2 of 17 nonaffiliated hospitals did so. More affiliated hospitals had budget overruns than underruns.

²⁰ Revenue variation in FY 2014 was based on revenue information in unaudited hospital income statements. Revenue information for FY 2015 used as the basis for determining hospital penalties for FY 2015 was provided by the HSCRC; although it was close to the information in unaudited hospital financial statements for that year, there were sizable differences for a few hospitals. Therefore, our calculations of FY 2014 revenue variation using unaudited financial statements may not always be accurate.

Table 11
Number of hospitals by percent variation of revenues from budget, all Maryland hospitals and by hospital characteristic, FY 2014 and FY 2015

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	18	18	5	1	1	2	1	4	17	19	1	1	1
Current regulatory system																
GBR	1	1	1	12	15	4	1	1	2	0	4	12	16	1	0	1
TPR	0	0	0	6	3	1	0	0	0	1	0	5	3	0	1	0
Number of inpatient beds																
<150	1	1	0	5	4	3	0	0	2	1	1	5	4	0	1	0
150–349	0	0	0	9	12	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	11	14	3	0	1	2	1	2	13	13	0	1	0
IBR > 5%	0	0	0	6	4	2	1	0	0	0	2	3	6	1	0	1
DSH percentage‡																
<20	1	0	0	5	10	1	0	1	0	1	1	9	7	0	0	0
20–30	0	1	0	9	3	2	0	0	1	0	1	5	7	0	1	0
>30	0	0	1	3	5	2	1	0	1	0	2	2	5	1	0	1
System affiliation																
Affiliated	1	0	1	12	10	3	1	1	1	0	4	9	13	1	0	1
Nonaffiliated	1	0	0	6	9	1	0	0	1	1	0	8	6	0	1	0

NOTES: * Holy Cross Germantown Hospital opened in FY 2015, but it is excluded from these analyses because it did not operate under a global budget during the time period covered. † IBR and DSH percentages were based on data from the 2015 Medicare 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 Medicare Impact file. Therefore, these hospitals are combined for the purposes of categorizing by teaching status and DSH percentage. GBR = Global Budget Revenue; IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

The number of hospitals that had revenues within 0.5 percent of their budgets remained the same (36) in FY 2014 and FY 2015. Unlike FY 2014, in FY 2015 more hospitals underran (7 hospitals) than overran (3 hospitals) their budgets by more than 0.5 percent. Three hospitals had revenues that varied from their budgets by more than 2 percent in FY 2015, compared with only one in FY 2014. Across the subcategories of hospitals examined, there were only small changes in the number of hospitals that had revenues within 0.5 percent of their budgets. Typically there was no change or the number increased or decreased by only one. Changes in the number of hospitals with underruns compared with overruns were also small in most categories. However, affiliated hospitals were more likely to underrun their budgets in FY 2015 (5 of 7 hospitals with greater than 0.5% budget variance) than in FY 2014 (2 of 7 hospitals with greater than 0.5% budget variance).

5.3.2 Adherence to Rate Corridors

Rates charged for services may vary from hospitals' approved rate orders, but hospitals are limited in the percentage by which they can deviate from their rate orders without obtaining approval. Additionally, if a change is made, it must be applied uniformly to charges for all rate centers. Hospitals are permitted to vary their charges from the approved rates within a ± 5 percent rate corridor without permission, up to ± 10 percent with permission from the HSCRC, and beyond ± 10 percent under special circumstances. The HSCRC's policies for approving rate changes in FY 2014 and FY 2015 were described in **Section 4.1.2**. Table 12 reports by quarter and for FY 2015 in aggregate the number of hospitals with charged rates that varied from their rate orders by 5–10 percent and more than 10 percent for three rate centers: clinic services, outpatient emergency services, and inpatient medical/surgical acute services. Results are reported from the third quarter of FY 2014 through the fourth quarter of FY 2015. The third quarter of FY 2014 was chosen as the beginning point for the analyses because it was the official start of the new model. Although rates were retroactively applied during the first two quarters of FY 2014, hospitals were not required to operate under the global-budget methodology during that time. We do not report aggregate results for FY 2014 because the analyses included only two quarters of this year. In addition, for each quarter of FY 2015, we show the number of hospitals that received permission to vary their rates by up to 10 percent. Hospitals that received this permission could vary their rates above or below the approved rate order. All hospitals that requested permission for this rate variation received approval in FY 2015. The number of hospitals with permission to vary their rates up to 10 percent is not shown for FY 2014 because hospitals were not required to request permission during that year.

The number of hospitals that received permission for up to 10 percent variation from the approved rate order increased over the course of FY 2015. By the fourth quarter of FY 2015, six quarters into the All-Payer Model, nearly half of hospitals had received this permission. However, particularly in the earlier quarters of the year, for each of the three rate centers the number of hospitals whose charged rates exceeded the 5 percent corridor was far greater than the number with permission to do so. Furthermore, although many hospitals charged rates that exceeded their rate orders by more than 10 percent, information provided by the HSCRC did not indicate that any hospitals were given permission to do so in FY 2015. Although there is no penalty applied on a quarterly basis for noncompliance with approved rates, if a rate charged exceeds the approved rate for a quarter, the hospital is notified of the potential compliance issue.

Table 12
Number of hospitals with permission to vary rates and with charged rates for selected rate centers outside the 5 percent rate corridor by quarter, third quarter of FY 2014 through fourth quarter of FY 2015

Rate center	Q3 FY 2014	Q4 FY 2014	Q1 FY 2015	Q2 FY 2015	Q3 FY 2015	Q4 FY 2015	2015 aggregate
Number of hospitals with permission to vary rates up to 10%	N/A	N/A	2	3	9	21	—
Clinic services							
# of hospitals with 5–10% rate variation	11	12	8	11	10	15	3
# of hospitals with >10% rate variation	6	13	14	11	9	11	8
Outpatient emergency services							
# of hospitals with 5–10% rate variation	9	12	12	8	14	23	11
# of hospitals with >10% rate variation	7	12	6	12	7	8	2
Inpatient medical/surgical acute services							
# of hospitals with 5–10% rate variation	16	13	10	12	14	15	6
# of hospitals with >10% rate variation	13	17	16	10	8	16	3

If the rates charged in a rate center vary from the approved amount by more than the allowed corridor over the entire rate year, a noncompliance penalty is applied to the hospital's budget in the subsequent year, regardless of whether the hospital was in compliance with its global budget.

Throughout the first six quarters of All-Payer Model implementation, hospitals' charged rates commonly exceeded their established rate orders by more than 5 percent. The number of hospitals with rate adjustments was largest in the last quarter of the fiscal year. This pattern is expected as hospitals seek to adjust their revenues to account for actual utilization during the year to meet their budget targets. Our analyses indicate that hospitals did not comply with the requirement to apply uniform adjustments to charges for all rate centers. The number of hospitals with rate adjustments in a given quarter varied considerably across the three rate centers.

Although large numbers of hospitals charged rates that exceeded the 5 percent rate corridor during a given quarter, the average rates charged over the course of the year were closer to established rates. For example, in FY 2015, depending on the quarter, 8–16 hospitals charged rates for medical/surgical acute services that differed from their rate orders by more than 10 percent. However, the average rate charged during FY 2015 differed from the rate order by more than 10 percent for only 3 hospitals. This suggests that there were offsetting rate increases and rate decreases over the course of the year.

Table 13 shows the percentage of hospitals with rate variations of 5–10 percent and greater than 10 percent for inpatient medical/surgical acute services by hospital characteristic. Across all Maryland hospitals, the percentage of hospitals with rate variation outside the 5 percent corridor ranged from slightly less than half to about two-thirds, depending on the quarter. A higher percentage of TPR than GBR hospitals exceeded the 5 percent corridor during the first four quarters of All-Payer Model implementation, but this pattern was reversed during the fifth and sixth quarters. On average over the course of FY2015, GBR and TPR hospitals were roughly equally likely to exceed the 5 percent corridor, but no TPR hospitals exceeded the corridor by more than 10 percent, whereas 8 percent of GBR hospitals (3 of 36 hospitals) did so. Small hospitals with less than 150 beds were generally far more likely than medium and large hospitals to exceed the 5 percent corridor. This pattern also held on average over FY 2015. The average annual rates in FY 2015 for all hospitals with 350 or more beds were within the 5 percent corridor. There was no consistent pattern by teaching status or DSH percentage, although a somewhat higher percentage of low DSH percentage hospitals had average annual rates in FY 2015 outside the 5 percent corridor. While affiliated hospitals were less likely than nonaffiliated hospitals to exceed the 5 percent corridor during the first three quarters of the All-Payer Model period, they were more likely than nonaffiliated hospitals to do so during the fourth through sixth quarters. In aggregate in FY 2015, the percentage of hospitals with rates outside the 5 percent corridor did not differ markedly by affiliation status.

Table 13
Percentage of hospitals with charged rates for inpatient medical/surgical acute services outside the 5 percent corridor by hospital characteristic and quarter, third quarter of FY 2014 through fourth quarter of FY 2015

Hospital characteristic	Variation from rate order	Q3 FY 2014	Q4 FY 2014	Q1 FY 2015	Q2 FY 2015	Q3 FY 2015	Q4 FY 2015	FY2015 aggregate
All Maryland hospitals*	5–10%	35	28	22	26	30	33	13
	>10%	28	37	35	22	17	35	7
Current regulatory system								
GBR	5–10%	28	19	19	22	31	36	11
	>10%	25	36	33	22	19	33	8
TPR	5–10%	60	60	30	40	30	20	20
	>10%	40	40	40	20	10	40	0
Number of inpatient beds								
<150	5–10%	21	36	36	29	29	29	21
	>10%	50	57	36	43	21	43	14
150–349	5–10%	48	22	22	22	35	35	13
	>10%	17	30	26	13	17	30	4
350+	5–10%	22	33	0	33	22	33	0
	>10%	22	22	56	11	11	33	0

(continued)

Table 13 (continued)
Percentage of hospitals with charged rates for inpatient medical/surgical acute services outside the 5 percent corridor by hospital characteristic and quarter, third quarter of FY 2014 through fourth quarter of FY 2015

Hospital characteristic	Variation from rate order	Q3 FY 2014	Q4 FY 2014	Q1 FY 2015	Q2 FY 2015	Q3 FY 2015	Q4 FY 2015	FY2015 aggregate
Teaching status†								
IBR > 5%	5–10%	46	31	15	15	31	46	8
	>10%	23	23	54	23	15	31	8
IBR ≤ 5%	5–10%	31	28	25	31	31	28	16
	>10%	31	44	28	22	19	38	6
DSH percentage‡								
<20	5–10%	28	11	17	22	39	28	22
	>10%	33	50	33	28	22	33	6
20–30	5–10%	60	40	33	33	33	40	7
	>10%	13	27	33	13	0	20	7
> 30	5–10%	17	33	17	17	8	33	8
	>10%	33	33	33	25	33	42	8
System affiliation								
Affiliated	5–10%	31	28	21	38	31	41	14
	>10%	24	34	28	17	17	34	7
Not affiliated	5–10%	41	29	24	6	29	18	12
	>10%	35	41	47	29	18	35	6

NOTES: * Holy Cross Germantown Hospital opened in FY 2015 and is excluded from these analyses. † IBR and DSH percentages were based on data from the 2015 Medicare 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 Medicare Impact file. Therefore, these hospitals are combined for the purposes of categorizing by teaching status and DSH percentage. GBR = Global Budget Revenue; IBR = intern-to-bed ratio; TPR = Total Patient Revenue; DSH = disproportionate share hospital.

5.4 Discussion

During FY 2014 and FY 2015, which included the first 18 months of operation for the All-Payer Model, Maryland hospitals were largely successful at adhering to their global budgets. About 80 percent succeeded in staying within the narrow 0.5 percent corridor in both years. However, the number of hospitals that deviated from their budgets by more than 2 percent grew from one in FY 2014 to three in FY 2015. Smaller hospitals were less likely to be able to operate within the 0.5 percent global budget corridor, although this improved slightly in FY 2015. Smaller hospitals may experience greater variability in their service volumes and, therefore, may find it more difficult to stay within the narrow budget corridor permitted. Hospitals with high DSH percentages continued to face greater challenges in complying with their budgets than did other hospitals in both years.

To remain within their budgets, hospitals frequently exercised the option to adjust the rates charged during the course of the year. During most of the first six quarters of All-Payer Model implementation, over half of the hospitals' charged rates differed from their rate orders by

more than 5 percent. The HSCRC did not enforce the requirement for hospitals to request permission to vary their rates by more than 5 percent until FY 2015. However, in that year the number of hospitals with greater than 5 percent rate variation routinely exceeded the number with permission, and many hospitals had greater than 10 percent rate variation, although this permission had not been granted. Hospitals also did not appear to comply with the requirement to change rates for all rate centers in tandem. The finding that average rates charged over the course of the year in FY 2015 are much closer to rate order amounts than the rates charged in the individual quarters indicates considerable volatility in charged rates over time. It appears that hospitals may make frequent rate adjustments during the course of the year in response to short-run volume fluctuations to ensure that they remain in compliance with their annual budget. The higher prevalence of large variations from rate orders among small hospitals is consistent with the greater challenges these hospitals had in complying with their annual budgets.

Hospitals were transitioning to global budgets and rate orders were still being issued during the third and fourth quarters of FY 2014, which could have contributed to the variation of charged rates from hospital rate orders during that time period. However, our analyses do not indicate that variation of charges from rate orders decreased in FY 2015 as hospitals became more accustomed to operating under global budgets. According to the HSCRC, some adjustments to hospital rate orders occurred during the course of FY 2015, and these rate adjustments were applied to the global budget calculation for the entire fiscal year. As a result, hospitals might have needed to make larger rate adjustments after the new rate order was applied to meet their annual global budgets. In addition, these analyses used a hospital's final rate order for the fiscal year to calculate variation of charged amounts from the rate order. Thus, rate variations for time periods before any adjustments do not reflect the rate order in place at the time services were provided. Nonetheless, we found the greatest variation from rate orders in the last quarter of the fiscal year, when final rate orders are in place and there should not be bias in the calculation of rate variation.

Future reports will monitor whether the variability of charged rates decreases over time as hospitals gain experience with the All-Payer Model. We will explore the reasons for and responses to rate adjustments through stakeholder and hospital site visit interviews. It will also be important to follow whether global budget compliance continues to pose a greater challenge for small hospitals.

SECTION 6 MARYLAND MARKET DYNAMICS

6.1 Research Questions

The All-Payer Model encourages hospitals to reduce their per-case intensity and their overall patient volumes. However, hospitals may be able to increase their budgets if they can demonstrate that they increased their shares of the market for hospital services. This introduces two incentives that could affect hospital market dynamics in Maryland.

First, hospitals could decide to undertake market actions to increase their market shares in order to increase their annual budgets. Market actions to increase market share include purchasing hospitals or other entities. For example, acquiring physician groups could provide greater opportunities for aligning hospital and physician interests, as well as provide additional patient referrals to hospitals. Other market actions, such as upgrading hospital facilities, could also attract new patients, increase market share, and, therefore, raise hospital budget ceilings. However, for such strategies to be effective, hospitals' increase in revenue from additional market share would have to offset the increased cost of providing care to additional patients. The HSCRC tries to discourage such market share expansion by attempting to set rates close to estimated hospital costs.

Second, global budgets may create an incentive for hospitals to limit or eliminate the least profitable service lines. Although Maryland's rate-setting system is intended to align rates with hospital costs, rates are updated from a historical base and may not correspond with costs uniformly across revenue centers. As a result, some service lines may be more profitable than others. Furthermore, certain service lines may attract patients who tend to be more costly, which might create incentives to eliminate those service lines. However, the market shift adjustment policy is intended to deter hospitals from eliminating services.

The descriptive analyses in this section focused on a broad set of market actions to capture the full range of Maryland hospital system changes occurring at the same time as the implementation of the All-Payer Model. We examined the extent and nature of market actions, the characteristics of hospitals involved in market actions, hospital openings and closures, and shifts in service lines before and after the implementation of the All-Payer Model in January 2014.

We addressed the following research questions:

1. To what extent did acute-care hospitals undertake market actions before and after the inception of the Maryland All-Payer Model, and what types of market actions did they undertake?
2. How did the characteristics of acute-care hospitals change after the hospitals undertook market actions, and how did these hospitals differ from hospitals that did not undertake any market actions?

3. To what extent were there changes in service lines within acute-care hospitals before and after the inception of the All-Payer Model, and what types of service lines were affected?

In answering these research questions, we describe trends in the Maryland hospital market but do not attribute them to potential effects of the All-Payer Model on Maryland hospitals.

6.2 Evaluation Methods

To address the three research questions, we calculated descriptive statistics using data collected on Maryland's 47 acute-care hospitals. The tables and figures in this section present descriptive results for Maryland's acute-care hospitals by calendar year before and after the implementation of the All-Payer Model in January 2014. The remainder of this section describes the measures and data sources used in these analyses.

6.2.1 Measures

Hospital Market Actions. This analysis identifies hospital market actions that occurred from January 1, 2011, through July 31, 2015. These market actions are ownership changes for hospitals, ownership changes for nonhospital facilities, hospital construction, hospital renovation, service line additions and closures, and hospital openings and closures.

- **Hospital ownership change:** We defined a hospital ownership change as a health system's purchase of a hospital and its assets. We considered the hospital that was purchased—rather than the health system that acquired the hospital—to be the entity undergoing the ownership change market action.
- **Nonhospital ownership change:** We defined ownership change for a nonhospital facility as the purchase of a nonhospital asset—such as a home health provider—by a single hospital, health system, or other provider. If a hospital purchased a nonhospital asset, we attributed the market action to that hospital. Similarly, if a health system purchased a nonhospital asset, we attributed the market action to the main hospital in the health system (e.g., Johns Hopkins Hospital in the Johns Hopkins Health System).
- **Construction:** The construction category included the creation of a new hospital or nonhospital facility. We assigned construction activity to the hospital that pursued the construction project.
- **Renovation:** Hospital renovations included updates to hospital facilities, such as renovating a hospital's cancer center or increasing the size of its operating rooms. Renovations differ from construction in that they do not involve the creation of an entirely new building.
- **Service additions and closures:** We considered a hospital to have added a service if that hospital provided a new service that it had not provided in the prior year. Similarly, a service closure occurred when a hospital ceased providing a service. We did not consider a hospital opening or closure to be a change in a service line.

- **Hospital openings and closures:** We tracked plans for hospital openings and closures. Because of the relative infrequency of hospital openings and closures from 2011 through 2015, we discuss these separately from other market actions.

We assigned ownership changes and service closures to the years in which these actions were completed. We allocated all service additions, construction, and renovation actions to the year in which the MHCC reviewed them, because these projects can require significant lead time to implement.

Characteristics of Hospitals That Participated in Market Actions. We used three measures to characterize hospitals undergoing market actions: total hospital beds, full-time equivalent (FTE) employment, and net operating revenue. We also calculated the percentage of hospitals undertaking market actions that were affiliated with multihospital health systems.

In Maryland, net operating revenue is reported by fiscal year—which begins in July—rather than by calendar year. Because we present market dynamics trends by calendar year, we assigned net operating revenue figures to the calendar year that corresponds to the end of each fiscal year. For example, we attributed fiscal year 2013 net operating revenue figures to the 2013 calendar year.

Changes in Service Lines Before and After the Implementation of the All-Payer Model. We measured changes in service lines before and after the implementation of the All-Payer Model in two ways. First, we used the HSCRC’s revenue and volumes reports to calculate hospital beds by service line at the state level (HSCRC, n.d.-a). The service lines for which bed counts are reported are:

- Medical/surgical (acute).
- Pediatrics (acute).
- Psychiatric (acute).
- Obstetrics (acute).
- Newborn nursery.
- Medical/surgery intensive care unit (ICU).
- Neonatal ICU.

We selected these service lines for two reasons: (1) They represent a set of commonly used services and (2) they are available at many hospitals in the state. We present bed counts by calendar year from 2011 through 2015.

Second, we measured changes in total volumes by service line at the state level from 2011 through 2014. We do not present total volumes for 2015 because we do not have complete data for the calendar year and thus could not compare results to those for earlier years.

6.2.2 Data Sources

We used Maryland CON applications, CON status update documents, MHCC meeting minutes, MHCC update documents, and articles from online publications to identify and categorize hospital market actions. We used the HSCRC's revenue and volumes reports, disclosure of hospital financial and statistical data reports, and wage and salary surveys to describe the characteristics of hospitals that participated in market actions from 2011 through 2015. The revenue and volumes reports include monthly reports of revenues, volumes, and beds by rate center for all acute-care hospitals in Maryland (HSCRC, n.d.-a). To describe changes in hospital service lines before and after the implementation of the All-Payer Model, we used both the revenue and volumes reports and the MHCC's *Annual Report on Selected Maryland Acute Care and Special Hospital Services* (MHCC, 2015a).

6.3 Results

6.3.1 Hospital Market Actions

As shown in Table 14, from January 2011 through July 2015, 39 of 47 hospitals participated in a total of 101 market actions (in addition to 1 hospital opening and 1 announced hospital closure). Sixty-two of these market actions took place in 2011–2013, the period before the implementation of the All-Payer Model. Trends in market actions by year do not appear to have changed after the implementation of the All-Payer Model. However, most market actions are relatively rare, so it is difficult to establish trends, particularly with only 18 months in the time period after implementation of the All-Payer Model. More detail on these market actions is provided below.

Table 14
Number of hospitals undertaking market actions by category, January 2011–July 2015

Year	Ownership changes		Building activities		Service changes	
	Ownership change (hospital)	Nonhospital ownership change	Construction	Renovation	Addition of services	Closure of services
2011	1	1	1	10	0	1
2012	2	0	1	21	0	3
2013	2	0	4	15	1	4
2014	0	0	0	7	1	2
2015	1	2	3	14	3	1
Total actions by category	6	3	9	67	5	11

Hospital Ownership Changes. The 2011–2015 period included six transfers of hospital ownership, five of which occurred before the implementation of the All-Payer Model. The

UMMS purchased four of the hospitals that underwent ownership changes. MedStar, a health system with hospitals in both Maryland and Washington, DC, purchased one hospital and LifeBridge Health, a Baltimore-based health system, also purchased one hospital. By July 2015, nearly half of Maryland's acute-care hospitals were owned by one of the state's three largest health systems: UMMS (11 hospitals), MedStar Health (7 hospitals), and the Hopkins Health System (4 hospitals).

Nonhospital Ownership Changes. We identified three instances of ownership changes that did not involve the sale of entire hospitals and their subsidiaries. One of these three nonhospital transactions occurred before the implementation of the All-Payer Model: In 2011, Johns Hopkins Health System purchased the remaining ownership shares of a home health system (MHCC, 2011). Additionally, in 2015, Johns Hopkins' Bayview Medical Center sold delicensed chronic care beds to a company that owns SNFs (MHCC, 2015c), and MedStar purchased three endoscopy practices in three different Maryland counties (MHCC, n.d.).

Construction. As shown in Table 15, from January 2011 through July 2015, Maryland hospitals and health systems proposed nine construction projects.²¹ Six of the projects were proposed before the implementation of the All-Payer Model; three of those six were for the construction of new hospitals to replace older facilities:

- In 2012, the UMMS proposed replacing the University of Maryland Shore Medical Center at Easton, which in July 2015 had 112 licensed acute-care beds, with a new facility with fewer beds (Polk, 2014).
- In October 2013, Dimensions Healthcare submitted a CON application to build a 231-bed facility in Largo to replace the existing Prince George's Hospital Center, which in July 2015 had 237 licensed acute-care beds (MHCC, 2015b).
- In the same month, Adventist HealthCare proposed replacing Washington Adventist Hospital in Takoma Park, which in July 2015 had 230 licensed beds, with a 201-bed hospital located in Silver Spring (MHCC, 2015b; Washington Adventist Hospital, 2013). Adventist HealthCare further modified its proposal in 2014, reducing the proposed number of beds to 170 (Washington Adventist Hospital, 2014).

As of July 2015, the MHCC was still reviewing the three hospital-construction projects, even though they all were initially proposed before 2014. The remaining three pre-2014 proposed construction projects, and all three of those proposed in 2015, were for new ambulatory care facilities, such as community health centers.

Renovation. From January 2011 through July 2015, 34 acute-care hospitals proposed 67 renovation projects: 46 in 2011–2013 and 21 in 2014 and 2015. Renovation project budgets ranged from less than a million dollars (for updating hospital spaces such as the morgue or pharmacy department) to \$228.8 million (for construction of a new hospital tower for the Holy Cross Hospital of Silver Spring). Common renovation projects included expanding hospital

²¹ This count does not include Adventist's CON application, originally submitted in 2009, for construction of an 86-bed hospital in Clarksburg. The MHCC denied the CON in January 2011.

spaces, such as operating rooms, EDs, and lobbies; converting semiprivate rooms to private rooms; and building additions to existing hospitals.

Service Line Additions. There were five service-line additions at Maryland's acute-care hospitals between 2011 and 2015. Four of the five occurred after the implementation of the All-Payer Model in January 2014. The only service line addition before 2014 was a proposal to open an inpatient hospice. From 2014 through summer 2015, proposed service openings included the addition of cardiac surgery services at two separate hospitals, the addition of acute inpatient and outpatient psychiatric services at a single hospital, and the establishment of a hospice unit in one hospital.

Service Line Closures. We identified 11 service line closures that occurred from January 2011 through July 2015. Five of the 11 service lines that closed were related to care for pregnant women and newborns. Eight of the closures took place at six different hospitals before implementation of the All-Payer Model; three closures occurred at two hospitals after implementation.

Hospital Openings and Closures. During the 2011–2015 period, one acute-care hospital opened, and another acute-care hospital announced that it would become an outpatient-only facility. In October 2014, Holy Cross Germantown, a 93-bed facility, opened in Montgomery County (MHCC, 2015b). In late July 2015, Laurel Regional Hospital in Prince George's County, which had been losing money, announced that it would become an outpatient-only facility by 2018 (Koh, 2015). Dimensions Health, which owns Laurel Regional, plans to replace both Laurel Regional and Prince George's Hospital Center with a new hospital managed by UMMS (Koh, 2015). However, the MHCC has yet to approve this plan.

Although this analysis focuses on acute-care hospitals, it should be noted that the University Specialty Hospital within the UMMS closed in July 2012 (Maryland.gov, 2015). The UMMS transferred 92 of the University Specialty Hospital's 180 beds to Maryland General Hospital (now known as the University of Maryland Midtown) and to Kernan Hospital (now known as the University of Maryland Rehabilitation and Orthopedic Institute) (MHCC, 2012).

6.3.2 Characteristics of Hospitals Participating in Market Actions

In addition to counting market actions by year, we compared the characteristics of hospitals that participated in market actions with the characteristics of hospitals that did not participate in market actions. The results of this comparison are presented in Table 15.

Table 15
Characteristics of hospitals by whether they participated in market actions

Hospital participation in market actions between January 2011 and July 2015		Average number of hospital beds, 2011	Average net operating revenue (millions), 2011	Average FTEs, 2011	Percentage of hospitals affiliated with a multihospital health system in 2011
Ownership change (hospital)?	Yes	206	\$198.2	1,118	33.3%
	No	271	\$294.7	1,673	60.0%
Construction?	Yes	374	\$407.5	2,297	77.8%
	No	237	\$251.7	1,432	54.1%
Renovation?	Yes	302	\$324.9	1,832	55.9%
	No	162	\$161.0	947	66.7%
Addition of services?	Yes	339	\$365.9	2,005	60.0%
	No	254	\$271.9	1,552	58.5%
Closure of services?	Yes	298	\$267.4	1,572	57.1%
	No	257	\$284.8	1,606	59.0%

Compared with hospitals that were not purchased from 2011 through 2015, hospitals that experienced ownership changes had, on average, fewer hospital beds, lower net operating revenues, and fewer FTE employees in 2011. Two of the six hospitals that underwent an ownership change (33.3%) from 2011 through 2015 were part of a multihospital system in 2011. (In 2013, the UMMS purchased the Upper Chesapeake Health System, a two-hospital system.) On the other hand, 60 percent of hospitals that did not experience ownership changes were affiliated with a multihospital system in 2011 (24 of 40 hospitals).

Because we recorded only three instances of ownership changes for nonhospital facilities, we do not report characteristics of hospitals associated with these transactions.

Compared with hospitals that did not undertake construction projects from 2011 through 2015, hospitals that proposed construction projects had, on average, more beds, higher net operating revenues, and more FTE employees in 2011. In addition, a larger percentage of hospitals undertaking construction projects (7 of 9 hospitals) were affiliated with multihospital health systems in 2011 than were hospitals that did not undertake construction projects (20 of 37 hospitals).

Hospitals that proposed renovation projects in this time period had more beds, more FTE employees, and higher average net operating revenues in 2011 than hospitals that did not undertake renovation projects. A smaller percentage of hospitals that proposed renovations were affiliated with multihospital health systems (19 of 34 hospitals) than were hospitals that undertook renovations (8 of 12 hospitals) during the study period.

Hospitals that added services from 2011 through 2015 had more beds, more FTE employees, and higher net operating revenues in 2011 than hospitals that did not add services. A

slightly larger percentage of hospitals that added services were also affiliated with a health system (3 of 5 hospitals) than were hospitals that never added services (24 of 41 hospitals).

Hospitals with service closures also had more beds, on average, in 2011 than did hospitals without service closures. On the other hand, hospitals with service closures had fewer FTE employees and lower net operating revenues in 2011 than hospitals without service closures. A slightly smaller percentage of hospitals that closed services were affiliated with a multihospital system (4 of 7 hospitals) than were hospitals that never closed services (23 of 39 hospitals).

6.3.3 Trends in Bed Counts and Volumes by Service Line Before and After Implementation of the All-Payer Model

We examined trends in hospital beds by year and service line for a selected set of service lines. These service lines made up approximately 87 percent of total acute-care hospital beds in Maryland during the study period. Medical/surgical beds make up the largest share of all hospital beds in Maryland, accounting for 53.1 percent of acute-care hospital beds in 2011 and 50.9 percent of beds in 2015.

As Table 16 shows, the total number of acute-care hospital beds declined by 2.4 percent from 2011 through 2013, and by 2.8 percent from 2014 through 2015. This decline in the total number of beds in Maryland is larger than the 0.23 percent decline in beds at all nonfederal, short-term general and specialty U.S. hospitals from 2011 through 2013 (the most recent year for which data are available) (American Hospital Association, 2015).

Five of the seven service lines that we tracked experienced declining bed counts over the 2011–2015 period. Despite the opening of the Holy Cross Germantown, which has medical/surgical beds, the medical/surgical bed count declined by 4.7 percent before the implementation of the All-Payer Model and an additional 3.9 percent after the implementation of the All-Payer Model. Pediatrics also experienced consistent decreases in bed counts from 2011 through 2015. From 2011 through 2013, pediatrics bed counts declined by 5.0 percent and then by another 4.0 percent from January 2014 through summer 2015. The numbers of obstetrics and newborn nursery beds also declined in both the 2011–2013 and 2014–2015 periods. The rate of decline in obstetrics beds in 2011–2013 is greater than the rate of decline in 2014–2015, likely because there were no closures of obstetrics services in 2014 or 2015. Five hospitals added a total of 14 psychiatric beds from January 2011 through July 2015. One of the five hospitals added 7 psychiatric beds. Two hospitals added a total 10 neonatal intensive care beds between 2011 and 2015.

To further illuminate changes in hospital service lines before and after the implementation of the All-Payer Model, we examined trends in total volumes by service line from January 2011 through December 2014. We do not present total volumes for 2015 because our analysis includes only 7 full months of 2015.

Table 16
Maryland acute-care hospital beds by service line, January 2011–July 2015

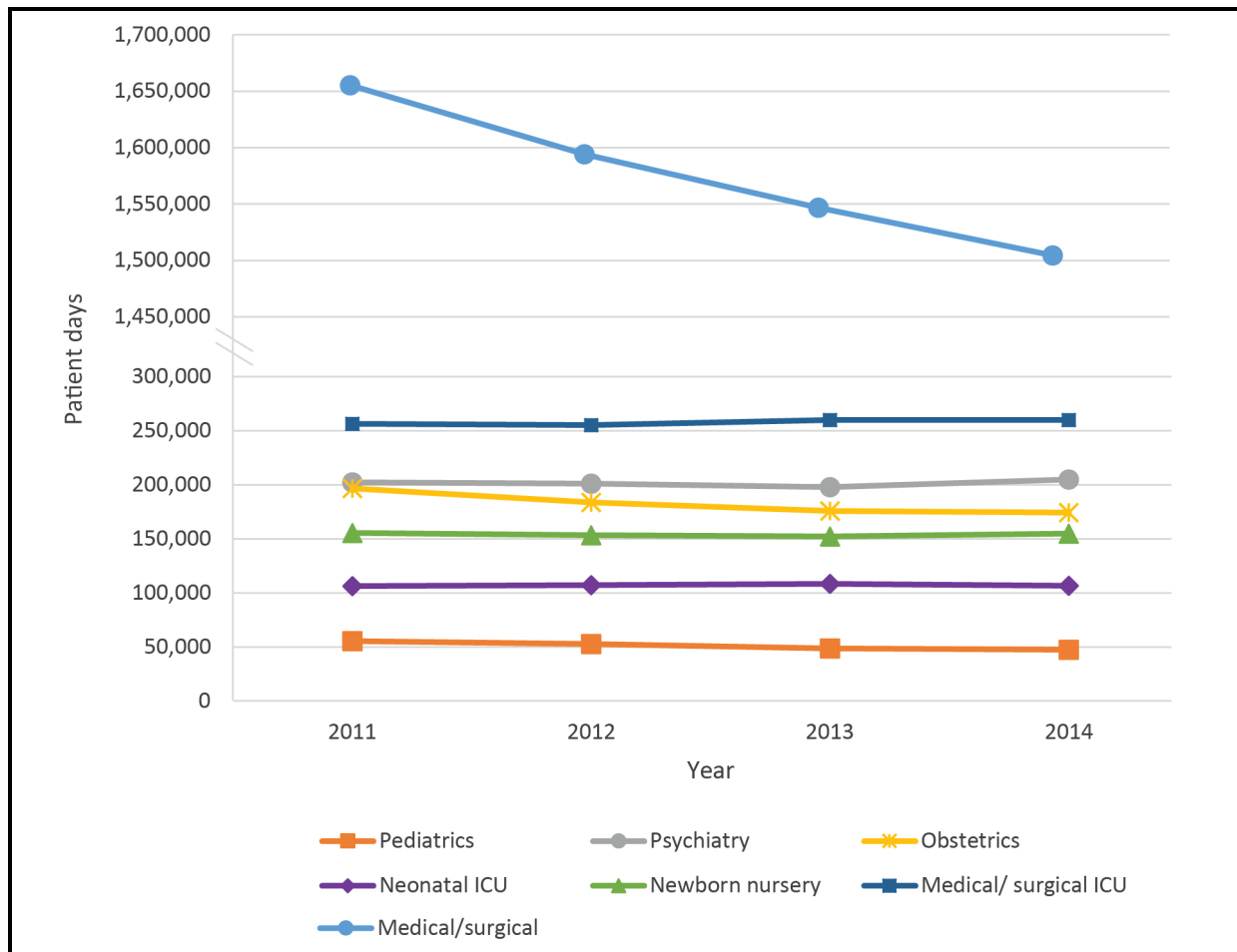
Year	Medical/ surgical (N=46 through 2013, N=47 in 2014)	Pediatrics (N=22 through 2014, N=21 in 2015)	Psychiatric (N=28 through 2013, N=29 starting in 2014)	Obstetrics (N=34 through 2012, N=33 starting in 2013)	Newborn nursery (N=34 through 2012, N=33 starting in 2013)	Medical/ surgical ICU (N=45 through 2013, N=46 in 2014)	Neonatal ICU (N=15 through 2013, N=16 starting in 2014)	Total acute care hospital beds (all rate centers)
2011	6,570	323	685	852	924	1,041	377	12,364
2012	6,383	319	688	836	926	1,040	375	12,126
2013	6,258	307	699	824	915	1,040	387	12,071
2014	6,134	303	723	824	911	1,046	410	11,907
2015	5,893	291	730	820	899	1,038	397	11,576
Percent change, 2011– 2013	–4.7%	–5.0%	2.0%	–3.3%	–1.0%	–0.1%	2.5%	–2.4%
Percent change, 2014– 2015	–3.9%	–4.0%	1.0%	–0.5%	–1.3%	–0.8%	–3.1%	–2.8%

NOTE: Ns are numbers of hospitals offering a given service line.

Figure 2 shows trends in total state volumes (in patient days) for the seven selected service lines from January 2011 through December 2014. Four of the seven service lines experienced declines in patient volumes: pediatrics (–14.0%), obstetrics (–11.0%), general medical/surgical services (–9.1%), and newborn nursery (–0.3%). There were small increases in volume for neonatal ICU (0.4%), acute psychiatric services (1.3%), and medical/surgical ICU services (1.4%) during this time period. These increases in volume correspond with increases in bed counts for these service lines between January 2011 and December 2014.

The figure indicates that there are no consistent changes in volumes across service lines from 2013, the last year before the implementation of the All-Payer Model, through 2014, the year in which Maryland implemented the All-Payer Model. Volumes for pediatrics, obstetrics, and general medical/surgical services declined from 2011 through 2013 and continued to decline through 2014. Medical/surgical ICU volumes increased from 2011 through 2013 and continued to increase through 2014. Newborn nursery and psychiatric volumes declined from 2011 through 2013 but then increased through 2014. Neonatal ICU volumes increased from 2011 through 2013 but then declined through 2014.

Figure 2
Trends in volumes for seven service lines in Maryland (in patient days), January 2011–
December 2014



6.4 Discussion

Trends in market actions did not change substantially after the implementation of the All-Payer Model in January 2014. In fact, many of the hospital market actions undertaken in the All-Payer Model period likely were planned before the model’s implementation. In addition, most market actions, with the exception of renovation, occurred relatively infrequently from January 1, 2011, through July 31, 2015. Hospitals that participated in market actions in that time period differed from hospitals that did not in number of FTE employees, net operating revenues, and number of hospital beds. In particular, that hospitals that experienced ownership changes had lower revenues and less capacity than nonpurchased hospitals indicates that (1) independent hospitals are smaller than chain hospitals, and (2) hospitals that are “smaller” likely are easier to purchase. In fact, independent hospitals in Maryland have sought partnerships with larger health systems to obtain access to additional financial resources and achieve financial stability (Walker, 2012, February 20).

Total acute care beds in Maryland declined before and after the implementation of the All-Payer Model, a trend that corresponds with national declines in hospital bed counts. Five of the seven service lines presented in this study experienced declines in bed counts in Maryland from 2011 through 2015, and four experienced declines in volume in the state from 2011 through 2014. There are no clear changes in trends in bed counts and volumes after the implementation of the All-Payer Model.

The statistics presented in this section do not make claims of causality because factors outside of the All-Payer Model could drive any changes observed, and we are not able to control for those factors, which include economic conditions, the implementation of the ACA's Medicaid coverage provisions in 2014, and national trends toward substituting ambulatory care for inpatient care.

For future reports, we will continue to monitor hospital market actions, changes in hospital beds, and changes in hospital volumes. Future reports will also examine (1) the extent to which changes in adjusted discharges allowed by the HSCRC are due to changes in population growth and shifts in market share²² and (2) trends in quality of care for hospitals that have undertaken market actions compared with hospitals that have not undertaken market actions.

²² Examining the associations between adjusted discharges, population growth, and shifts in market share requires Maryland hospital discharge data, which we did not have access to when we were conducting market dynamics analyses for this first annual report.

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SECTION 7 SERVICE MIX

7.1 Research Questions

The rate and volume controls integrated into the Maryland All-Payer Model limit the influence that charge and volume changes can have on a hospital's total revenue. However, hospitals may have incentives to change their service mix in several ways. In some cases, the All-Payer Model creates conflicting incentives for hospital behavior so the impacts on hospital case mix may be difficult to predict.

First, hospital case-mix severity may increase over time as a result of incentives to reduce admissions of patients who could be treated outside of the hospital. At the same time, hospitals may face countervailing pressures to reduce the costliness of admitted patients to remain within projected budgets. For example, although incentives for patient skimming are reduced because hospitals bill for services provided, they may still try to limit the share of inpatient admissions for patients with the highest severity or risk of mortality. Hospitals may also increase the profitability of services provided by shifting less acute patients to higher intensity settings such as ICUs. This may also be reflected by changes in case-mix-adjusted charge per discharge. Increases in case-mix severity also could increase the likelihood that an admission involves an ICU stay. However, restrictions on overall revenues limit incentives to increase billing for high-cost services. Third, the mix of hospital services by hospital department may change over time. For example, to the extent that reductions in inpatient utilization come primarily from medical admissions, which may be more likely to be unnecessary than surgical admissions, the relative share of surgical admissions may increase over time. Similarly, hospitals may attempt to redirect revenues across care delivery settings (e.g., reducing the share of revenues from ED and inpatient services and increasing the share of revenues from outpatient services as a result of reductions in PAU). Finally, to the extent that they are not accounted for in budget updates, the All-Payer Model budget constraints might adversely impact the diffusion of new, cost-increasing medical technologies in Maryland's hospitals.

To test our hypotheses on how hospitals responded to incentives in the All-Payer Model by altering their service mix, we addressed the following research questions:

- How did trends in hospital case-mix severity change in Maryland after the implementation of the All-Payer Model relative to the comparison group?
- How did trends in charges, utilization of specific hospital services, and share of revenue from care delivery settings change in Maryland after implementation of the All-Payer Model relative to the comparison group?
- How did trends in the adoption of new medical technology by Maryland hospitals change after the implementation of the All-Payer Model relative to the comparison group?

7.2 Evaluation Methods

To assess whether there were changes in service mix after the implementation of the All-Payer Model, we analyzed a set of admission- and hospital-level outcome measures. The admission-level outcomes included the following:

- DRG weight per admission.
- Probability that an admission is classified as major or extreme using the 3M APR-DRG Grouper.
- Probability that an admission includes an ICU stay.
- Case-mix-adjusted charge per discharge.
- Probability of robotic hysterectomy among hysterectomies.²³
- Probability of robotic prostatectomy among prostatectomies.
- Probability of endovascular surgery among heart valve replacements.
- Probability of endovascular intracranial surgery among intracranial vascular surgeries.

Hospital-level outcomes included the following:

- Proportion of hospital revenue from inpatient admissions.
- Proportion of hospital revenue from ED visits.
- Surgical to medical admission ratio.

Each measure was derived from Medicare claims data for January 1, 2011, through March 31, 2015, and is described in detail in *Appendix C*. As described in *Section 2*, we conducted a D-in-D analysis for each outcome. Regression models for admission-level analyses included admissions to Maryland hospitals from residents of Maryland and admissions to comparison hospitals from residents of comparison hospital market areas. Hospital-level

²³ In April 2014 the Food and Drug Administration (FDA) issued a warning about the use of surgical cutting tools known as power morcellators to remove uterine growths known as fibroids. Uterine fibroids are a common reason for hysterectomy, which has been increasingly performed laparoscopically or with robotic assistance. Although only approximately 1 in 500 fibroids contains cancerous cells, the morcellator (if not used with appropriate containment devices) can spread these cells throughout the abdominal cavity of the patient, effectively “seeding” the patient with cancer. Lawsuits against manufacturers of power morcellators and the parent company for the most commonly used robotic-assisted surgery system were filed shortly after the FDA announcement. Thus this measure can be seen as a marker of efficiency if use of these potentially harmful surgical procedures declines in Maryland relative to the comparison group.

outcomes were calculated using all admissions to a hospital regardless of the patient's resident status in Maryland or the comparison hospital market areas.

7.3 Results

Results from regressions models are presented in the following sections, organized by the three main research questions. For each outcome we report the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model, along with an overall estimate for the first five quarters combined.

7.3.1 Case-Mix Severity

Table 17 displays findings for three outcomes that were used to measure changes in hospital case-mix severity after the implementation of the All-Payer Model: DRG weight per admission, probability of admission classified as major/extreme, and probability of an admission with an ICU stay.

- There were no significant changes in Maryland relative to the comparison group in admission severity, as measured by DRG weight, for the first five quarters after the implementation of the All-Payer Model. However, a trend of increasing severity did appear to be emerging, particularly in quarters four and five.
- The probability of having an inpatient admission classified as major or extreme severity of illness increased in Maryland relative to the comparison group in aggregate over the first five quarters since the implementation of the All-Payer Model. Overall, the change in the probability of an admission being classified as major/extreme severity in the implementation period was 1.68 percentage points larger in Maryland hospitals than in comparison hospitals. There were significant positive changes in Maryland relative to the comparison group in all quarters except quarter four.
- The probability of an admission including an ICU stay increased in Maryland relative to comparison hospitals over the first five quarters since the implementation of the All-Payer Model. Overall, the change in the probability of an admission including an ICU stay was 1.47 percentage points larger in Maryland hospitals than in comparison hospitals. The overall finding was driven by significant positive changes in Maryland relative to the comparison group in quarters one and five.

Table 17
Difference in the pre-post severity of admissions for Medicare beneficiaries in Maryland
and the comparison group, first five quarters of Maryland All-Payer Model
implementation

Outcome	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
DRG weight per admission			
Q1	−0.0002	−0.0261	0.0258
Q2	0.0108	−0.0176	0.0391
Q3	0.0019	−0.0264	0.0303
Q4	0.0584***	0.0289	0.0880
Q5	0.0511***	0.0196	0.0826
Overall	0.0167	−0.0032	0.0366
Probability of an admission with a major/extreme 3M APR-DRG severity			
Q1	0.0137**	0.0019	0.0255
Q2	0.0189***	0.0068	0.0309
Q3	0.0232***	0.0104	0.0360
Q4	0.0097	−0.0035	0.0229
Q5	0.0239***	0.0102	0.0375
Overall	0.0168***	0.0079	0.0256
Probability of admission with ICU stay			
Q1	0.0204***	0.0089	0.0320
Q2	0.0088	−0.0034	0.0210
Q3	0.0108*	−0.0015	0.0232
Q4	0.0082	−0.0046	0.0209
Q5	0.0328***	0.0192	0.0465
Overall	0.0147***	0.0060	0.0234

NOTE: A generalized linear model with an identity link and normal distribution was used to obtain estimates of the difference in admission case severity. A linear probability model was used to obtain estimates of the difference in probability of major/extreme severity of illness for inpatient admissions. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the value or probability of event 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 value or probability of event in Maryland relative to the comparison group. The total weighted N for all models is 1,312,967. APR-DRG = all patient refined diagnosis-related group; ICU = intensive care unit; Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

7.3.2 Use of Specific Hospital Services

We examined the following outcomes related to changes in the use of specific hospital services: case-mix-adjusted charge per discharge, share of total revenues from inpatient admissions, share of total revenues from ED visits, and surgical to medical volume ratio. The first outcome focuses on changes in costs, presumably via intensity of services provided, within a DRG. The second and third outcomes examine changes in hospital care delivery setting that are associated with costs. Finally, the fourth outcome focuses on surgical versus medical admissions as a potential mechanism for hospitals to influence financial status. Results from regression models for these outcomes are shown in Table 18.

- The case-mix-adjusted charge per discharge among inpatient admissions increased in Maryland relative to the comparison group in each of the first five quarters of the All-Payer Model implementation. The aggregate estimate for the first five quarters of the model implementation was also positive and significant, indicating that the change in the case-mix-adjusted charge per discharge was \$287.53 greater in Maryland hospitals than in comparison hospitals.
- The proportion of total revenues that were from inpatient admissions increased in Maryland hospitals relative to comparison group hospitals in aggregate over the first five quarters of the All-Payer Model implementation and in quarters four and five individually. The aggregate estimate for the first five quarters of the model implementation indicated that the change in the share of total revenue derived from inpatient admissions was 2.3 percentage points larger among Maryland hospitals than among comparison hospitals.
- In contrast, the proportion of total revenues from ED visits decreased in Maryland hospitals relative to the comparison group in quarters one and five of the All-Payer Model implementation. The aggregate estimate for the first five quarters of the model implementation was also negative and significant, indicating that the change in the share of total revenue derived from ED visits was 1.1 percentage points less among Maryland hospitals than among comparison hospitals.
- The change in the ratio of surgical to medical admissions did not differ significantly for Maryland hospitals relative to comparison group hospitals in any of the first five quarters of the All-Payer Model implementation or over these quarters in aggregate.

Table 18
Difference in the pre-post case-mix-adjusted charge per discharge for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model

Outcome	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Case-mix-adjusted charge per discharge (\$)			
Q1	357.07***	277.30	436.84
Q2	151.33***	67.40	235.26
Q3	151.10***	58.74	243.46
Q4	402.96***	302.35	503.57
Q5	550.69***	456.84	644.55
Overall	287.53***	225.57	349.49
Proportion of hospital revenue from inpatient admissions			
Q1	−0.0190	−0.0139	0.0520
Q2	0.0204	−0.0137	0.0544
Q3	0.0154	−0.0199	0.0507
Q4	0.0362*	−0.0005	0.0729
Q5	0.0445**	0.0064	0.0827
Overall	0.0234*	−0.0012	0.0480
Proportion of hospital revenue from emergency department visits			
Q1	−0.0133*	−0.0271	0.0005
Q2	−0.0094	−0.0238	0.0049
Q3	−0.0054	−0.0203	0.0094
Q4	−0.0130	−0.0284	0.0025
Q5	−0.0150*	−0.0311	0.0010
Overall	−0.0108**	−0.0211	−0.0010
Surgical to medical admission ratio			
Q1	−0.0054	−0.0265	0.0156
Q2	0.0022	−0.0195	0.0240
Q3	−0.0002	−0.0228	0.0224
Q4	0.0100	−0.0135	0.0334
Q5	0.0160	−0.0084	0.0404
Overall	0.0017	−0.0139	0.0174

NOTE: A generalized linear model with an identity link and normal distribution was used to obtain estimates of the difference in case-mix-adjusted charge per discharge. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in charge 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 charge in Maryland relative to the comparison group. The total weighted N for the charge per discharge is 1,312,967. The total weighted N for the revenue and surgical to medical ratio regressions is 1,540. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

7.3.3 Adoption of New Medical Technology

We examined changes in the adoption of new medical technologies following the implementation of the All-Payer Model, estimating the likelihood that advanced technologies were used in four surgical procedures: hysterectomies, prostatectomies, heart valve replacements, and intracranial vascular surgeries. These four surgical procedures are common in the Medicare population. They also are available in a more conventional technique and an advanced technique that uses emerging technology that is reimbursable but not yet considered standard of care. Table 19 displays the results from these analyses.

- In quarter five of the All-Payer Model implementation, the change in the probability of robotic hysterectomy among patients who had a hysterectomy was 14.7 percentage points lower in Maryland than in the comparison group. The aggregate estimate of the difference in the change in probability of robotic hysterectomy for the first five quarters of the model implementation was not significant.
- There was no significant difference between Maryland and the comparison group in the change in probability of robotic prostatectomy among patients who had a prostatectomy over the first five quarters of the All-Payer Model implementation in aggregate or in any of the quarters individually.
- The probability of having an endovascular heart valve replacement among patients who had a heart valve replacement increased in Maryland relative to the comparison group in quarter two and quarter three of the model implementation. However, the aggregate estimate of the change in probability of having an endovascular heart valve replacement for the first five quarters since the implementation of the All-Payer Model was not significant.
- There were no significant changes in Maryland relative to the comparison group in the probability of receiving an endovascular intracranial procedure among patients with an intracranial surgery in any of the first five quarters of the All-Payer Model implementation or in aggregate for all five quarters.

Table 19
Difference in the pre-post probability of using advanced technological procedures for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Probability of robotic hysterectomy among hysterectomies			
Q1	−0.0302	−0.1739	0.1135
Q2	−0.075	−0.2243	0.0743
Q3	−0.0135	−0.1604	0.1335
Q4	−0.0467	−0.2415	0.148
Q5	−0.1472*	−0.3128	0.0184
Overall	−0.0508	−0.1502	0.0486
Probability of robotic prostatectomy among prostatectomies			
Q1	−0.2599	−0.6399	0.1202
Q2	0.0084	−0.2994	0.3163
Q3	−0.0242	−0.3357	0.2873
Q4	0.0023	−0.3461	0.3507
Q5	−0.081	−0.396	0.234
Overall	−0.099	−0.3402	0.1422
Probability of endovascular surgery among heart valve replacements			
Q1	−0.0622	−0.196	0.0715
Q2	0.0859*	−0.0105	0.1823
Q3	0.1829***	0.0726	0.2933
Q4	0.0543	−0.0533	0.162
Q5	0.0938	−0.031	0.2187
Overall	0.0551	−0.0211	0.1312
Probability of endovascular intracranial surgery			
Q1	−0.0679	−0.2181	0.0822
Q2	−0.0232	−0.146	0.0996
Q3	−0.1061	−0.2808	0.0686
Q4	−0.0774	−0.2977	0.1429
Q5	−0.0671	−0.2904	0.1561
Overall	−0.0615	−0.193	0.07

NOTE: A linear probability model was used to obtain estimates of the difference in probability of event for each outcome. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the probability of event occurrence 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 the probability of event occurrence in Maryland relative to the comparison group. The total weighted N for the hysterectomy model is 3,750. The total weighted N for the prostatectomy model is 1,308. The total weighted N for the heart valve replacement model is 3,489. The total weighted N for the endovascular intracranial surgery model is 642. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

7.4 Discussion

As described in the introduction to this section, this series of analyses examines changes in hospital case mix, use of specific hospital services and settings, and use of new technologies. Despite tight rate and volume controls integrated into Maryland's All-Payer Model, global budgets may create incentives for hospitals to change their case mix, type of services provided, and use of new technology to preserve financial status. Although we report interim results for the first five quarters after implementation of the All-Payer Model, it is too early in the evaluation period to draw definitive conclusions about changes associated with the All-Payer Model.

Measurement of several of the outcomes analyzed relies on diagnosis codes reported in Medicare claims (DRG weight per admission, probability that an admission is classified as major or extreme, and case-mix-adjusted charge per discharge). Diagnosis codes may not be coded completely in claims for Maryland hospitals because, unlike hospitals operating under IPPS, their payment does not differ based on patient diagnoses. Therefore, we expect that secondary diagnoses may be undercoded, thus leading to less complex DRG categorizations. However, unless the underreporting of diagnosis codes has changed over time, this should not bias the results of the D-in-D analyses.

We found modest increases in the probability of major/extreme admission and the probability of ICU admission among Maryland hospitals relative to comparison hospitals during the first five quarters of the All-Payer Model. This finding could be consistent with Maryland hospitals reducing unnecessary admissions and diverting care to non-hospital settings. Our findings of decreased probability of inpatient admission in some quarters and increased probability of an outpatient ED visit in the five quarters overall (see **Section 8.3.1**) support this interpretation of this result.

In addition to increases in admission severity, we observed modest increases in case-mix-adjusted charge per discharge among Maryland hospitals relative to comparison hospitals (\$200, or about 1.5% of the average case-mix-adjusted charge per discharge in Maryland). Omitting admission severity as a driver of increases in cost per discharge leaves several possible explanations. This may be related to increased LOS after the implementation of the All-Payer Model (see **Section 8.3.1**), changes in intensity of services utilized (e.g., ICU) within a DRG, or to increases in charges among Maryland hospitals exceeding the rate of increase in IPPS payments in comparison hospitals. Consistent with increased severity and cost per admission, we see small increases in the proportion of total revenue from inpatient admissions. This is accompanied by small decreases in proportion of total revenue from ED visits. Increases in the share of total revenues from inpatient utilization with reduced share of revenues from ED utilization may reflect combined efforts to reduce ED utilization and expenditures while also limiting admissions to a more acutely ill population. We note that changes in per admission or visit charges and share of total revenue from care delivery settings must be interpreted in concert with findings from the utilization/expenditure and quality sections of this report.

Finally, findings on use of advanced technology in surgical procedures are heterogeneous at this point in the evaluation. The declining use of robotic-assisted hysterectomies suggests Maryland hospitals are more likely to limit diffusion of a potentially harmful new technology, although it could also represent a constraint on high-cost resources. Yet, the increased use of

endovascular heart valve replacements seems to argue that hospitals do not necessarily face constraints on investing in high-cost resources.

SECTION 8

SERVICE UTILIZATION AND EXPENDITURES

8.1 Research Questions

As hospitals respond to global budgets and other features of the Maryland All-Payer Model, utilization and expenditures for hospital services should decrease. In particular, inpatient admissions and outpatient ED use, which are the basis for PAU adjustments, should fall. Although global budgets cover only hospital services, reductions in hospital expenditures should cause total expenditures to decrease. However, to the extent that nonhospital services are substituted for hospital services, the impact on total expenditures will be less than the savings from reduced hospital expenditures. To assess the consequences of the All-Payer Model for utilization and expenditures, we addressed the following research questions:

1. How did trends in utilization of and expenditures for hospital inpatient and ED services, as well as total expenditures for hospital and nonhospital services, change in Maryland after the implementation of the All-Payer Model relative to the comparison group?
2. How did trends in Medicare beneficiary cost-sharing liability for hospital inpatient, ED, hospital outpatient department, and physician and other professional services,²⁴ as well as the total cost-sharing liability for all hospital and nonhospital services change in Maryland after the implementation of the All-Payer Model relative to the comparison group?
3. Did the All-Payer Model reduce or eliminate variation across hospitals in expenditures that are not explained by variations in patients' health status?

8.2 Evaluation Methods

How the All-Payer Model affects trends in utilization and expenditures is a fundamental question of the evaluation. Changes in utilization and expenditures can also affect beneficiary liability for cost-sharing payment. To address the first two questions, we used the following outcome measures:

- The probability of having any inpatient admission use.
- The probability of having any ED visits that did not lead to a hospitalization (outpatient ED) use.
- LOS per admission.
- Total, inpatient facility, outpatient ED, other hospital outpatient department, professional, and other expenditures per beneficiary per month (PBPM).
- Expenditures per hospital admission.

²⁴ Includes all professional claims submitted on a CMS-1500 claim form in the carrier file (i.e., the physician/supplier Part B claims file).

- Expenditures per outpatient ED visit.
- Total, inpatient, outpatient ED, other hospital outpatient department, and professional cost-sharing liability PBPM.

Each measure was derived from Medicare claims data for January 1, 2011, through March 31, 2015, and is described in detail in *Appendix C*. As described in *Section 2*, we calculated descriptive trends and conducted a D-in-D analysis for the expenditure and utilization outcomes. For the descriptive analyses of key utilization and expenditure trends, we present graphs of weighted quarterly averages for Maryland and the comparison group Medicare beneficiaries for the baseline period (2011–2013) and the first five quarters of the All-Payer Model period implementation period (first quarter 2014 through first quarter 2015). The quarterly averages were weighted by the product of two factors: (1) the fraction of the quarter during which the beneficiary was eligible for the analyses (the eligibility fraction) and (2) the beneficiary’s propensity score. Regression models for population measures, including all PBPM expenditures and number of admissions or visits per 1,000 beneficiaries, included all residents of Maryland and the comparison hospitals’ market areas. Regression models for admission- and visit-level measures were restricted to residents who had one or more admissions or visits to a Maryland or comparison group hospital. We report the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model, along with an overall estimate for the first five quarters combined.

The third question addresses whether variations in expenditures and utilization not explained by differences in health status are reduced or eliminated after the implementation of the All-Payer Model. To answer this question, we limited the analysis to residents admitted for care in a Maryland hospital. We used APR-DRGs as a measure of health status and expenditures as an approximation of inpatient resource use. We estimated the following model for Maryland hospitals in the baseline and implementation periods separately with the admission as the unit of analysis:

$$EXP_{p,h,t} = \alpha + \sum \beta_d APRDRG_{p,h,t} + \sum \rho_h H_h + \mu_{p,h,t}, \quad (8.1)$$

where

- $EXP_{p,h,t}$ = the allowed expenditures of the p -th inpatient in the h -th hospital in period t (baseline or All-Payer Model).
- $APRDRG_{p,h,t} = 0,1$ indicator of the patient’s APR-DRG in period t .
- $H_h = 0,1$ indicator of a given Maryland hospital.
- $\mu_{p,h,t}$ = the unexplained variation in the p -th patient’s inpatient utilization.

We included both APR-DRG and hospital indicators to control for variation within APR-DRGs and within hospital. If the All-Payer Model reduces differences in resource use not explained by health status, the error term should be smaller in the regression for the implementation period than in the baseline period—that is, there should be less unexplained variation.

8.3 Results

8.3.1 Utilization and Expenditures

Utilization. Figures 3 and 4 show, for Maryland and the comparison group, quarterly averages of the percentage of Medicare beneficiaries who had any inpatient admissions and those who had any outpatient ED visits.

- The percentage of Medicare beneficiaries with any acute inpatient admissions was similar in Maryland and the comparison group throughout the baseline period; the percentage decreased throughout the baseline period for both Maryland and the comparison group. The rates leveled out during the implementation period, although by the fourth quarter of 2014, both rates began to increase slightly (Figure 3).
- The percentage of Medicare beneficiaries who had any ED visits that did not lead to hospitalization was also similar in Maryland and the comparison group throughout the baseline period (Figure 4). The ED visit rate showed some seasonal fluctuations, but it generally trended slightly upward for both Maryland and the comparison group throughout the baseline period. The upward trend continued for both groups through the implementation period; however, the percentage increased at a faster rate for Maryland beneficiaries.

Figure 3
Percentage of Medicare beneficiaries with any all-cause acute inpatient admission for first quarter 2011 through first quarter 2015, Maryland and comparison group

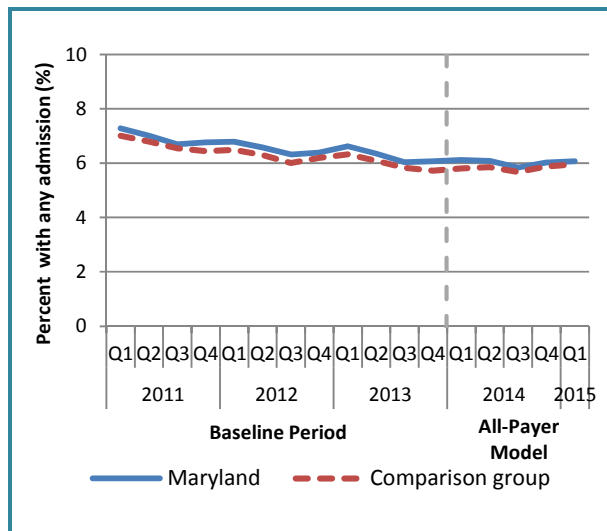


Figure 4
Percentage of Medicare beneficiaries with any ED visits that did not lead to a hospitalization for first quarter 2011 through first quarter 2015, Maryland and comparison group

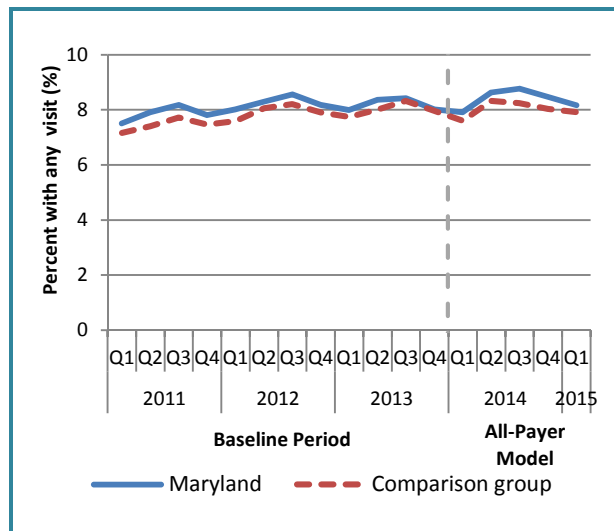


Table 20 shows the results of the D-in-D regression analyses for the probability of inpatient and ED use and LOS for Maryland relative to the comparison group.

- The probability of inpatient admissions decreased in Maryland relative to the comparison group in the third and fourth quarters of the All-Payer Model implementation. However, the magnitude of the relative declines was small. For example, in the fourth quarter of the implementation period, the change in the probability of an inpatient admission was 0.23 percentage points lower in Maryland than in the comparison group. Over the first five quarters of the All-Payer Model implementation period overall, there was no statistically significant difference in the change in the probability of an inpatient admission in Maryland than in the comparison group.
- In contrast, the probability of having an ED visit that did not lead to a hospitalization declined less in Maryland relative to the comparison group in the first four quarters of the All-Payer Model implementation, although the magnitude was also small. Overall, the change in the probability of an outpatient ED visit was 0.24 percentage points larger in Maryland than in the comparison group after the All-Payer Model implementation.
- The average LOS decreased less for Maryland beneficiaries relative to comparison group beneficiaries in the second and fourth quarters of the All-Payer Model implementation, but there were no statistically significant differences in the change in LOS for other quarters. Overall for the five quarters, the change in LOS was slightly larger in Maryland than in the comparison group (0.096 days), but the estimate was only marginally significant.

Table 20
Difference in the pre-post change in utilization for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Probability of an acute inpatient admission			
Q1	0.00040	−0.0011	0.0019
Q2	−0.00060	−0.0022	0.0009
Q3	−0.0019**	−0.0036	−0.00030
Q4	−0.0023***	−0.0041	−0.0006
Q5	−0.0016	−0.0034	0.0003
Overall	−0.0010	−0.0022	0.00020

(continued)

Table 20 (continued)
Difference in the pre-post change in utilization for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Probability of an ED visit that did not lead to a hospitalization			
Q1	0.0021**	0.00040	0.0038
Q2	0.0021**	0.0003	0.0039
Q3	0.0035***	0.0016	0.0054
Q4	0.0024**	0.0004	0.0044
Q5	0.0017	−0.0004	0.0039
Overall	0.0024***	0.0010	0.0037
Acute inpatient length of stay			
Q1	−0.016	−0.14	0.10
Q2	0.21***	0.06	0.36
Q3	0.070	−0.07	0.21
Q4	0.22***	0.07	0.36
Q5	0.014	−0.14	0.17
Overall	0.096*	−0.006	0.197

NOTE: A linear probability model was used to obtain estimates of the difference in probability of use for inpatient admissions and emergency department (ED) visits. A generalized linear model with an identity link and normal distribution was used to obtain estimates of the difference in acute inpatient length of stay. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in probability of utilization 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 probability of utilization in Maryland than in the comparison group. The total weighted N for inpatient admission and ED utilization models is 22,985,755. The total weighted N for the length of stay model is 1,312,967. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Expenditures. Figures 5 through 8 provide quarterly average total, inpatient, outpatient ED, and other hospital outpatient PBPM expenditures.

- For Medicare beneficiaries, average total PBPM expenditures were similar and remained fairly constant over the baseline and implementation periods for Maryland and the comparison group (Figure 5). Maryland had consistently higher total PBPM expenditures than the comparison group throughout the baseline and All-Payer Model periods.
- Average inpatient facility, outpatient ED, and other hospital outpatient department PBPM expenditures were consistently higher in Maryland than in the comparison group (Figures 6 through 8). Throughout the baseline period, average inpatient facility PBPM expenditures declined slightly for both groups, whereas outpatient ED and other hospital outpatient department expenditures increased—and both of these increased at a faster rate in Maryland than in the comparison group. In the period after

All-Payer Model implementation, average inpatient PBPM expenditures declined and then increased for Maryland but increased slightly for the comparison group. Outpatient ED and other hospital outpatient department PBPM expenditures initially increased and then declined slightly in both groups in the implementation period, although the decline was faster in Maryland than in the comparison group.

Figure 5
Average total PBPM expenditures for first quarter 2011 through first quarter 2015 for Medicare beneficiaries in Maryland and the comparison group

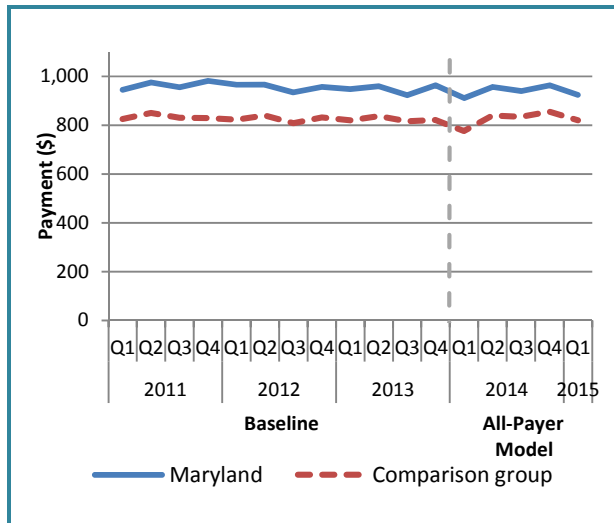


Figure 6
Average inpatient facility PBPM expenditures for first quarter 2011 through first quarter 2015 for Medicare beneficiaries in Maryland and the comparison group

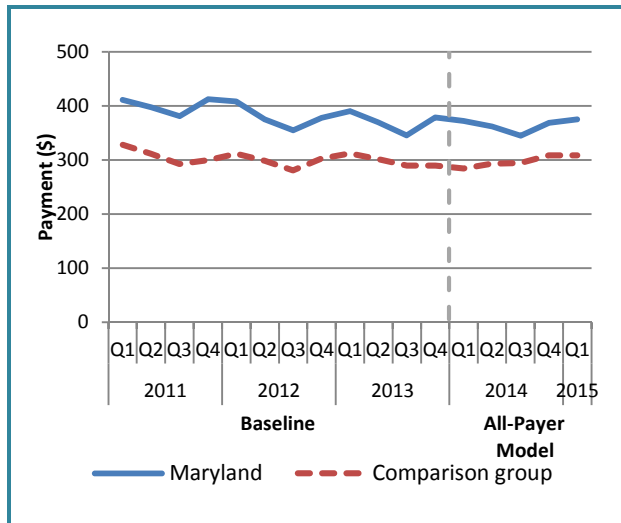


Figure 7
Average outpatient emergency department PBPM expenditures for first quarter 2011 through first quarter 2015 for Medicare beneficiaries in Maryland and the comparison group

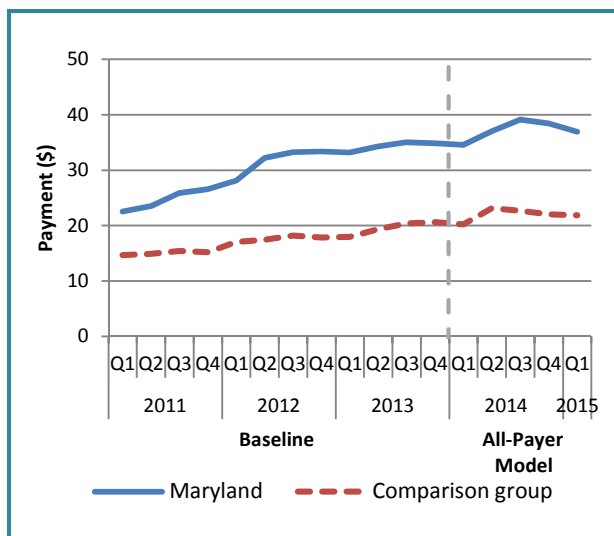


Figure 8
Average other hospital outpatient department PBPM expenditures for first quarter 2011 through first quarter 2015 for Medicare beneficiaries in Maryland and the comparison group

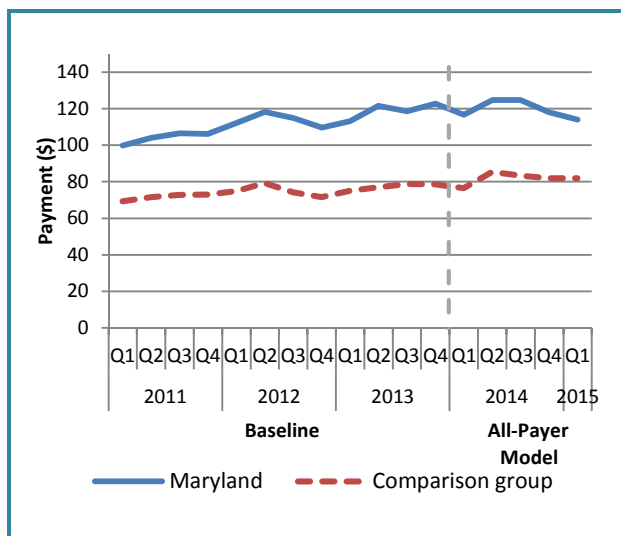


Table 21 presents the results of the D-in-D regression analyses for the expenditure measures.

- The change in total PBPM expenditures was smaller in Maryland relative to the comparison group in the third quarter of the All-Payer Model implementation, and there was also a smaller change in the fourth quarter that was marginally significant. However, there was no statistically significant difference in the overall change in total PBPM expenditures in Maryland relative to the comparison group over the first five quarters of the implementation period.
- The change in inpatient facility PBPM expenditures was larger in Maryland than in the comparison group in the first quarter of the All-Payer Model implementation, but in the third quarter the change was smaller in Maryland than in the comparison group. There was no statistically significant difference in the overall change in inpatient facility PBPM expenditures in Maryland relative to the comparison group over the first five quarters of the implementation period.
- The change in both outpatient ED and other hospital outpatient department PBPM expenditures was smaller in Maryland than in the comparison group in each quarter after implementation of the All-Payer Model and in the post period overall (−\$3.17 and −\$7.75 PBPM less, respectively).

Table 21
Difference in the pre-post change in expenditures for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences (\$)	95% confidence interval	
		Lower limit	Upper limit
Total PBPM			
Q1	13.06	−4.00	30.12
Q2	−8.24	−27.98	11.49
Q3	−24.63**	−46.15	−3.11
Q4	−23.49*	−47.72	0.75
Q5	−11.84	−37.87	14.19
Overall	−7.92	−23.90	8.07
Inpatient facility PBPM			
Q1	21.08***	8.52	33.64
Q2	2.47	−11.71	16.64
Q3	−16.96**	−32.66	−1.27
Q4	−6.42	−24.98	12.13
Q5	9.93	−9.10	28.96
Overall	3.37	−8.01	14.76

(continued)

Table 21 (continued)
Difference in the pre-post change in expenditures for Medicare beneficiaries in Maryland
and the comparison group, first five quarters of Maryland All-Payer Model
implementation

Outcome	Regression-adjusted difference-in-differences (\$)	95% confidence interval	
		Lower limit	Upper limit
Outpatient ED PBPM			
Q1	−2.62***	−3.54	−1.69
Q2	−3.86***	−5.18	−2.55
Q3	−2.36***	−3.45	−1.27
Q4	−3.22***	−4.29	−2.15
Q5	−4.87***	−6.04	−3.69
Overall	−3.17***	−3.92	−2.42
Other hospital outpatient department PBPM			
Q1	−4.77***	−7.93	−1.62
Q2	−6.89***	−10.44	−3.34
Q3	−6.09***	−9.89	−2.29
Q4	−12.60***	−16.43	−8.78
Q5	−16.80***	−21.32	−12.28
Overall	−7.75***	−10.57	−4.94
Physician and other professional PBPM			
Q1	−0.40	−3.97	3.17
Q2	−1.82	−5.97	2.32
Q3	−2.19	−6.49	2.11
Q4	−2.02	−6.63	2.58
Q5	−2.62	−7.55	2.31
Overall	−1.52	−4.92	1.87
Other PBPM			
Q1	−0.12	−5.48	5.25
Q2	1.58	−4.15	7.30
Q3	2.89	−3.31	9.10
Q4	0.72	−5.78	7.23
Q5	2.62	−4.68	9.92
Overall	1.10	−3.51	5.71
Payment per inpatient admission			
Q1	188.18	−74.68	451.03
Q2	324.29**	34.98	613.59
Q3	−78.26	−388.13	231.62
Q4	761.37***	431.41	1091.34
Q5	499.56***	181.96	817.16
Overall	286.16**	77.20	495.12

(continued)

Table 21 (continued)
Difference in the pre-post change in expenditures for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences (\$)	95% confidence interval	
		Lower limit	Upper limit
Payment per outpatient ED visit			
Q1	−91.22***	−106.68	−75.77
Q2	−127.04***	−141.88	−112.20
Q3	−95.16***	−109.90	−80.41
Q4	−94.01***	−109.37	−78.66
Q5	−104.18***	−120.54	−87.82
Overall	−103.31***	−113.98	−92.64

NOTE: ED = emergency department; PBPM = per beneficiary per month. A generalized linear model with an identity link and normal distribution was used to obtain estimates for differences in expenditures. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures 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 expenditures in Maryland relative to the comparison group. The total weighted N for all PBPM expenditure models is 22,985,755. The total weighted N for payment per admission model is 1,312,967. The total N for payment per ED visit model is 2,931,458. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

- In contrast, there were no statistically significant differences in the change in physician and other professional or other PBPM expenditures in Maryland relative to the comparison group in any of the first five quarters of the implementation period or in this period overall.
- The change in payments per inpatient admission was larger in Maryland than in the comparison group in the second, fourth, and fifth quarters of the period after implementation of the All-Payer Model. Over all five implementation quarters, the change was \$286 larger in Maryland than in the comparison group.
- Payments per ED visit decreased in Maryland relative to the comparison group in each quarter of the All-Payer Model implementation period. Over all five implementation quarters, the change in payment per ED visit was \$103 lower in Maryland than in the comparison group.

8.3.2 Beneficiary Cost Sharing

Medicare beneficiary cost-sharing liability is closely associated with Medicare expenditures. As a result, any reductions (or increases) in Medicare expenditures as a result of the All-Payer Model also affect beneficiaries' out-of-pocket costs. Although these effects are

driven by the effects on Medicare expenditures, to obtain a direct measure we estimated All-Payer Model effects on beneficiary cost-sharing liability for total, inpatient, outpatient ED, hospital outpatient, and professional services. Table 22 presents the results of the D-in-D regression analyses for the beneficiary cost-sharing measures.

- Total beneficiary cost sharing decreased in Maryland relative to the comparison group in the second through fifth quarters of the All-Payer Model implementation. Likewise, the change in total beneficiary cost sharing was \$3.21 PBPM lower in Maryland than in the comparison group over all five quarters of implementation.
- There was no statistically significant difference in the change in beneficiary cost sharing for inpatient services in Maryland relative to the comparison group over the first five quarters of the implementation period overall; however, the change in beneficiary cost sharing for inpatient services was significantly lower in Maryland than in the comparison group in the third and fourth quarters of the implementation period at the $p < 0.10$ level.
- As in the expenditure results, the change in beneficiary cost sharing for outpatient ED and other hospital outpatient department services was lower in Maryland than in the comparison group in each of the first five quarters after the implementation of the All-Payer Model and in this time period overall ($-\$0.79$ and $-\$1.81$ PBPM, respectively).
- Although the change in beneficiary cost sharing for professional services was larger in Maryland than in the comparison group in the first and fifth quarters of All-Payer Model implementation, there was no difference in the change in cost-sharing payments for professional services in Maryland relative to the comparison group over the first five quarters overall.

Table 22
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences (\$)	95% confidence interval	
		Lower limit	Upper limit
Total PBPM			
Q1	-0.76	-3.08	1.56
Q2	-3.23**	-5.78	-0.67
Q3	-3.28**	-5.97	-0.59
Q4	-5.97***	-9.07	-2.87
Q5	-4.96***	-8.46	-1.45
Overall	-3.21***	-5.32	-1.10

(continued)

Table 22 (continued)
Difference in the pre-post change in beneficiary cost sharing for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome	Regression-adjusted difference-in-differences (\$)	95% confidence interval	
		Lower limit	Upper limit
Inpatient facility PBPM			
Q1	−0.28	−1.41	0.85
Q2	−0.15	−1.26	0.95
Q3	−1.04*	−2.25	0.17
Q4	−1.58*	−3.21	0.04
Q5	−1.12	−3.07	0.83
Overall	−0.69	−1.65	0.26
Outpatient ED PBPM			
Q1	−0.62***	−0.87	−0.37
Q2	−1.04***	−1.31	−0.76
Q3	−0.61***	−0.89	−0.32
Q4	−0.81***	−1.10	−0.51
Q5	−1.06***	−1.37	−0.74
Overall	−0.79***	−0.99	−0.59
Other hospital outpatient department PBPM			
Q1	−1.13***	−1.85	−0.41
Q2	−1.64***	−2.45	−0.84
Q3	−1.57***	−2.41	−0.73
Q4	−3.02***	−3.90	−2.13
Q5	−3.35***	−4.33	−2.36
Overall	−1.81***	−2.45	−1.17
Professional PBPM			
Q1	1.42***	0.51	2.33
Q2	−0.15	−1.19	0.90
Q3	−0.38	−1.47	0.70
Q4	−0.36	−1.52	0.79
Q5	1.11*	−0.14	2.35
Overall	0.24	−0.61	1.10

NOTE: ED = emergency department; PBPM = per beneficiary per month. A generalized linear model with an identity link and normal distribution was used to obtain estimates for differences in expenditures. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures 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 expenditures in Maryland relative to the comparison group. The total N for all beneficiary cost-sharing models is 22,985,755. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

8.3.3 Variation Across Hospitals in Expenditures Not Explained by Patients' Health Status

We ran the model specified in *Equation 8.1* above for the baseline and implementation periods separately and examined the change in the unexplained variance, as measured by the scaled deviance. The scaled deviance was 600,000 in the regression for the baseline period and 240,000 in the regression of the implementation period, representing a 60 percent reduction in reduction in unexplained variance. Therefore, there was a reduction in differences in resource use not explained by health status after the All-Payer model implementation.

8.4 Discussion

In response to the All-Payer Model, utilization and expenditures for hospital services, especially inpatient admissions and ED use, should decrease. Our analyses of the first five quarters of All-Payer Model implementation found reductions in utilization, expenditures, or both relative to the comparison group in all categories of hospital services in one or more quarters. However, there was no difference in the change in total PBPM expenditures in Maryland relative to the comparison group in the early implementation period overall, likely because we did not find reductions in inpatient expenditures for the overall time period. On the other hand, we did not find any differences in the change in spending for physician and other professional or other services in Maryland relative to the comparison group after implementation of the All-Payer Model—that is, there is no evidence of substitution of nonhospital for hospital services.

Relative to the comparison group, there was no overall difference in the change in inpatient admissions or expenditures during the implementation period. Payment per admission increased in Maryland relative to the comparison group, however. These results suggest that admissions became more resource intensive, perhaps because fewer cases that might have been treatable in outpatient settings were admitted. Moreover, we found that there was a reduction in differences in resource use not explained by health status after the All-Payer model implementation, suggesting that variation in service use is more closely driven by differences in clinical need.

Each hospital where we conducted a site visit had implemented strategies to reduce non-emergent ED use. Nonetheless, the likelihood of having an ED visit that did not lead to a hospitalization declined less in Maryland relative to the comparison group after All-Payer Model implementation. This finding corroborates the perception of physician stakeholders that hospital ED use will not fully shift to community physicians in Maryland until there is an adequate supply of PCPs. The slower decline in outpatient ED visits could reflect a reduction in ED visits resulting in a hospitalization or an increase in ED visits. We did not find a difference in the change in admissions through the ED in Maryland relative to the comparison group (see *Section 10.3.1*), suggesting that the former explanation is unlikely.

Although the likelihood of having an outpatient ED visit declined less in Maryland than in the comparison group, payments per ED visit declined in Maryland while increasing in the comparison group, indicating that ED visits were less resource intensive during the implementation period in Maryland. In addition, ED PBPM expenditures declined more in

Maryland than in the comparison group. Likewise, hospital outpatient expenditures declined more in Maryland relative to the comparison group after implementation of the All-Payer Model. The decline in outpatient ED and other hospital outpatient department expenditures suggests that hospitals may be responding to the All-Payer Model in part by reducing provision of outpatient services; however, our site visit findings indicate that hospitals are seeking to expand outpatient services by recruiting PCPs and purchasing or building new outpatient facilities. Future reports will monitor whether the decline in outpatient spending continues as the All-Payer Model matures. Because beneficiary cost sharing is closely linked with Medicare expenditures, out-of-pocket costs for outpatient ED and other hospital outpatient department services likewise declined for Maryland beneficiaries relative to those in the comparison group during the implementation period. Maryland beneficiaries also had a slight decline in total cost sharing relative to the comparison group during the implementation period.

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SECTION 9 QUALITY OF CARE

9.1 Research Questions

The Maryland All-Payer Model has a three-part aim of promoting better care, better health, and lower cost for all Maryland patients. Global budgets may provide an incentive for hospitals to engage in population health management (PHM), which, if successful, can help the state to achieve these aims. PHM can involve (1) a focus on subpopulations of patients (e.g., those with a specific chronic disease or at risk for certain conditions); (2) coordination of care, with primary care providers as leaders of the health care team; and (3) patient engagement and community integration. Other incentives introduced to reduce hospital costs may either improve or reduce hospital quality and population health.

In this section, we address the following research questions related to quality of care:

1. How did trends in care coordination activities change in Maryland relative to the comparison group after implementation of the All-Payer Model?
2. How did trends in avoidable or reducible utilization change in Maryland relative to the comparison group after implementation of the All-Payer Model?

9.2 Evaluation Methods

Although the model includes two secondary interventions related to quality of care (reductions in readmissions and MHACs, a set of 65 potentially preventable conditions), these alone do not provide a complete picture of health care quality, particularly in the context of PHM. In this first annual report, RTI used bivariate statistics and multivariate models on Medicare claims data to determine the association of the All-Payer Model with changes in care coordination and avoidable or reducible utilization. Specifically, we addressed the questions above by examining the following measures:

- Probability of having a follow-up visit within 14 days of hospital discharge,
- Probability of having an ED visit within 30 days of hospital discharge,
- Probability of having an unplanned readmission within 30 days of hospital discharge, and
- Probability of having an admission for an ACSC.

The four measures were calculated using Medicare claims data for January 1, 2011, through March 31, 2015, and are described in *Appendix C*. We conducted descriptive analyses of three of these measures (all except probability of an ED visit within 30 days of hospital discharge), which are key outcomes for the evaluation. We present graphs of weighted quarterly averages for Medicare beneficiaries in Maryland and the comparison group for the baseline period (2011–2013) and the first five quarters of the implementation period (first quarter 2014 through first quarter 2015). We used D-in-D analyses as described in *Section 2* for each measure.

The regression models for the admission-level measures were restricted to individuals with an admission to a Maryland or comparison group short-term, acute-care hospital. Regression models for population measures included all residents of Maryland and the comparison hospital market areas.

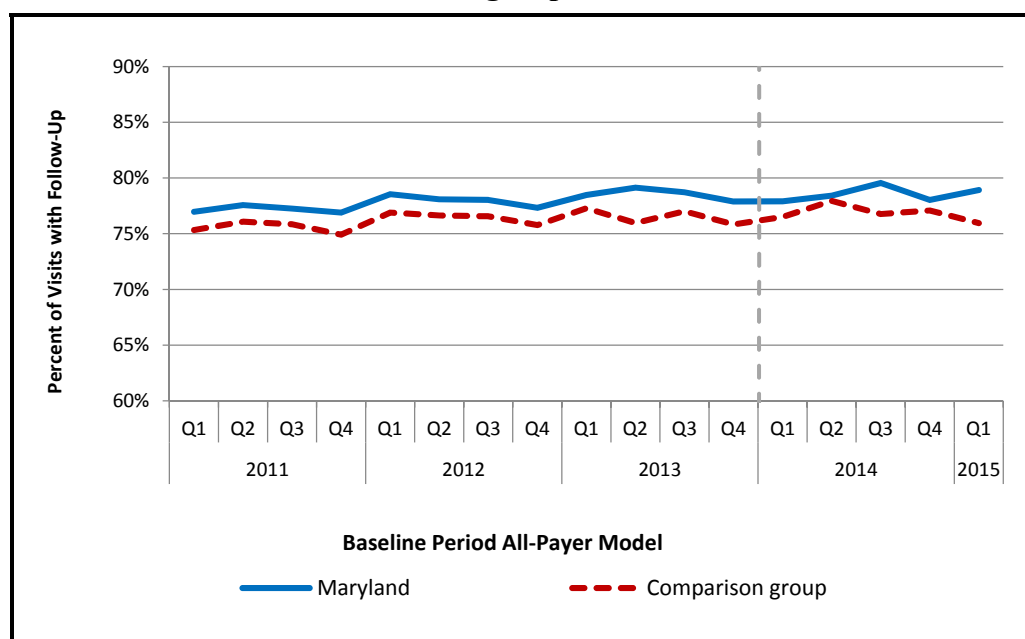
9.3 Results

9.3.1 Care Coordination

Figure 9 shows quarterly averages of the percentage of Medicare beneficiaries who had any inpatient admissions and subsequently had a follow-up visit within 14 days of discharge.

- The percentage of discharges with a follow-up visit within 14 days of discharge was consistently higher in Maryland than in the comparison group throughout the baseline and All-Payer Model periods. Between the start of the baseline period and the end of the All-Payer Model period overall, both groups improved (Maryland by 1.95 percentage points and the comparison group by 0.62 percentage points). However, during the five quarters of the All-Payer Model period alone, Maryland improved (1.01 percentage point increase), while the comparison group declined (0.55 percentage points).

Figure 9
Percentage of discharges with a follow-up visit within 14 days for first quarter 2011 through first quarter 2015, Maryland and comparison group



We present the results of the D-in-D regression analyses on the care coordination measure in Table 23. We report the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model, along with an overall estimate for the first five quarters combined.

- The probability of a follow-up visit within 14 days of hospital discharge decreased in Maryland relative to the comparison group in the second and fourth quarters of the All-Payer Model implementation. Over the entire All-Payer Model implementation period, however, the change in the probability of a follow-up visit within 14 days of discharge in Maryland was not significantly different from that in the comparison group.

Table 23
Difference in the pre-post change in probability of a follow-up visit within 14 days of discharge for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Probability of a follow-up visit within 14 days of discharge	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Q1	-0.008	-0.020	0.004
Q2	-0.016**	-0.028	-0.003
Q3	-0.008	-0.004	0.021
Q4	-0.011*	-0.024	0.002
Q5	0.006	-0.010	0.021
Overall	-0.006	-0.015	0.003

NOTE: A linear probability model was used to obtain estimates of the difference in probability of follow-up visit within 14 days of discharge. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the probability of follow-up visit 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 (preferred)* in the probability of follow-up visit in Maryland relative to the comparison group. The total weighted N for this model is 902,649. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10; **p<0.05; ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

9.3.2 Avoidable and Reducible Utilization

ED Visit Within 30 Days of Hospital Discharge. Table 24 presents the results of the D-in-D regression analysis on this outcome measure, including the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model and an overall estimate for the first five quarters combined.

- There were no statistically significant differences in the change in the probability that a Medicare beneficiary had an ED visit within 30 days of hospital discharge in Maryland relative to the comparison group in four of the first five quarters of the implementation period or in this period overall. In the fourth quarter of the All-Payer Model implementation, however, the change in the probability of an ED visit within 30 days of discharge was 1.4 percentage points lower in Maryland than in the comparison group.

Table 24
Difference in the pre-post change in the probability of an emergency department visit within 30 days of discharge for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Probability of an ED visit within 30 days of discharge	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Q1	−0.004	−0.014	0.007
Q2	0.001	−0.001	0.005
Q3	−0.004	−0.015	0.006
Q4	−0.014**	−0.025	−0.003
Q5	−0.002	−0.015	0.011
Overall	−0.004	−0.012	0.003

NOTE: A linear probability model was used to obtain estimates of the difference in probability of emergency department (ED) visit after a discharge. A *negative* value corresponds to a *greater decrease* or a *smaller increase (preferred)* in the probability of an ED visit after discharge after implementation of the All-Payer Model in Maryland than in the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the probability of an ED visit after discharge in Maryland than in the comparison group. The total weighted N for this model is 812,007. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10; **p<0.05; ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Unplanned Readmission Within 30 Days of Hospital Discharge. Figure 10 shows quarterly averages of the percentage of Medicare beneficiary inpatient admissions to a short-term, acute-care hospital that subsequently had an unplanned readmission within 30 days of discharge.

- For Medicare beneficiaries, the percentage of discharges with a readmission within 30 days of discharge was similar for Maryland and the comparison group over the baseline and All-Payer Model implementation periods. Between the start of the baseline period and the end of the implementation period, the rates for both groups decreased, although Maryland's decrease (2.65 percentage points) was slightly larger than that observed in the comparison group (1.01 percentage points). This trend was also observed in the 3-year baseline period (2.39-percentage-point decrease in Maryland and a 2.00-percentage-point decrease in the comparison group). In the five-quarter implementation period, Maryland's rate decreased (by 0.22 percentage points) while the comparison group increased (0.70 percentage points).

Figure 10
Percentage of discharges with an unplanned readmission within 30 days
for first quarter 2011 through first quarter 2015 for Medicare
beneficiaries in Maryland and comparison group

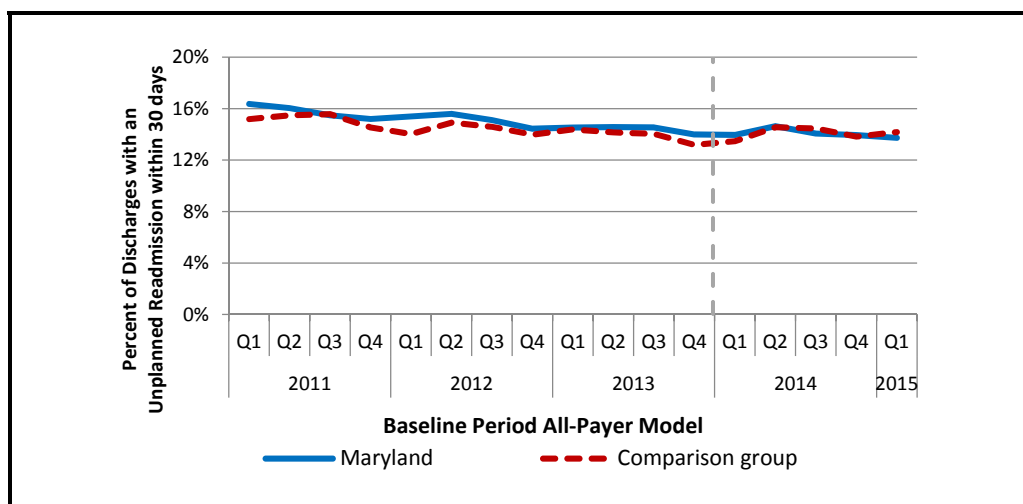


Table 25 presents the results of the D-in-D regression analysis on this outcome measure, including the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model and an overall estimate for the first five quarters combined.

- There were no statistically significant differences in the change in the probability that a Medicare beneficiary had an unplanned readmission within 30 days of hospital discharge in Maryland relative to the comparison group in any of the first five quarters of the implementation period or in this period overall.

Table 25
Difference in the pre-post change in unplanned readmissions within 30 days of discharge for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Probability of unplanned readmission within 30 days of discharge	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Q1	0.001	-0.008	0.011
Q2	-0.002	-0.013	0.009
Q3	-0.007	-0.018	0.004
Q4	-0.002	-0.012	0.009
Q5	-0.006	-0.018	0.007
Overall	-0.002	-0.010	0.005

NOTE: A linear probability model was used to obtain estimates of the difference in probability of unplanned readmissions after a discharge. A *negative* value corresponds to a *greater decrease* or a *smaller increase (preferred)* in probability of unplanned readmissions after a discharge 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 probability of unplanned readmissions after a discharge in Maryland relative to the comparison group. The total weighted N for this model is 902,910. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. None of the differences were statistically significant.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Admissions for ACSCs. Figure 11 shows quarterly averages of the rate of admissions for ACSCs per 1,000 population for Maryland and the comparison group.

- For Medicare beneficiaries, the rate of admissions for ACSCs was similar for Maryland and the comparison group over the baseline and implementation periods, with noticeable seasonality in the admissions rate. Between the start of the baseline period and the end of the implementation period, the rates for both groups decreased, although Maryland's decrease (0.38 percentage points) was slightly larger than that observed in the comparison group (0.27 percentage points). This trend was also observed in the 3-year baseline period (0.54-percentage-point decrease in Maryland and a 0.45-percentage-point decrease in the comparison group). However, from the start to end of the five-quarter implementation period, this trend was reversed, although Maryland had a slightly smaller increase than the comparison group (0.04-percentage-point increase in Maryland and a 0.11-percentage-point increase in the comparison group).

Figure 11
Rate of admissions for ambulatory care sensitive conditions per
1,000 population for first quarter 2011 through first quarter 2015
for Medicare beneficiaries in Maryland and the comparison group

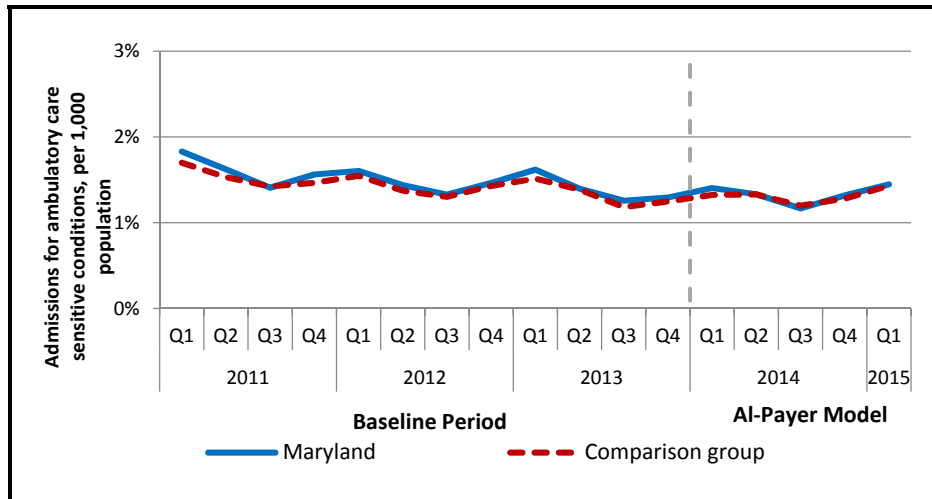


Table 26 presents the results of the D-in-D regression analysis on this outcome measure, including the D-in-D estimate for each of the first five quarters since the implementation of the All-Payer Model and an overall estimate for the first five quarters combined.

- There were no statistically significant differences in the change in the probability of an admission for an ACSC in Maryland relative to the comparison group in four of the first five quarters of the implementation period or in this period overall. The change was 0.1 percentage points lower in Maryland in the third quarter of the implementation period than in the comparison group, but this difference was only marginally significant.

Table 26
Difference in the pre-post change in the probability of a hospital admission for an ambulatory care sensitive condition for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Probability of admission for ACSCs	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Q1	0.0003	-0.0004	0.0010
Q2	-0.0002	-0.0010	0.0005
Q3	-0.0007*	-0.0015	0.0000
Q4	-0.0003	-0.0011	0.0005
Q5	0.0000	-0.0009	0.0009
Overall	-0.0002	-0.0007	0.0004

NOTE: A linear probability model was used to obtain estimates of the difference in probability of admission for an ambulatory care sensitive condition (ACSC). A *negative* value corresponds to a *greater decrease* or a *smaller increase (preferred)* in probability of admission for an ACSC 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 probability of admission for an ACSC in Maryland relative to the comparison group. The total weighted N for this model is 22,985,755. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10; **p<0.05; ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

9.4 Discussion

During the first five quarters of implementation, the measures evaluated provided little evidence that the All-Payer Model was associated with positive or negative changes in care coordination or avoidable or reducible utilization for patients. With few exceptions, the results of the D-in-D analyses are statistically insignificant.

The rate at which discharges had a follow-up visit within 14 days was generally higher in Maryland than in the comparison group. The continued increase in the rate of follow-up visit within 14 days in Maryland during the implementation period provides some evidence to support a focus on efforts to improve care coordination reported by Maryland hospitals (see **Section 4.2.5**), although the trend relative to the comparison group did not change after implementation of the All-Payer Model.

The percentage of discharges with a readmission within 30 days declined modestly in Maryland throughout the baseline and intervention periods for Maryland. Given that reductions in readmissions have been a target nationwide for several years, and a target of particular focus for Maryland hospitals (see **Section 4.2.4**), a decline in readmissions over the period from 2011

through the first quarter of 2015 is not unexpected. Maryland's readmission rate was generally similar to the rate in the comparison group. In contrast, Maryland has consistently had a higher readmission rate than the national average. This difference reflects the intentional selection of a comparison group that was similar to Maryland at baseline. The differing comparators may explain our D-in-D finding that the All-Payer Model did not have a significant impact on Maryland's readmission rate, whereas Maryland's monitoring report on the first year of All-Payer Model implementation found a modest narrowing of the gap between the readmission rate in Maryland and that in the rest of the country (see **Section 4.1.3**). However, the descriptive finding that the readmission rate decreased in Maryland after implementation of the All-Payer Model, while it increased in the comparison group, is consistent with trends in the national comparison.

Despite the increased emphasis on community-based care and care coordination after the implementation of the All-Payer Model described in hospital site visits (see **Section 4.2.5**), we found little evidence of positive impacts on our measures of care coordination and avoidable or reducible utilization. There was considerable variation in the extent to which hospitals had developed strategies to address these issues, and hospital leaders reported challenges in changing patient behaviors. Larger impacts may emerge over time as hospital initiatives in these areas expand and mature. Similarly, one of the strategies of PHM is a focus on subpopulations of patients, such as those with ACSCs. To date, the trends in admissions for ACSCs were very similar in Maryland and the comparison group for both the baseline and implementation periods. It will be important to monitor this measure to determine whether the All-Payer Model affects the rate of admissions for these conditions in the future. In addition, future analyses will assess whether All-Payer Model impacts differ for populations other than Medicare, including Medicaid and commercially insured populations.

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SECTION 10 SPILLOVER EFFECTS

10.1 Research Questions

The incentives in Maryland's All-Payer Model to reduce hospital costs are intended to reduce unnecessary hospital use and encourage delivery of services in appropriate lower cost settings. However, incentives to reduce expenditures for hospital services might lead to under-provision of care, avoidance of costly cases, and shifting patients either to other hospitals or nonregulated (i.e., nonhospital) providers. Hospitals may have some ability to impact outcomes, either through admission behavior or subsequent discharge behavior. For example, hospitals might attempt to limit admissions of complex, difficult-to-manage cases. Findings on this outcome are reported in *Section 7*. On the other hand, admissions through EDs limit hospitals' ability to avoid costly cases.²⁵ Hospital behaviors also can produce spillover effects on other hospitals and nonregulated providers. For example, hospital budget caps might create a greater incentive to transfer costly, hard-to-manage cases to other short-term acute-care (STAC) hospitals or to post-acute-care (PAC) settings. As a consequence of this potential, the HSCRC's budget-setting methodology contains adjustments for hospitals whose case-mix severity index fell during the prior year, and the HSCRC developed a transfer case payment adjustment policy (see *Section 4.1.1*). These policies might limit potential spillover effects. Global budgets might also restrict the accessibility of outpatient hospital services, causing patients to seek care in nonhospital settings. Finally, implementation of the All-Payer Model could affect border crossing by Maryland residents and nonresidents. For some hospitals, revenues from care provided to out-of-state residents do not count against the budget constraint. Consequently, these hospitals have incentives to increase revenues from care provided to out-of-state residents. At the same time, if there are constraints on use of Maryland hospitals, Maryland residents might increase their use of out-of-state hospitals.

In this section, we address the following questions related to spillover effects of the All-Payer Model:

1. Were Maryland hospitals more likely to avoid costly inpatient cases after the implementation of the All-Payer Model?
2. Were services provided in hospital outpatient settings shifted to nonregulated settings outside of hospitals after the implementation of the All-Payer Model?
3. Were there changes in the extent of border crossing by both Maryland residents and nonresidents in obtaining inpatient care after the implementation of the All-Payer Model?

10.2 Evaluation Methods

We conducted analyses in three broad domains corresponding to the evaluation questions listed above. The outcome measures were constructed using Medicare claims from January 1,

²⁵ Emergency Medical Treatment and Labor Act rules limit the ability of hospitals to deny ED care, especially for potentially serious cases.

2011, through March 31, 2015. The measures are described in detail in *Appendix C*. Depending on the measure, outcomes were analyzed using either descriptive or multivariate methods. Descriptive analyses examined trends before and after implementation of the All-Payer Model. The multivariate analyses used the D-in-D models described in *Section 2*.

Analyses that examined avoidance of costly inpatient cases used multivariate D-in-D models for the following outcomes:

- Probability that an admission occurs through an ED.
- Probability that an admission results in a transfer to another STAC hospital.²⁶
- Probability that a transfer to another STAC hospital is classified as major or extreme by the APR-DRG grouper.
- Probability that an admission results in a transfer to PAC.
- Probability that a transfer to PAC is classified as major or extreme by the APR-DRG grouper.

The regression models for these admission-level outcomes were restricted to admissions to Maryland hospitals from residents of Maryland and admissions to comparison hospitals from residents of comparison hospital market areas. The admission-level D-in-D model described in *Section 2* was modified to incorporate two additional measures of patient acuity as controls: admission through the ED (except when it is a dependent variable) and being a resident in a SNF. Patients who were in SNFs before admission are likely to be returned to SNFs after the hospital discharge.

The site-of-care outcome variables were:

- Number of urgent care visits per 1,000 Maryland Medicare beneficiaries in Maryland urgent care centers.
- Number of primary care visits, total and by place of service.

Urgent care visits per 1,000 Medicare beneficiaries were limited to Maryland residents and were analyzed only by descriptive methods because the place of service code on Medicare physician claims is not reliably coded for the urgent care place of service.²⁷ Taxpayer Identifier Numbers supplied by the HSCRC allowed us to identify visits in Maryland urgent care centers. Analyses of primary care visits used the person-level D-in-D model described in *Section 2*.

²⁶ Maryland hospitals are not subject to the IPPS and PAC transfer rules. However, with the implementation of the All-Payer Model, Maryland hospitals have a greater incentive to transfer complex cases to other STAC hospitals and PAC settings. Given that the destination of transfers from IPPS hospitals can be critical access hospitals as well as IPPS hospitals, we refer to such transfers as *STAC transfers*.

²⁷ The practice expense relative value units for services rendered in urgent care centers are the same as for physician offices. Because payment is not affected, many providers at urgent care centers appear to be coding “office” place of service instead of “urgent care center.”

These regression models included all residents of Maryland and the comparison hospital market areas. We estimated separate models for primary care visits in total and in three settings: physician offices; freestanding clinics—federally qualified health centers (FQHCs) and rural health clinics (RHCs); and hospital outpatient departments. Because of the aforementioned issues in identifying urgent care center visits, visits with an urgent care place of service as well as those from a Method II critical access hospital are combined with physician office visits.

We conducted descriptive analyses for changes in border crossing before and after the implementation of the All-Payer Model, using the following measures:

- Percentage of hospital admissions of Maryland residents to a non-Maryland hospital.
- Percentage of admissions to Maryland hospitals that are for nonresidents.
- Percentage of inpatient days in Maryland hospitals that are for nonresidents.
- Percentage of Maryland hospital revenue that is for nonresidents.

For the three measures of Maryland hospital utilization by nonresidents, separate analyses were conducted by whether the hospitals' target budgets excluded non-Maryland residents. We also examined shares of nonresident admissions for residents of border states (Delaware, Washington, the District of Columbia, Pennsylvania, Virginia, and West Virginia) and residents of nonborder states.

10.3 Results

10.3.1 Avoidance of Costly Inpatient Cases

Table 27 shows the differences in the pre-post change in the probability of outcomes related to avoidance of admissions that are likely to be costly for Maryland admissions relative to the comparison group.

- During the first five quarters of the All-Payer Model, aside from the first quarter there was no statistically significant difference in the change in admissions through the ED in Maryland relative to the comparison group.
- There was no statistically significant difference in the change in the transfer measures analyzed for Maryland relative to the comparison group during the first five quarters of the All-Payer Model. Relative to the comparison group, Maryland had no difference in the change in admissions that resulted in a STAC transfer, admissions classified as major or extreme severity that resulted in a STAC transfer, admissions that resulted in a PAC transfer, or admissions classified as major or extreme severity that resulted in a PAC transfer during the All-Payer Model period.

Table 27
Difference in the pre-post change in the probability of avoiding costly admissions for
Medicare beneficiaries in Maryland and the comparison group, first five quarters of
Maryland All-Payer Model implementation

Outcome by quarter	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Admission through the ED			
Q1	0.0174*	−0.0033	0.0380
Q2	0.0089	−0.0136	0.0314
Q3	0.0016	−0.0260	0.0292
Q4	−0.0019	−0.0305	0.0267
Q5	−0.0015	−0.0341	0.0310
Overall	0.0073	−0.0147	0.0294
Admission resulted in STAC transfer			
Q1	0.0006	−0.0016	0.0028
Q2	0.0013	−0.0004	0.0031
Q3	0.0012	−0.0005	0.0029
Q4	−0.0001	−0.0018	0.0016
Q5	0.0009	−0.0014	0.0031
Overall	0.0008	−0.0004	0.0020
Admission with STAC transfer classified as major or extreme severity			
Q1	−0.0238	−0.1432	0.0956
Q2	0.1156	−0.0167	0.2480
Q3	−0.0235	−0.1425	0.0955
Q4	−0.0274	−0.2198	0.1650
Q5	0.0606	−0.0948	0.2160
Overall	0.0164	−0.0688	0.1017
Admission resulted in PAC transfer			
Q1	0.0026	−0.0009	0.0061
Q2	0.0012	−0.0021	0.0045
Q3	0.0009	−0.0053	0.0070

(continued)

Table 27 (continued)
Difference in the pre-post change in the probability of a complex case by type of complex case for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome by quarter	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Q4	0.0006	-0.0036	0.0048
Q5	0.0028	-0.0018	0.0074
Overall	0.0016	-0.0020	0.0053
Admission with PAC transfer classified as major or extreme severity			
Q1	0.0064	-0.0534	0.0661
Q2	0.0094	-0.0500	0.0688
Q3	0.0241	-0.0545	0.1026
Q4	0.0067	-0.0712	0.0846
Q5	0.0177	-0.0726	0.1080
Overall	0.0113	-0.0374	0.0600

NOTE: ED = emergency department; PAC = post-acute-care; STAC = short-term acute-care. A linear probability model was used to obtain estimates of the difference in the probability of a complex case. A generalized linear model with an identity link and normal distribution was used to obtain estimates. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in probability of a complex case 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 probability of a complex case in Maryland relative to the comparison group. The total weighted N for the admission through the ED, admission resulted in a STAC transfer, and admission resulted in a PAC transfer models is 1,376,379. The total weighted N for the admission with STAC transfer classified as major or extreme model is 12,530. The total weighted N for the admission with PAC transfer classified as major or extreme model is 27,695. The samples for these last two models were restricted, respectively, to admissions with a STAC transfer and admissions with a PAC transfer. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10; **p<0.05; ***p<0.01.

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

10.3.2 Site of Care

Figure 12 shows the number of monthly urgent care visits per 1,000 Maryland Medicare beneficiaries at Maryland urgent care centers.

- The urgent care visit rate rose steadily from 23.3 in the first quarter 2011 to 38.5 in the fourth quarter 2012. Thereafter, aside from the fourth quarter 2014, monthly visits fluctuated between 34.5 and 38.4 with no discernible trend.

Figure 12
Monthly urgent care visits per 1,000 Maryland Medicare beneficiaries at Maryland urgent care centers for the first quarter 2011 through the first quarter 2015

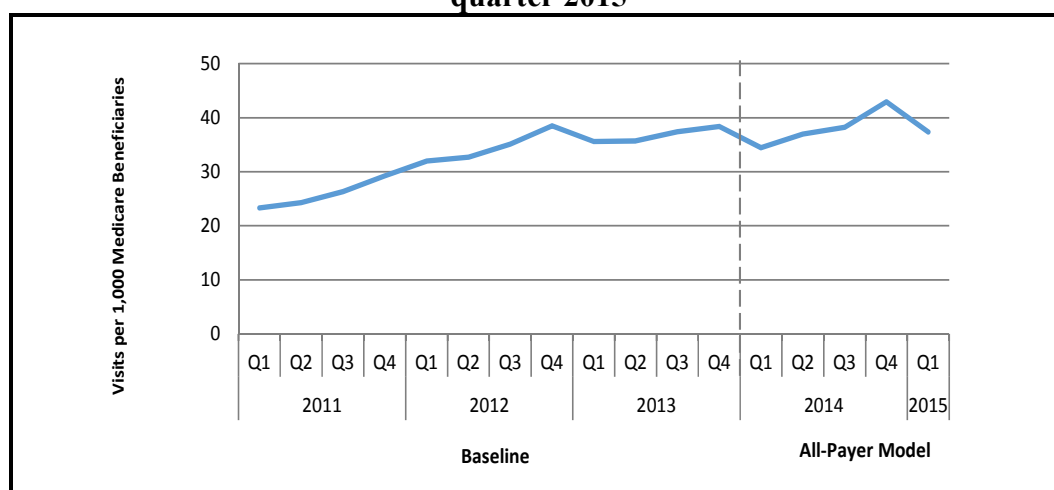


Table 28 shows the differences in the pre-post change in the monthly number of Medicare primary care visits by place of service for Maryland residents relative to the comparison group. Results are described below.

- Aside from the fifth quarter of All-Payer Model implementation, there was no statistically significant difference in the change in the number of monthly primary care visits at hospital outpatient departments in Maryland relative to the comparison group in any quarter of the All-Payer Model period or in the first five quarters overall. In the fifth quarter, the change per 1,000 Medicare beneficiaries was 2.1 visits larger in Maryland than in the comparison group. Whether this is the start of a trend or a transitory effect remains to be seen.
- The change in the number of monthly primary care visits at physician offices (including visits to urgent care centers and Method II critical access hospitals) was lower in Maryland than in the comparison group during the first two quarters of All-Payer Model implementation. However, there were no statistically significant differences in the change in the number of primary care visits to these settings during

the five quarters overall or during the third and fourth quarters of the All-Payer Model. The change in the number of visits was larger in Maryland than in the comparison group in the fifth quarter, but the difference was marginally significant.

- Findings showed the number of monthly primary care visits at FQHCs and RHCs increased for Maryland beneficiaries relative to comparison group beneficiaries in all five quarters after All-Payer Model implementation. The quarterly estimates of the change in the number of monthly visits per 1,000 Medicare beneficiaries ranged from 1.7 to 4.7 lower in Maryland than in the comparison group. During the All-Payer Model period overall, the change was 2.8 visits higher in Maryland than in the comparison group.
- The combined number of monthly primary care visits at all sites of care decreased in Maryland relative to the comparison group in the second quarter after All-Payer Model implementation, although the difference in the change was only marginally significant. The number of visits increased in Maryland relative to the comparison group in the subsequent three quarters. However, there was no significant difference in the change in the number of visits in the overall period following implementation.

Table 28

Difference in the pre-post change in the monthly number of primary care visits by place of service for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome by quarter	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
Hospital outpatient departments			
Q1	−0.0001	−0.0011	0.0009
Q2	−0.0002	−0.0013	0.0009
Q3	−0.0010	−0.0022	0.0002
Q4	−0.0003	−0.0016	0.0010
Q5	0.0021***	0.0007	0.0035
Overall	−0.0001	−0.0010	0.0008
Physician offices ^a			
Q1	−0.0048**	−0.0087	−0.0008
Q2	−0.0072***	−0.0117	−0.0028
Q3	0.0028	−0.0019	0.0076
Q4	0.0026	−0.0025	0.0077
Q5	0.0051*	−0.0006	0.0109
Overall	−0.0020	−0.0057	0.0017

(continued)

Table 28 (continued)
Difference in the pre-post change in the monthly number of primary care visits by place of service for Medicare beneficiaries in Maryland and the comparison group, first five quarters of Maryland All-Payer Model implementation

Outcome by quarter	Regression-adjusted difference-in-differences	95% confidence interval	
		Lower limit	Upper limit
FQHCs and RHCs			
Q1	0.0017***	0.0009	0.0025
Q2	0.0028***	0.0019	0.0037
Q3	0.0026***	0.0017	0.0036
Q4	0.0047***	0.0037	0.0057
Q5	0.0038***	0.0026	0.0050
Overall	0.0028***	0.0020	0.0036
All sites of care combined			
Q1	−0.0032	−0.0074	0.0010
Q2	−0.0046*	−0.0093	0.0001
Q3	0.0045*	−0.0005	0.0096
Q4	0.0070**	0.0016	0.0124
Q5	0.0110***	0.0050	0.0171
Overall	0.0007	−0.0032	0.0046

NOTE: FQHC = federally qualified health center; RHC = rural health clinic. A linear count model was used to obtain estimates of the difference in the number of primary care visits by place of service. A generalized linear model with an identity link and normal distribution was used to obtain estimates. A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the number of visits 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 number of visits in Maryland relative to the comparison group. The total weighted N for each model is 22,943,832. Q1 = January–March 2014, Q2 = April–June 2014, Q3 = July–September 2014, Q4 = October–December 2014, Q5 = January–March 2015. *p<0.10, **p<0.05, ***p<0.01.

^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.

10.3.3 Border Crossing

Figure 13 shows the share of nonresident admissions, inpatient days, and Medicare inpatient payments at Maryland's STAC hospitals.

- The nonresident share of admissions was about 8 percent throughout the baseline and All-Payer Model periods, with no evidence of any trends during the time period analyzed.
- The nonresident shares of inpatient days and Medicare payments also showed little evidence of trends.

We also explored the share of admissions for nonresidents by whether the beneficiary resided in a border state and whether nonresident admissions were included in the hospital's global budget. We did not find a change in the trend after implementation of the All-Payer Model for any of these groups.

Figure 13
Share of nonresident admissions, inpatient days, and Medicare inpatient payments at Maryland's STAC hospitals for the first quarter 2011 through the first quarter 2015

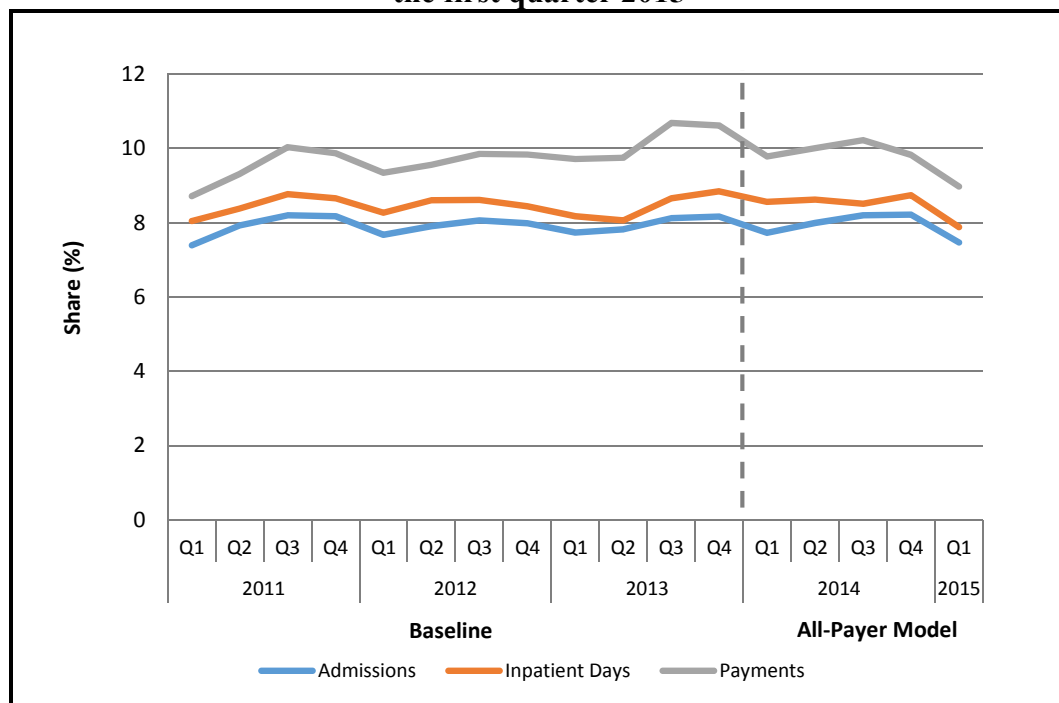
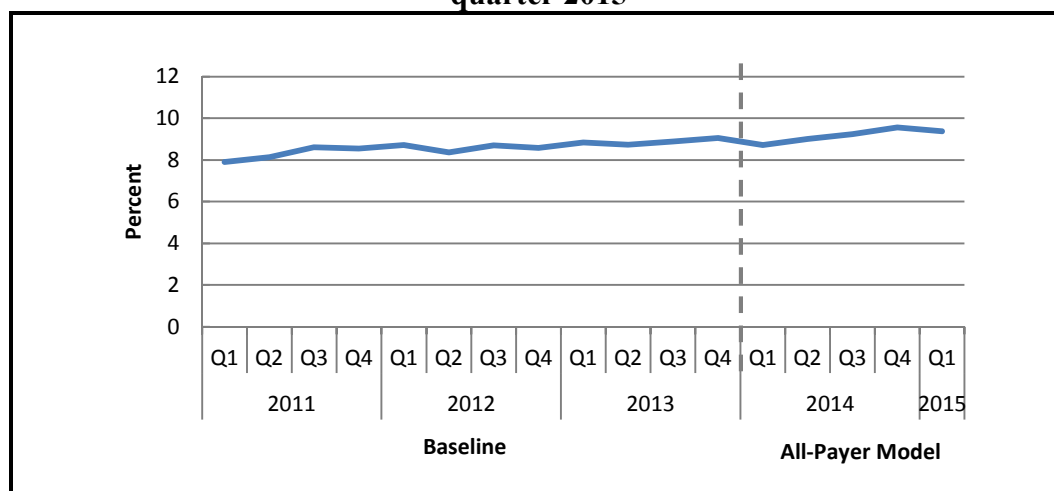


Figure 14 shows the share of Maryland residents admitted to an out-of-state STAC hospital.

- There was an upward trend in the share of Maryland’s beneficiaries who had a Medicare admission at STAC hospitals outside of Maryland that began during the baseline period and continued after implementation of the All-Payer Model. The trend did not appear to change during the All-Payer Model period.

Figure 14
Share of Maryland’s beneficiaries who had a Medicare admission at STAC hospitals outside of Maryland for the first quarter 2011 through the first quarter 2015



10.4 Discussion

The All-Payer Model may incentivize underprovision of care, avoidance of costly cases, and shifting patients either to other hospitals or nonregulated (i.e., nonhospital or out-of-state hospital) providers. Throughout the first five quarters since the implementation of the All-Payer Model, we did not find changes in the behavior of Maryland hospitals with regard to transferring patients to other STAC hospitals or PAC settings. In addition, we found no evidence of ED visits’ being shifted to urgent care centers, or hospital outpatient department primary care services’ being shifted to other sites of care. Although we did find that primary care visits at FQHCs and RHCs increased relative to the comparison group, the increase was driven by the decrease in the comparison group during the period after implementation of the All-Payer Model rather than an increase in these visits in Maryland. Likewise, border crossing by out-of-state beneficiaries, as evidenced by inpatient admissions and admissions in out-of-state hospitals by Maryland’s Medicare beneficiaries, has not changed since the All-Payer Model implementation, despite incentives for hospitals whose budgets excluded admissions of non-Maryland residents to increase these admissions and reports from the site visit to one hospital that this strategy was being pursued as a way to increase revenue. These analyses were restricted to Medicare beneficiaries, and it is possible that changes might have occurred among privately insured

patients or patients from other countries. This will be explored in future reports using commercial insurance data and hospital discharge data.

As noted in **Section 7.4**, underreporting of diagnosis codes in Maryland hospital claims may reduce the likelihood that an admission is classified as major or extreme. However, this should not bias the results of the D-in-D analyses unless the underreporting of diagnosis codes has changed over time.

Overall, we do not find evidence of spillover effects of the Maryland All-Payer Model based on the outcomes included in our analyses. Future analyses will also examine whether services previously provided in inpatient settings have been shifted to preadmission or to postdischarge providers. Although the findings from the analyses to date indicate that spillover effects are not a concern, they reflect experience early in the implementation of the All-Payer Model. Hospital behaviors may change over time, particularly if hospital financial constraints increase. Analyses in future reports will determine whether these findings are sustained over time.

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SECTION 11 TRANSFORMATION OF MARYLAND HEALTH CARE WORKFORCE

11.1 Evaluation Questions

For the Maryland All-Payer Model to be successful, Maryland believes that it needs to educate health professionals on issues related to health reform, including quality improvement, population health, and cost-effective decision making. To ensure that the workforce evolves to support the Maryland All-Payer Model, Maryland is crafting a 5-year plan to work with academic medical systems to transform medical education curricula to align with the changing health care system. To better understand the Maryland workforce transformations that result from the All-Payer Model, we addressed the following research questions:

1. How did the profile of Maryland's health care workforce in terms of gender, number of years of practice, and specialty change after the implementation of the Maryland All-Payer Model?
2. What new models of workforce development, deployment, and related training and education did Maryland use to support the All-Payer Model, either directly or through new infrastructure activities?
3. Did any of these new models target clinicians serving a higher proportion of Maryland residents on Medicaid, the Children's Health Insurance Program, or Medicare? Were these new care models more or less likely to be adopted by DSHs?

11.2 Evaluation Methods

To describe the profile of Maryland's health care workforce in terms of gender, years of practice, and specialty, we used Maryland physician licensure data, NPPES files, and secondary data available from public Web sites to produce an overall profile of the workforce. For this report, we present a baseline profile of the health care workforce. The final report will present the profile after the All-Payer Model implementation. Information on the models of workforce development, deployment, and medical education curricula that are being considered under the Maryland All-Payer Model was gathered by reviewing documents from Maryland's Innovation in Graduate Medical Education (GME) workgroup.

11.3 Results

11.3.1 Baseline Profile of Maryland Health Care Workforce

Physician Workforce. In 2013, before the implementation of the All-Payer Model, Maryland had 21,161 licensed physicians (Table 29). Of all active physicians, 22 percent had been practicing for more than 30 years. We were able to obtain specialty and gender information for 15,369 physicians by merging the physician licensure data with the NPPES data. Among these physicians, 36 percent (5,529) were female and 36 percent (5,565) were primary care

Table 29
Baseline physician workforce profile, 2013

Specialty	Total active physicians		Female		Male		Practicing ≤30 years		Practicing >30 years	
	N	%	N	%	N	%	N	%	N	%
All	21,161						16,441	77.7	4,720	22.3
All with known specialty	15,369		5,529	36.0	9,840	64	11,792	76.7	3,577	23.3
Primary care physicians	5,565	36.2	2,687	48.3	2,878	51.7	4,297	77.2	1,268	22.8
All specialty	9,804	63.8	2,842	29.0	6,962	71.0	7,495	76.4	2,309	23.6
Allergy & immunology	111	0.7	40	36.0	71	64.0	80	72.1	31	27.9
Anesthesiology	926	6	275	29.7	651	70.3	798	86.2	128	13.8
Dermatology	237	1.5	110	46.4	127	53.6	168	70.9	69	29.1
Emergency medicine	684	4.5	217	31.7	467	68.3	602	88.0	82	12.0
Internal medicine	2,457	16	667	27.1	1,790	72.9	1,850	75.3	607	24.7
Ophthalmology	488	3.2	136	27.9	352	72.1	338	69.3	150	30.7
Otolaryngology	185	1.2	37	20.0	148	80.0	140	75.7	45	24.3
Pathology	282	1.8	102	36.2	180	63.8	220	78.0	62	22.0
Pediatric subspecialist	358	2.3	184	51.4	174	48.6	315	88.0	43	12.0
Physical med/rehab	176	1.1	56	31.8	120	68.2	138	78.4	38	21.6
Psychiatry & neurology	1,543	10	596	38.6	947	61.4	1,091	70.7	452	29.3
Radiology	691	4.5	200	28.9	491	71.1	527	76.3	164	23.7
Surgery	1,282	8.3	155	12.1	1,127	87.9	953	74.3	329	25.7
Urology	196	1.3	13	6.6	183	93.4	129	65.8	67	34.2
Other	188	1.2	54	28.7	134	71.3	148	78.7	40	21.3

NOTE: Specialty information was obtained from the National Plan and Provider Enumeration System (NPPES) database. Physicians in the Maryland physician licensure data with incorrect or incomplete licensing numbers in the NPPES could not be merged, so their specialty is listed as unknown.

physicians.²⁸ Relative to males, females were disproportionately likely to be primary care doctors. Approximately 23 percent of PCPs have practiced for more than 30 years. With the exception of pediatric subspecialists, each specialty is predominately male. Anesthesiology,

²⁸ We identified primary care and specialty physicians on the basis of the physician taxonomy code in the NPPES. The full list of primary care and specialty classifications is in Table C-2 in **Appendix C**.

emergency medicine, and pediatric subspecialists all have a relatively lower portion of specialists who have been practicing for more than 30 years (each less than 15 percent). In contrast, allergy and immunology, dermatology, psychiatry and neurology, and urology all have a higher (greater than 27 percent) portion of physicians who have practiced 30 years or more. This baseline physician profile is similar to data reported by the American Association of Medical Colleges (AAMC) using the American Medical Association physician master file from 2012; the AAMC reports that 37 percent of Maryland physicians were female and 31 percent were PCPs (AAMC Center for Workforce Studies, 2013). According to the AAMC figures, Maryland ranked ninth in the country for the supply of active PCPs at 95 active patient PCPs per 100,000 population.

Nursing Workforce. Since 2006, Maryland has implemented the Nurse Support Program (NSP) II to increase the number of hospital bedside nurses in Maryland (HSCRC, 2014e). The NSP II aims to increase the number of hospital bedside nurses by reducing barriers to nursing education. Specifically, NSP II expands academic capacity, including the number of nursing faculty, and supports student success through statewide initiatives and competitive grants. The nursing workforce increased by approximately 28 percent from 2005–2007 to 2008–2012. According to Kaiser State Health Facts, Maryland had 72,231 active nurses as of October 2015, 60,784 of whom were registered nurses and 11,447 of whom were licensed practical nurses (Kaiser State Health Facts, n.d.). According to 2008–2010 data from the Health Resources and Services Administration, Maryland’s 975.5 registered nurses per 100,000 population was higher than the national average of 920.9 (U.S. Department of Health and Human Services, 2013).

11.3.2 New Workforce Models

In spring 2015, Maryland kicked off an Innovations in GME workgroup to oversee the development of the 5-year plan to transform GME (Maryland.gov, n.d.). The workgroup submitted a report to CMS on December 31, 2015, that details Maryland’s plan to transform medical education curricula to align with health reform. The workgroup held a summit with over 100 stakeholders in May 2015 to help inform its recommendations (HSCRC, 2015b). As a result of the summit and subsequent workgroup meetings, the group identified a number of challenges and barriers to transforming GME in Maryland, including the following:

- Because training is primarily hospital based, trainees are not sufficiently trained in population health needs, care coordination, teamwork, quality improvement, cost containment, and other aspects of value-based care.
- It is difficult to change residency programs, in part because of uncertainty about how to fund non-hospital-based training.
- Lack of consensus on physician workforce needs in Maryland has stymied past workforce initiatives in the state.
- Maryland faces difficulties in recruiting health professionals to underserved communities.

The workgroup considered the following models to address these challenges and transform medical education in the state:

- Adapt training program curricula to teach continuous improvement skills, cost containment, population health, and principles of safe patient care. The following changes were suggested:
 - Connect GME programs and trainees to the community by developing rotations that provide broader experiences in communities, including rotations in accountable care organizations, primary care medical homes, and other outpatient settings.
 - Engage residents with data about quality improvement and population health.
 - Improve the connection between population needs and GME.
 - Increase training in interprofessional communication.
- Enable the HSCRC to adjust hospitals' payment rates to reflect residency program changes and to increase transparency by disentangling GME from the hospital budget.
- Use loan repayment programs to target increases in workforce supply by specialty, demographics, and geography and to recruit students from rural and underserved areas.

In addition to plans for physician GME, the NSP II has noted the need to train nurses in care coordination, cost containment, and population health in light of the new All-Payer Model (HSCRC, 2014e). Such training could be in the form of continuing education, changes to nurse preparation program curricula, and increased nurse educator knowledge.

11.3.3 Targeting Clinicians Serving a High Portion of Patients With Public Insurance and Disproportionate Share Hospitals

It is not yet clear whether these models will target clinicians who have a high percentage of patients covered by public insurance or whether they will be more likely to be adopted by DSHs. The workgroup is considering defining population health for specialized groups, such as older adults and those with behavioral health needs. In addition, the workgroup emphasized the need to encourage community-based training that improves population health.

11.4 Discussion

To date, Maryland has made progress with convening stakeholders and developing a plan for GME to align medical education with health care transformation. Future reports will examine the implementation of Maryland's plans and any impacts on transforming the workforce. The final report will examine how the profile of the workforce changes after the implementation of the All-Payer Model.

SECTION 12

COMPARISON TO THE INPATIENT PROSPECTIVE PAYMENT SYSTEM

12.1 Research Questions

Some have hypothesized that Maryland's all-payer rate setting system provides higher payments than would be paid under the IPPS because it eliminates cross-subsidization among payers, other than modest discounts for Medicare and Medicaid. The analyses described in this section estimated the difference in Medicare inpatient payment rates between Maryland and comparison group hospitals to provide insights into whether Medicare inpatient payment rates are higher in Maryland than in other states because of the all-payer rate setting system. These analyses addressed the following research question:

- What is the magnitude and direction of the difference in inpatient payment rates for Medicare in Maryland compared with a comparison group?

12.2 Evaluation Methods

To address this question, we compared the weighted average payments for inpatient hospital admissions by Medicare beneficiaries who are residents of Maryland with the weighted average payments for inpatient admissions for Medicare beneficiaries residing in the market areas of a matched hospital comparison group. Weights were defined based on the share of admissions by DRG in Maryland hospitals. We used the comparison group described in **Section 2.2.2**, based on matched hospitals and market areas. Analyses included Medicare claims data for inpatient discharges between January 1, 2011, and March 31, 2015.

The unit of analysis was the inpatient admission to a short-term acute care hospital. We calculated Medicare inpatient payments for each inpatient stay for Maryland residents and residents of comparison hospital market areas. We restricted to admissions to Maryland hospitals (for Maryland residents) and to comparison hospitals (for comparison area residents). We then calculated the average payment for each DRG by year for both Maryland and the comparison group. To apply the same weight to DRGs in Maryland and the comparison group, we calculated the relative weight for each DRG/year combination in Maryland by dividing the count of admissions in each DRG by the sum of all admissions in that year. This DRG/year weight was applied to each DRG/year in the comparison group to create an equivalent distribution of DRGs as found in Maryland. We then calculated the DRG weighted average payment by year in both Maryland and the comparison group.

In addition to this analysis, we calculated the average inpatient payments for selected high-volume DRGs. We identified the top five DRGs by volume in both Maryland and the comparison group. There was substantial overlap so we only present the top five DRGs by volume based on Maryland data.

12.3 Results

We examined the difference in payment levels by year between Maryland and the comparison group and the growth in payments over time for both groups. We found that the weighted average payment differential ranged from 20.7 to 25.7 percent higher in Maryland than

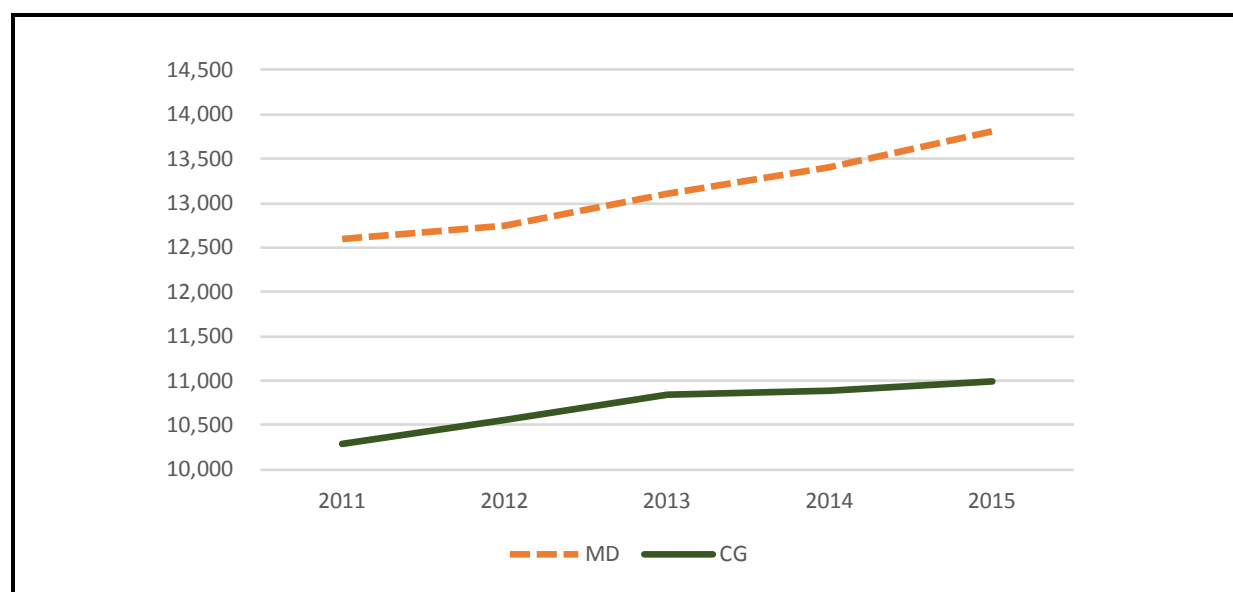
in the comparison group for the same mix of DRGs (Table 30). The average Maryland payment grew from 12,599 in 2011 to 13,817 in 2015. In the comparison group, average payment per admission for the same distribution of DRGs as Maryland grew from 10,296 in 2011 to 10,993 in 2015. The rate of growth in payments was higher for the comparison group between 2011 and 2013, but higher in Maryland beginning in 2014 and continuing into 2015. Figure 15 is a graphical representation of the average payments over time, which shows a widening gap in 2014 and 2015.

Table 30
Weighted average payment per admission: Maryland and comparison group

Payment per admission	2011	2012	2013	2014	2015
Maryland payments (\$)	12,599	12,746	13,104	13,412	13,817
Comparison group payments (\$)	10,296	10,559	10,848	10,892	10,993
Difference in payment	22.4%	20.7%	20.8%	23.1%	25.7%
Maryland payment annual growth rate		1.2%	2.8%	2.3%	3.0%
Comparison group payment annual growth rate		2.6%	2.7%	0.4%	0.9%

SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

Figure 15
Average Medicare payment per admission by year: Maryland and comparison group



SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

We also examined relative payments in Maryland and comparison group hospitals for the five most prevalent DRGs in Maryland (Table 31). The table is sorted in descending order by the prevalence of DRGs in Maryland. We found larger payment differentials for the most prevalent admission, DRG 470 (major joint replacement or reattachment of lower extremity without complications or comorbidities). The difference in payment ranged from 32 to 41 percent larger in Maryland than in the comparison group depending on the year. The DRG with the second highest prevalence, DRG 871 (septicemia or severe sepsis without mechanical ventilation 96+ hours with major complication or comorbidity), had the lowest payment differential of the top five DRGs by volume. The payment differential for this DRG ranged from 13 to 26 percent.

Table 31
Average payment for Maryland and comparison group hospitals for top five Maryland diagnosis-related groups by volume

DRG description		2011	2012	2013	2014	2015
DRG 470: Major joint replacement or reattachment of lower extremity w/o mcc	<i>MD</i>	\$17,213	\$18,093	\$17,922	\$17,418	\$17,021
	<i>CG</i>	\$12,732	\$12,801	\$12,860	\$12,903	\$12,894
% difference		35	41	39	35	32
DRG 871: Septicemia or severe sepsis w/o mv 96+ hours w mcc	<i>MD</i>	15,565	14,835	14,967	15,150	15,329
	<i>CG</i>	12,865	13,102	12,866	12,547	12,162
% difference		21	13	16	21	26
DRG 885: Psychoses	<i>MD</i>	9,358	8,531	8,283	8,877	9,536
	<i>CG</i>	6,534	6,611	7,028	7,429	7,303
% difference		43	29	18	19	31
DRG 292: Heart failure & shock w cc	<i>MD</i>	8,062	8,109	7,843	7,955	8,362
	<i>CG</i>	6,610	6,662	6,648	6,800	6,617
% difference		22	22	18	17	26
DRG 690: Kidney & urinary tract infections w/o mcc	<i>MD</i>	6,093	5,927	5,838	6,014	6,419
	<i>CG</i>	4,694	4,782	4,832	5,002	4,990
% difference		30	24	21	20	29

NOTE: DRGs are ordered on the basis of their prevalence in Maryland. CG = comparison hospitals; MD = all Maryland hospitals. SOURCE: Chronic Conditions Data Warehouse Medicare fee-for-service claims.

DRG 291 (heart failure and shock with major complication or comorbidity) is the highest severity DRG of the triad 291, 292, and 293. These three DRGs are all for the same condition (heart failure and shock), but the severity is distinguished by the level of complicating or major complicating conditions and comorbidities. DRG 291 was present in the top five DRGs for the comparison group but was not among the top five Maryland DRGs. The prevalence of DRG 291 grew in Maryland from 1.7 to 2.0 percent between 2011 and 2015, while it grew from 1.9 to 2.6 percent over the same time period in the comparison group. DRG 292, which was among the top five DRGs in Maryland, changed from 2.2 to 2.7 percent of admissions in Maryland and from 2.2 to 2.1 percent of admissions in the comparison group. Finally, DRG 293, the least severe of

the triad, declined from 0.8 to 0.7 percent in Maryland and from 0.9 to 0.7 in the comparison group.

12.4 Discussion

We found a substantial payment differential between Maryland and the comparison group hospitals for the same mix of DRGs, ranging from 21 to 26 percent higher inpatient payments in Maryland depending on the year. We found similar differences for individual DRGs, with the range in inpatient payments for the highest five by volume ranging from 14 to 43 percent higher in Maryland. These higher payments in Maryland are expected because one of the goals of all-payer rate setting is to eliminate cross-subsidization among payers. At the same time, all-payer rate setting is expected to reduce commercial payment rates. Future reports will include corresponding analyses of commercial claims data to explore whether there are offsetting reductions in commercial payment rates in Maryland.

Although these analyses showed substantial payment differences between Maryland and the comparison group, there are other factors that could explain some of the differences. First, Maryland hospitals do not have the same incentives to completely code diagnoses for beneficiaries because, unlike hospitals operating under IPPS, their payment does not differ based on patient diagnoses. Therefore, we expect that secondary diagnoses may be undercoded, thus leading to less complex DRG categorizations. Specifically, we expect DRGs with complicating or comorbid conditions and major complicating or comorbid conditions to be less prevalent in the Maryland claims. If this is the case, the payment differential may reflect not only payment rate differences but also higher costs because of the greater complexity of cases within a DRG in Maryland than in the comparison group. As a result, our estimate of the payment differential may be biased upward. We found some evidence of undercoding in Maryland from examination of DRGs 291–293, which are differentiated only on the basis of complications and comorbidities. DRG 292 and DRG 293, which include less severe complications or comorbidities or none at all, receive a lower IPPS payment than DRG 291. However, DRG 292 represented a higher percentage of overall admissions in Maryland (2.7%) than in the comparison group (2.1%) in 2015. DRG 293 represented the same share in both Maryland and the comparison group in 2015 (0.7%). DRG 291, however, which receives the highest IPPS payment of the triad, represented a larger proportion of the overall admissions in the comparison group (2.6%) than in Maryland (2.0%) in 2015. The differential between Maryland and the comparison group in the relative prevalence of DRGs 291 and 292, which increased over time, likely reflects the differing incentives to completely code all diagnoses in comparison group and Maryland hospitals. In future reports, we will conduct additional analyses using repriced Maryland Medicare claims to compare the difference in actual payments under the All-Payer Model and the counterfactual of hypothetical IPPS and OPPS payments in Maryland. This comparison, which will be based on Maryland claims only, eliminates any potential bias because of differences in the completeness of diagnosis coding.

Second, payment differences between Maryland and the comparison areas may be the result of factors related to location and facility type, including cost differences based on wages and other input prices, and indirect medical education (IME), disproportionate share (DSH), UCC and other adjustments. Although payments for comparison hospitals can be standardized to remove IME, DSH, UCC, and wage adjustments, we were not able to obtain information needed

to standardize payments for Maryland hospitals. Therefore, our analyses used payments that were not standardized. Although many of these factors were implicitly controlled for in our comparison hospital selection, differences between Maryland and the comparison group in the distribution of admissions within a DRG by hospital type may still contribute to payment differences. For example, if relatively more cases occurred at teaching hospitals in Maryland while relatively more occurred in community hospitals in the comparison group, this may have biased the comparison group payments downward. If we are able to obtain a satisfactory methodology for standardizing Maryland payments, we will present standardized payments in future reports. We will also estimate the magnitudes and directions of payment differentials for commercial payers and Medicaid using unstandardized payment amounts in both Maryland and the comparison group.

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SECTION 13

DISCUSSION

Maryland implemented its All-Payer Model on January 1, 2014, retaining all-payer rate setting from its previous hospital payment system and incorporating annual global hospital budgets. Maryland beat its timeline for transitioning hospitals to global budgets, which had aimed to have at least 80 percent of hospitals operating under global budgets by the fifth year of the All-Payer Model. By July 2014 all general acute-care hospitals in the state were operating under either GBR or TPR. Some key policies, including how budgets would be adjusted to account for changes in hospital market share and in interhospital transfer rates, had not been formalized by the HSCRC at the time the All-Payer Model was implemented. The market shift adjustment was not announced until September 2015, well into the second year of implementation. At the same time, the HSCRC was flexible in enforcing some policies, allowing a transitional period for both hospitals and the HSCRC to learn how to operate within the new regulatory system. The HSCRC did not apply penalties for revenue variation from approved budgets or require hospitals to request permission to vary charges from approved rates until FY 2015.

Most hospitals have successfully managed their revenues to remain within their global budgets. In both FY 2014 and FY 2015, 36 of 46 hospitals had revenues that were within the 0.5 percent budget corridor, and only 2 hospitals in FY 2014 and 3 hospitals in FY 2015 deviated from their budgets by more than 2 percent. Hospitals took advantage of the ability to adjust their rates during the course of the year to keep revenues within their budgets. Over the first six quarters of implementation, depending on the quarter, slightly less than half to about two-thirds of hospitals charged rates that differed from their established rates by more than 5 percent, and many hospitals had greater than 10 percent rate variation. However, average rates charged over the course of the year in FY 2015 were much closer to rate order amounts than the rates charged in the individual quarters, suggesting there were offsetting rate increases and rate decreases over the course of the year. The volatility of rates from quarter to quarter may reflect hospitals' uncertainty about service volume and concerns about incurring penalties for revenues outside the narrow budget corridor. Variation in charged rates may stabilize as hospitals gain more experience operating under global budgets. Small hospitals were less likely to be able to comply with their annual budgets and more likely to make rate adjustments of more than 5 percent. Smaller hospitals may experience greater variability in their service volumes and, therefore, may find it more difficult to remain within the narrow 0.5 percent budget corridor permitted.

Most stakeholders and hospital-based leadership and staff remained open-minded about the All-Payer Model, although the absence of policies in several essential areas created uncertainty. Other areas of concern for hospital leaders included challenges in aligning physician and hospital incentives, as well as financial constraints that they felt limited their ability to remain competitive and to make investments that they believed would, in the long run, allow hospitals to operate more effectively and efficiently. However, the HSCRC was able to capitalize on many decades of experience working with the Maryland hospitals, as well as the hospitals' desire to continue all-payer rate setting, to maintain cooperation with the All-Payer Model.

Hospitals varied in the extent to which they had implemented new strategies to adapt to the All-Payer Model. Some hospitals had anticipated the need for changes and were well into

implementation of strategies to operate under global budgets, whereas others were still in the planning stages. Hospital systems that had performed well financially in recent years were better positioned to invest in new strategies. TPR hospitals, which were operating under global budgets before implementation of the All-Payer Model, were already making changes to respond to global budget incentives. The level of engagement with developing new strategies also appeared to be related to the degree of enthusiasm of hospital leadership for the All-Payer Model.

Although hospitals encountered common issues in responding to the All-Payer Model, each hospital we spoke with during site visits for the first evaluation year appeared to be customizing how it would respond to the new global budgeting payment incentives to meet its own organizational and patient population needs. The most frequent changes described were hiring new staff and creating divisions focused on improving quality and meeting the hospital's quality-of-care goals. During site visits, all hospitals described some strategies focused on reducing non-emergent ED use—for example, placing staff in the ED to increase care coordination and to triage patients, establishing relationships with outpatient facilities, and encouraging patients to establish relationships with primary care providers. Some hospitals had made significant staff and resource commitments to improving population health. Population health initiatives included offering patient education programs and hiring community health workers.

During its first year of operation (January–December 2014), the All-Payer Model performed well against the four major terms of its agreement with CMS (Patel et al., 2015). The all-payer per capita hospital growth rate was 1.47 percent, below the maximum allowed 3.58 percent growth rate. CMS estimated that Maryland had generated \$116 million in savings to Medicare (of the required \$330 million over 5 years) by achieving a 1.08 percent reduction in Medicare per capita hospital cost compared to a 1.07 percent increase for Medicare nationwide. Maryland made modest progress in bringing its Medicare readmission rate to the national average. Finally, the incidence rate of PPCs, which Maryland is required to reduce by 30 percent over 5 years, declined by more than 26 percent.

Although our evaluation finds some promising evidence of success for the All-Payer Model, our findings are not as strong as those based on performance against the terms of the agreement. There are several explanations for this. First, the terms of the All-Payer Model agreement with CMS use outcomes that mostly are not directly comparable to the evaluation outcomes. Second, to date our evaluation has focused primarily on the Medicare population. Third, the D-in-D methodology used in this evaluation has a different basis for comparison than the model agreement terms. D-in-D estimates are regression adjusted and based on comparison with a set of hospitals and populations in market areas selected because they are comparable to Maryland. The model agreement terms are either based on comparison with hospitals nationwide or externally established benchmarks (e.g., the previous 10-year growth in GSP).

Our D-in-D analyses of the first five quarters of All-Payer Model implementation found significant reductions relative to the comparison group in Maryland Medicare beneficiaries' utilization, expenditures, or both in all categories of hospital services in one or more quarters. However, we did not find evidence that the All-Payer Model was associated with significant reductions in total Medicare PBPM payments during the first five quarters of implementation overall, likely because we did not find reductions in inpatient admissions or expenditures for the

overall time period relative to the comparison group. There was some evidence that the All-Payer Model was associated with an increase in the complexity of inpatient admissions, perhaps because fewer cases that might have been treatable in outpatient settings were admitted. The changes in average payment per admission, LOS, probability of major/extreme admission, and probability of ICU admission after implementation of the All-Payer Model were larger in Maryland than in the comparison group. We also found some evidence that patients might be treated in higher intensity settings than they had been in the past, as reflected in an increase in the case-mix-adjusted charge per discharge and the increase in the probability of ICU admission.

Although implementation of the All-Payer Model was associated with a smaller decline in outpatient ED visits relative to the comparison group, it was also associated with a decrease in payments for these visits, indicating a reduction in resource intensity of ED visits. We also found a significant decrease in other hospital outpatient department expenditures associated with implementation of the All-Payer Model. The decreases in outpatient ED and other hospital outpatient department expenditures suggest that during the early implementation period hospitals may have been responding to the All-Payer Model in part by reducing provision of outpatient services. At the same time, we did not find evidence of substitution of nonhospital for hospital services, such as shifting ED visits to urgent care centers or shifting primary care visits from hospital outpatient departments to FQHCs and RHCs or physician offices.

We did not find evidence that implementation of the All-Payer Model was associated with improvement in care coordination, as measured by a reduction relative to the comparison group in the likelihood of a Medicare beneficiary's having had a follow-up visit within 14 days of hospital discharge. We also did not find any evidence of changes in three measures of avoidable or reducible utilization for Medicare beneficiaries relative to the comparison group: probability of having had an admission for an ACSC, probability of having had an unplanned readmission within 30 days after hospital discharge, and probability of having had an ED visit within 30 days after hospital discharge. Our readmission finding differs from that in Maryland's monitoring report on the first year of All-Payer Model implementation, which found a modest narrowing of the gap between the readmission rate in Maryland and that in the rest of the country. As noted earlier, our estimate is regression adjusted and is based on comparison with a group of hospitals selected for comparability to Maryland hospitals, rather than with hospitals nationwide.

Maryland's all-payer hospital payment rates are explicitly intended to eliminate cross-subsidization among payers. As a result, Medicare payments in Maryland may be higher than they are in other states, which was confirmed in our analyses. Both before and after implementation of the All-Payer Model, we found a substantial Medicare payment differential between Maryland and the comparison group hospitals for the same mix of DRGs, ranging from 21 to 26 percent higher inpatient payments in Maryland, depending on the year. These findings, although not unexpected given the goal of eliminating payer cross-subsidies, may be biased upward by less complete diagnosis coding on Medicare claims in Maryland, which results in assigning higher complexity cases to lower resource intensity DRGs in Maryland hospitals than in IPPS hospitals. Future analyses using Maryland Medicare claims repriced to IPPS and OPSS payments will eliminate this potential bias. In addition, future corresponding analyses of

commercial claims data will explore whether there are offsetting reductions in commercial payment rates in Maryland.

Overall, the results from our analyses provide modest evidence that the All-Payer Model is succeeding in reducing hospital expenditures without shifting costs to other parts of the health care system outside of the global budgets or resulting in adverse impacts on patient outcomes. These findings are particularly notable as they reflect early experience with the All-Payer Model, when hospitals were just beginning to adjust to the new system. Discussions with hospital leaders during site visits indicated that in most cases hospitals were in the early stages of developing strategies to respond to the incentives of the All-Payer Model. Hospitals were further along in developing strategies that could be implemented internally, such as meeting quality-of-care goals or triaging patients in the ED. Strategies that require changes outside the hospital's direct control—such as aligning hospital and physician incentives and reducing patient demand for hospital services by improving population health and altering care-seeking patterns—were in the nascent stages. Therefore, it is not surprising that we found the strongest impacts on hospital expenditures in areas where the hospital can have more immediate influence—reductions in expenditures per ED visit and expenditures for hospital outpatient department services. We found less encouraging results for care coordination, which requires changes in the relationship between the hospital and the physician community.

We found more evidence of reductions in expenditures than in utilization. The design of the All-Payer Model, which directly restricts hospital revenues, virtually guarantees success in reducing hospital expenditures. Limits on hospitals' ability to manipulate their charged rates to meet their budgets are intended to ensure that expenditure reductions reflect real changes in utilization of hospital services. However, to allow hospitals time to adjust to the new system, the HSCRC has not enforced these restrictions. Our analyses showed that hospitals varied their rates frequently during the course of the year, sometimes by amounts greater than what had been approved by the HSCRC. Thus, expenditure reductions might simply have reflected charge reductions, which, in the longer term, would not be financially sustainable for hospitals.

These are early findings from the All-Payer Model and, as noted earlier, hospitals for the most part had not yet implemented strategies to make harder-to-achieve changes in underlying determinants of utilization. Future evaluation reports will monitor whether the All-Payer Model succeeds in driving these types of change and how hospital financial performance is affected. The All-Payer Model is intended to affect hospital utilization for all Maryland residents, including Medicaid and commercially insured individuals. Our evaluation to date has focused primarily on impacts in the Medicare population because of longer lags in Medicaid and commercial insurance data availability. As a result, the findings in this report represent only a partial picture of All-Payer Model impacts. In future reports, analyses will be expanded to assess changes in the Medicaid and commercially insured populations.

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**APPENDIX A:
KEY INFORMANT INTERVIEW PROTOCOLS**

MARYLAND ALL-PAYER EVALUATION INTERVIEW PROTOCOL

Hospital Financial Staff: The hospital's chief finance officer and other lead financial staff that play a critical role in ensuring that the hospital maintains its global budget and the volume targets without penalty.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role and UMMS in the development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

1. We know that you serve as the Vice President of Reimbursement & Revenue Advisory Services for UMMS. Can you tell us what your role entails?
 - *Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.*
2. How long have you held this role?
3. What role did you or your organization have in the development and implementation of the All-Payer Model?

Probe:

- What type of participation did you have in the Global Budget contract negotiations for the UMMS hospitals?
 - Can you talk a little bit about your role on the HSCRC Data and Infrastructure workgroup?
 - i. Do you think the workgroups were helpful or not helpful in moving the implementation of the model forward?
4. How, if at all, has your role in the implementation of the All-Payer Model changed over time?

Implementation Progress

This next set of questions are about your hospital’s implementation progress related to the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we may ask specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

5. Can you take us through the implementation process that has taken place within UMMS and each individual hospital? For example, once the final GBR contracts were signed, what happened at the system level?
 - a. What happened at the hospital level?
 - b. Are you involved in any of the individual hospital level implementation practices?
6. Please describe the overall changes you observed taking place within the hospital system January 2014.

PROBES:

- Which, if any, of these changes do you feel are related to the new hospital rate-setting model?
 - What evidence do you have indicating that these changes relate to the new model?
7. Can you describe any specific new programs or processes UMMS implemented either as a result of the new model or at the same time as the new model?
 8. Have you noticed any broader state-wide or regional trends in how hospitals or hospital systems are implementing their rates under this new model?

Probe:

- How does UMMS fit into these trends?
9. What differences have you noticed in how other hospitals or hospital systems are implementing or changing under this new model?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

10. What changes, if any, have you observed in the way UMMS spends its resources since the new model was implemented?
 - Please describe in as much detail as possible. To what do you attribute these changes?
11. What changes, if any, have you observed in patient's utilization of hospital-based services in your facility since the new model was implemented?

- Please describe in as much detail as possible. To what do you attribute these changes?
12. What, if any, hospital policies have been implemented in your facility as part of the new model that might impact health care costs and utilization—both hospital based and non-hospital based?
- Are you aware of any unintended consequences have you observed from these policies?
13. What initiatives(s) (for example, accountable care organizations [ACOs], gainsharing, etc.) have you observed your facility use to align physician behavior with hospitals' global budgets?
14. Are you aware of other informal incentive strategies used to align physician behaviors with UMMS hospitals' global budgets?

Hospital consolidation and market power

These next set of questions aim to better understand the strategic behavior and decisions around hospital consolidation and market power.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

15. Please describe your observations regarding UMMS strategic or market environment. How has the strategic environment changed for UMMS since implementation of the new model?
- a. We know that UMMC recently announced (in March 2015) that it was getting its own board of directors. What sparked this change? What influence, if any, did the new model have any influence on this change?
 - b. What does the addition of a board of directors mean to UMMC and the UMMS in general?
16. What types of strategic behaviors were common prior to the new model's implementation, including mergers and acquisitions, investments in disease specific have hospitals engaged in?
- a. From your perspective, has the CON process changed as a result of the new model?
 - b. Can you share how UMMS approach to CON requests has changed, if at all?
17. What, if any, changes in services has your facility made since implementation of the new model?

18. What, if any, changes or shifting in overall hospital market share have you observed?

Spillover effects

The next section includes questions about unintended consequences or spillover effects of the new model.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

19. What, if any, spillover effects on other providers have arisen since the new model was implemented? For example, have changes within your facility had impacts on outpatient, post-acute care, primary care or any other health care sectors?

20. What, if any, factors within your facility are driving any spillover effects?

21. Are there specific health care reforms being implemented in your facility that may interact or intersect with the new model?

- For example, how do the ACO or patient-centered medical home initiatives interact with the new model?

22. What impact, if any, do you these health system reforms have on the new model?

Role on CRISP Governance

Before we end the interview, we would like to discuss your role on the CRISP Governance board. From our reading, we understand that CRISP and the HIE more broadly plays a large role in the new model.

23. From your role on the Governance board, how, if at all, has CRISP's role changed within the state?

24. We understand that CRISP is now helping HSCRC provide data with a shorter timelag. Can you help us understand how CRISP ended up playing this role in the new model?

- a. What challenges did CRISP encounter as it began working to expand its data capacities and work with HSCRC to meet the new model's data needs?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

25. What, if any, implementation successes has your organization observed/accomplished since the new model was introduced last year?
26. Are there any hospitals within the UMMS network that you feel have been particularly successful at implementing the new model?
 - a. What specific areas have been the most successful for them?
27. What, if any, implementation challenges has your organization observed/accomplished since the new model was introduced last year?
28. Are there any UMMS hospitals that have found it challenging to implement the new model?
 - a. What challenges or barriers has(ve) the hospitals encountered?
 - b. What do you think contributes to these challenges?
29. What were some of the unique challenges that arose during the rate-setting process for UMMS under this new model?
 - Determining how to handle out-of-state or international patient costs?
 - Determining how to handle interhospital system transfers?
 - Transitioning Total Patient Revenue hospitals to global budgets?
30. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?
31. Are there any other questions or observations you would like to share with our evaluation team?

MARYLAND ALL-PAYER EVALUATION KEY INFORMANT INTERVIEW PROTOCOL

Non-hospital-based staff: This broad stakeholder category includes payers (Medicaid as well as private payers); state staff; workgroup members; and staff working at advocacy organizations such as MedChi, MHA, Maryland Health Care for All, and Maryland Women’s Coalition for Healthcare Reform.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role as the executive director at HSCRC in the development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.

1. We know that you joined HSCRC as the interim executive director as the waiver was being negotiated. Can you discuss your role in the initial development and implementation of the All-Payer Model? Also, at what stage of the development and negotiations of the new model did you join HSCRC?

Probe:

- We know that there were at least two public drafts of the revised all-payer model. Were you involved in both iterations? Or were you more involved in the final proposal than the initial proposal?
 - How did HSCRC collaborate with DHMH as part of the negotiation and proposal development process?
 - What role would you describe John Colmers playing in the development and negotiation of the new waiver application?
 - i. What other HSCRC staff, if any, were involved in the negotiations with CMS?
 - What other stakeholders outside of HSCRC were at the negotiating table?
2. When and WHY did the state begin negotiations with CMS to possibly revise its all-payer model?
 - Who started the conversation? Was this driven by the hospitals, the state or CMS? Were the revised negotiations driven by a prediction that MD would no longer meet the terms of the former waiver?
 - How long did HSCRC think it would take to negotiate a revised model?
 3. During the initial negotiations between CMS and HSCRC, what other cost-saving models or initiatives were discussed and not included in the revised waiver application?
 - Why weren't they included?
 4. Once the waiver application was finalized, when did HSCRC begin working with the hospitals to set rates?

5. In reviewing the application, it appears that HSCRC's intention was for all hospitals to move to Global budgets by the 3 years of the waiver. How did you manage to move all non-TPR hospitals to GBR in the first year?
 - How easy or hard was it to negotiate this change?

Implementation Progress

This next set of questions are about your observations regarding progress of the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we will ask more specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

6. Can you describe any specific new programs or processes that you have observed individual hospitals or hospital systems implementing either as a result of the new model or at the same time as the new model?
 - How have you made these observations?
 - How easy or hard is it to observe individual hospital or hospital system implementation of the new model?
7. What differences have you noticed in how individual hospitals or hospital systems are implementing or changing under this new model?
8. In reviewing the Commission notes, we know that MHA requested a mid-year rate increase which was turned down by HSCRC. Can you give any insight into the HSCRC's decision to turn down this request?
9. We know that the workgroups have already and are currently discussing physician incentives and alignment as well as options for developing a market shift factor. Are there other state-wide reform initiatives associated with the waiver that HSCRC is currently working on or anticipates working on over the next year?
10. In your opinion, is the state on-target to meet its savings goal of \$330 million by 2019?

Other issues (e.g., CRISP)

11. How, if at all, has HSCRC's interactions with other state agencies or organizations such as CRISP changed with the development and implementation of the revised all-payer model?

Clinical Care

These next set of questions deal with clinical care. We would like your perspective on the impact the new model has had on clinical care.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

12. Have you seen any individual hospital or hospital system changes that have resulted in changes in the way patient care is delivered?

These changes could be either tangible or non-tangible. For example:

- i. Are there new clinical protocols?
- ii. New initiatives or areas of emphasis?
- iii. Do the clinical staff sense a new direction?

Quality Improvement and Innovation

This next section focuses on quality improvements and innovations.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

13. What programs, if any, have Maryland hospitals implemented to improve care quality?
- Have you observed any changes in these programs since the implementation of the new model?

Health care workforce

This next set of questions focuses on provider adequacy and possible changes in the workforce that have occurred since the new model has been implemented.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

14. How, if at all, will the revised all-payer model impact the quality and type of healthcare professionals in Maryland particularly within the hospitals and hospital systems?
 - How ‘adequate’ is the healthcare workforce? Specifically describe the adequacy (number, training, access by patients) of nurses, primary care providers, and specialists?
15. What improvements, if any, need to be made to ensure the adequacy of this workforce and their training throughout the state?
16. What impact, if any, has the new model had on health care workforce shortages (such as the nursing shortage)? How have workforce shortages been address?
17. What future impact, if any, do you envision the new model having on the health care workforce? On medical education?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

18. Do you have any observations about how hospitals will spend their resources under the new model? What do you suspect they might do differently?
19. What, if any, state and hospital policies have been implemented as part of the new model that might impact health care costs and utilization—both hospital based and non-hospital based?
 - Are you aware of any unintended consequences have you observed from these policies?
20. What initiatives(s) (for example, accountable care organizations [ACOs], gainsharing, etc.) have you observed that hospitals or hospital systems use to align physician behavior with hospitals’ global budgets?
21. Have you observed other informal incentive strategies used to align physician behaviors with hospitals’ global budgets?

Assessments (size and type)

22. Are you aware of any assessments being conducted by individual hospitals or hospital systems of this revised model?

- What type of assessments are they conducting?
- How, if at all, is the HSCRC involved?
- How is this a small or large assessment?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

23. What, if any, implementation successes have you observed the HSCRC accomplish since the new model was introduced last year?

24. What, if any, implementation challenges have you observed the HSCRC accomplish since the new model was introduced last year?

25. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?

26. Are there any other questions or observations you would like to share with our evaluation team?

MARYLAND ALL-PAYER EVALUATION KEY INFORMANT INTERVIEW PROTOCOL

Non-hospital-based staff: This broad stakeholder category includes payers (Medicaid as well as private payers); state staff; workgroup members; and staff working at advocacy organizations such as MedChi, MHA, Maryland Health Care for All, and Maryland Women’s Coalition for Healthcare Reform.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role as the HSCRC chairman in the development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

1. As chairman of the HSCRC, what are the roles and responsibilities?

Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.

- What, if any interaction or unofficial role, do you have on the All-Payer System modernization advisory council or the workgroups?

2. How long have you held this role?

3. What role did you play in the initial development and implementation of the All-Payer Model?

Probe:

- We know that there were at least two public drafts of the revised all-payer model. Were you involved in both iterations? Or were you more involved in the final proposal than the initial proposal?
 - How did your role as HSCRC chairman intersect with the role of the Secretary of DHMH—Dr. Josh Sharfstein? For example, was he more or less instrumental in negotiating and developing the revised all-payer model?
4. When and WHY did the state begin negotiations with CMS to possibly revise its all-payer model?
 - Who started the conversation? Was this driven by the hospitals, the state or CMS? Were the revised negotiations driven by a prediction that MD would no longer meet the terms of the former waiver?
 - How long did HSCRC think it would take to negotiate a revised model?
 5. During the initial negotiations between CMS and HSCRC, what other cost-saving models or initiatives were discussed and not included in the revised waiver application?
 - Why weren’t they included?
 6. How, if at all, has this role in the implementation of the All-Payer Model changed over time?

Implementation Progress

This next set of questions are about your observations regarding progress of the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we will ask more specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

7. Can you describe any specific new programs or processes that you have observed individual hospitals or hospital systems implementing either as a result of the new model or at the same time as the new model?
 - How have you made these observations?
 - How easy or hard is it to observe individual hospital or hospital system implementation of the new model?
8. What differences have you noticed in how individual hospitals or hospital systems are implementing or changing under this new model?

Other issues (e.g., CRISP)

9. How, if at all, has HSCRC's interactions with other state agencies or organizations such as CRISP changed with the development and implementation of the revised all-payer model?

Clinical Care

These next set of questions deal with clinical care. We would like your perspective on the impact the new model has had on clinical care.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

10. In your role as HSCRC chairman, have you seen any individual hospital or hospital system changes that have resulted in changes in the way patient care is delivered?

These changes could be either tangible or non-tangible. For example:

- i. Are there new clinical protocols?
- ii. New initiatives or areas of emphasis?
- iii. Do the clinical staff sense a new direction?

Quality Improvement and Innovation

This next section focuses on quality improvements and innovations.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

11. What programs, if any, have Maryland hospitals implemented to improve care quality?

- Have you observed any changes in these programs since the implementation of the new model?

Health care workforce

This next set of questions focuses on provider adequacy and possible changes in the workforce that have occurred since the new model has been implemented.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

12. In your role as HSCRC chairman, how, if at all, will the revised all-payer model impact the quality and type of healthcare professionals in Maryland particularly within the hospitals and hospital systems?

- How ‘adequate’ is the healthcare workforce? Specifically describe the adequacy (number, training, access by patients) of nurses, primary care providers, and specialists?

13. What improvements, if any, need to be made to ensure the adequacy of this workforce and their training throughout the state?

14. What impact, if any, has the new model had on health care workforce shortages (such as the nursing shortage)? How have workforce shortages been address?

15. What future impact, if any, do you envision the new model having on the health care workforce? On medical education?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

16. From your role at HSCRC, do you have any observations about how hospitals will spend their resources under the new model? What do you suspect they might do differently?
17. What, if any, state and hospital policies have been implemented as part of the new model that might impact health care costs and utilization—both hospital based and non-hospital based?
- Are you aware of any unintended consequences have you observed from these policies?
18. What initiatives(s) (for example, accountable care organizations [ACOs], gainsharing, etc.) have you observed that hospitals or hospital systems use to align physician behavior with hospitals' global budgets?
19. Have you observed other informal incentive strategies used to align physician behaviors with hospitals' global budgets?

Assessments (size and type)

20. As HSCRC chairman, are you aware of any assessments being conducted by individual hospitals or hospital systems of this revised model?
- What type of assessments are they conducting?
 - How, if at all, is the HSCRC involved?
 - How is this a small or large assessment?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

21. What, if any, implementation successes have you observed the HSCRC accomplish since the new model was introduced last year?
22. What, if any, implementation challenges have you observed the HSCRC accomplish since the new model was introduced last year?
23. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?
24. Are there any other questions or observations you would like to share with our evaluation team?

MARYLAND ALL-PAYER EVALUATION INTERVIEW PROTOCOL

Quality and Innovative Initiatives Staff: Hospitals' chief quality improvement and innovations officers as well as other lead quality staff serve as possible ambassadors for quality improvement initiatives that the hospital adopts to meet its quality targets.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role and UM BWMC in the initial development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

1. We understand that you are the Vice President of Quality and Patient Safety, what does this role entail?

Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.

2. What role did you or your organization have in the initial development and implementation of the All-Payer Model?
 - a. How does your role overlap or collaborate with your counterpart working on hospital system level quality initiatives?
 - b. Do you work with the CMO as part of his work on the Maryland Patient Safety Center board?
3. How, if at all, has this role in the implementation of the All-Payer Model changed over time?

Implementation Progress

This next set of questions are about the hospital’s implementation progress related to the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we will ask specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

4. Please describe your overall changes you observed taking place at the hospital since January 2014.

PROBES:

- Which, if any, of these changes do you feel are related to the new hospital rate-setting model?
- What evidence do you have indicating that these changes relate to the new model?

5. Can you describe any specific new programs or processes your hospital/hospital system implemented either as a result of the new model or at the same time as the new model?
6. What differences have you noticed in how other hospitals or hospital systems are implementing or changing under this new model?

Clinical Care

These next set of questions deal with clinical care.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

7. How, if at all, has your hospital, hospital system, and staff changed the way patient care is delivered since the new All-Payer Model was implemented?
8. What, if anything, do your clinical staff seem to be doing differently regarding patient care since the new model has been implemented?

Probes:

- a. These changes could be either tangible or non-tangible. For example:
 - i. Are there new clinical protocols?
 - ii. New initiatives or areas of emphasis?
 - iii. Do the clinical staff sense a new direction?

Quality Improvement and Innovation

This next section focuses on quality improvements and innovations

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

9. What programs, if any, has your hospital implemented to improve care quality?
 - Have you observed any changes in these programs since the implementation of the new model?
10. What impact have these quality-of-care initiatives had on patient outcomes? What evidence do you have that supports these impacts?
11. What strategies, if any, is your hospital implementing that might impact population health?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

12. What changes, if any, have you observed in the way your hospital/hospital system spends resources since the new model was implemented?
 - Please describe in as much detail as possible. To what do you attribute these changes?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

13. What, if any, implementation successes has your organization observed/accomplished since the new model was introduced last year?
14. What, if any, implementation challenges has your organization observed/accomplished since the new model was introduced last year?
15. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?
16. Are there any other questions or observations you would like to share with our evaluation team?

MARYLAND ALL-PAYER EVALUATION INTERVIEW PROTOCOL

Hospital-based physician leaders: Chief medical officers and heads of the hospital-based physicians particularly those that have a unique perspective on how the new model affects hospital physicians.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role and UM BWMC in the initial development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

1. We understand that you serve as the Chief Medical Officer and Senior Vice President for UM Baltimore Washington Medical Center, is that correct?

Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.

2. We know that the global budget for UM BWMC was negotiated at a system level. What role did you have in the initial development and implementation of the All-Payer Model?

Probe:

3. How, if at all, has your role in the implementation of the All-Payer Model changed over time?

Implementation Progress

This next set of questions are about the hospital’s implementation progress related to the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we will ask specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

4. Please describe your overall changes you observed taking place at the hospital since January 2014.

PROBES:

- Which, if any, of these changes do you feel are related to the new hospital rate-setting model?
 - What evidence do you have indicating that these changes relate to the new model?
5. Can you describe any specific new programs or processes your hospital implemented either as a result of the new model or at the same time as the new model?

Clinical Care

These next set of questions deal with clinical care.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

6. How, if at all, have UM BWMC staff changed the way patient care is delivered since the new All-Payer Model was implemented?
7. What, if anything, do your clinical staff seem to be doing differently regarding patient care since the new model has been implemented?

Probes:

- These changes could be either tangible or non-tangible. For example:
 - i. Are there new clinical protocols?
 - ii. New initiatives or areas of emphasis?
 - iii. Do the clinical staff sense a new direction?
- 8. How does your hospital coordinate patient care? What has changed under the new model?

Probes:

- What, if any, mechanisms or programs are in place to help facilitate care coordination within the hospital and discharge planning?
 - How effective are these mechanisms or programs at facilitating hospital care coordination?
 - What has changed regarding care coordination since the implementation of the new model?
9. What mechanisms or policies, if any, have been implemented through the new model to facilitate intrahospital transitions?

Quality Improvement and Innovation

This next section focuses on quality improvements and innovations

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

10. What programs, if any, has UM BWMC implemented to improve care quality?
 - Have you observed any changes in these programs since the implementation of the new model?
11. What impact have these quality-of-care initiatives had on patient outcomes? What evidence do you have that supports these impacts?
12. What strategies, if any, is your hospital implementing that might impact population health?

Health care workforce changes

This next set of questions focuses on provider adequacy and possible changes in the workforce that have occurred since the new model has been implemented.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

13. Please describe your observations regarding the quality and type of healthcare professionals in your hospital.
 - How ‘adequate’ is the healthcare workforce? Specifically describe the adequacy (number, training, access by patients) of nurses, primary care providers, and specialists?
14. What changes, if any, have you observed in the quality and type of healthcare professionals in your facility since January 2014?

PROBES:

- Have these changes helped or hindered your or your colleagues’ job performance?
 - What, if any, impact has the new model implementation had on these changes?
 - i. Are the new changes a result of the new model? If so, what evidence do you have?
15. What, if any, changes have you observed in training programs in your facility since the new model was implemented?
 16. Have you observed impacts on medical school, medical residency, fellowships or other training programs? What, if any, programs or initiatives have the state implemented to improve workforce training and/or adequacy under the All-Payer Model?
 17. What improvements, if any, need to be made to ensure the adequacy of this workforce and their training throughout the state?

18. What impact, if any, has the new model had on health care workforce shortages (such as the nursing shortage)? How have workforce shortages been address?
19. What future impact, if any, do you envision the new model having on the health care workforce? On medical education?
20. How do you think the workforce experience of your hospital/hospital system compares to others in Maryland?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

21. What changes, if any, have you observed in the way your hospital system spends resources since the new model was implemented?
 - Please describe in as much detail as possible. To what do you attribute these changes?
22. What changes, if any, have you observed in patient utilization of hospital-based services since the new model was implemented?
 - Please describe in as much detail as possible. To what do you attribute these changes in your hospital/hospital system?
23. What, if any, hospital policies have been implemented as part of the new model that might impact health care costs and utilization—both hospital based and non-hospital based?
 - Are you aware of any unintended consequences have you observed from these policies?
24. What initiatives(s) (for example, accountable care organizations [ACOs], gainsharing, etc.) have you observed that your hospital uses to align physician behavior with hospitals' global budgets?
25. Are you aware of other informal incentive strategies used to align physician behaviors with your hospitals' global budgets?

Hospital consolidation and market power

These next set of questions aim to better understand the strategic behavior and decisions around hospital consolidation and market power.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

26. Please describe your observations regarding your hospital's strategic or market environment. How has the strategic environment changed for your facility since implementation of the new model?
27. What, if any, changes in services has your facility made since implementation of the new model?

Spillover effects

The next section includes questions about unintended consequences or spillover effects of the new model.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

28. What, if any, spillover effects on other providers have arisen since the new model was implemented? For example, have changes within your facility had impacts on outpatient, post-acute care, primary care or any other health care sectors?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

29. What, if any, implementation successes has you organization observed/accomplished since the new model was introduced last year?
30. What, if any, implementation challenges has you organization observed/accomplished since the new model was introduced last year?
31. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?
32. Are there any other questions or observations you would like to share with our evaluation team?

MARYLAND ALL-PAYER EVALUATION INTERVIEW PROTOCOL

Hospital Management Staff: Chief executive officer and other lead management staff that play a key role in the All-Payer rate negotiations with the HSCRC and the implementation of the hospital's global budget.

Legend:

Text in brackets and highlighted, like [this], will be customized with hospital or organization-specific information and text.

Text in italics, like *this*, signifies notes to interviewers.

Introduction

Thank you for making time to speak with us today. As we explained in our invitation, we are researchers from RTI evaluating the new Maryland All-Payer Waiver Model. We'd like your candid views about this new model. Specifically, we'd like to understand how the Maryland All-Payer Model has been implemented or has impacted your organization.

Our discussion with you is part of an independent evaluation funded by the Centers for Medicare & Medicaid Services (CMS). Ultimately, your decision to participate is voluntary. If you do not wish to participate in this interview or answer any specific questions, please let us know.

We believe that participation in this interview poses minimal risks to you, and we will protect the confidentiality of your participation and comments. We will not quote you by name. We will use some quotations in reports, but quotations will not be attributed to an individual or his or her organization.

We will conduct the interview efficiently to make the most valuable use of your time.

While there are no direct benefits to you or your colleagues from participating in this study, your insights will be used by federal policymakers to identify implementation best practices and lessons learned from this new All-Payer model.

The institutional review board (IRB) at RTI International has reviewed this research and has determined that it meets criteria for exemption.

Finally, we will be audio-recording our conversation to ensure that our notes from today are complete.

Are these interview conditions OK with you? Do you have any questions before we begin?

About the Respondents

This first set of questions is to help us get to know you better and to understand your role and University of Maryland, Baltimore Washington Medical Center in the initial development and implementation of the All-Payer model. **In our effort to differentiate the current All-Payer waiver model from previous All-Payer models, we may refer to the current model as the “new model” throughout this interview.**

1. Based on our research, I understand that you serve as the President and CEO of UM BWMC and have held this role since 2008, is that correct?

Probe for specifics as later questions will focus on aspects of “the model” for which this individual has expertise/experience/responsibility.

2. What role did you have in the initial development and implementation of the All-Payer Model?

Probe:

- We know that Alicia Cunningham served on an HSCRC Waiver workgroup. What role, if any, did you play in collaborating with Alicia on her feedback to the workgroup?

3. As a member of the University of Maryland Medical System, discuss how has information about the implementation of the new model been shared with you and your staff?
4. How, if at all, has this role in the implementation of the All-Payer Model changed over time?

Implementation Progress

This next set of questions are about the hospital’s implementation progress related to the new model that took effect in January 2014. We are interested in broad changes from January 2014 until now that could be associated with or tied to implementation progress at all levels of your hospital. In the later sections, we will ask specific questions related to the implementation of utilization and cost, quality and readmission-related policies, patterns and programs since January 2014.

Probe: Interviewers will get general, higher level perspectives as appropriate. However, if interviewee/organization clearly has expertise/experience/responsibility in narrow areas (i.e., quality of care, rate setting, global budget determination, etc.) move to specifics quickly.

5. Please describe your overall changes you observed taking place at the hospital since January 2014.

PROBES:

- Which, if any, of these changes do you feel are related to the new hospital rate-setting model?
 - What evidence do you have indicating that these changes relate to the new model?
6. Can you describe any specific new programs or processes your hospital implemented either as a result of the new model or at the same time as the new model?
7. What differences have you noticed in how other UMMS hospitals are implementing or changing under this new model?
8. What tools are you using to implement and manage the global budget within UM BWMC?
9. What, if any, tools do you feel you still need to implement and manage the global budget within UM BWMC?
- a. Have you looked for these tools and what would it cost?

Clinical Care

These next set of questions deal with clinical care.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

10. How, if at all, has your hospital, hospital system, and staff changed the way patient care is delivered since the new All-Payer Model was implemented?
11. What, if anything, do your clinical staff seem to be doing differently regarding patient care since the new model has been implemented?

Probes:

- These changes could be either tangible or non-tangible. For example:
 - i. Are there new clinical protocols?
 - ii. New initiatives or areas of emphasis?
 - iii. Do the clinical staff sense a new direction?

12. How does your hospital coordinate patient care? What has changed under the new model?

Probes:

- What, if any, mechanisms or programs are in place to help facilitate care coordination within the hospital and discharge planning?
- How effective are these mechanisms or programs at facilitating hospital care coordination?
- What has changed regarding care coordination since the implementation of the new model?

13. What mechanisms or policies, if any, have been implemented through the new model to facilitate intrahospital transitions?

Quality Improvement and Innovation

This next section focuses on quality improvements and innovations

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

14. What programs, if any, has your hospital implemented to improve care quality?

- Have you observed any changes in these programs since the implementation of the new model?

15. What impact have these quality-of-care initiatives had on patient outcomes? What evidence do you have that supports these impacts?

16. What strategies, if any, is your hospital implementing that might impact population health?

Health care workforce changes

This next set of questions focuses on provider adequacy and possible changes in the workforce that have occurred since the new model has been implemented.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

17. Please describe your observations regarding the quality and type of healthcare professionals in your hospital/hospital system.

- How ‘adequate’ is the healthcare workforce? Specifically describe the adequacy (number, training, access by patients) of nurses, primary care providers, and specialists?

18. What changes, if any, have you observed in the quality and type of healthcare professionals in your facility since January 2014?

PROBES:

- Have these changes helped or hindered your or your colleagues’ job performance?
- What, if any, impact has the new model implementation had on these changes?
 - i. Are the new changes a result of the new model? If so, what evidence do you have?

19. What, if any, changes have you observed in training programs in your facility since the new model was implemented?

20. Have you observed impacts on medical school, medical residency, fellowships or other training programs? What, if any, programs or initiatives have the state implemented to improve workforce training and/or adequacy under the All-Payer Model?

21. What improvements, if any, need to be made to ensure the adequacy of this workforce and their training throughout the state?

22. What impact, if any, has the new model had on health care workforce shortages (such as the nursing shortage)? How have workforce shortages been address?

23. What future impact, if any, do you envision the new model having on the health care workforce? On medical education?

24. How do you think the workforce experience of your hospital/hospital system compares to others in Maryland?

Health care costs and utilization

This next section of questions addresses changes in health care costs and utilization patterns, policies, and initiatives.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

25. What changes, if any, have you observed in the way your hospital spends resources since the new model was implemented?
- Please describe in as much detail as possible. To what do you attribute these changes?
26. What changes, if any, have you observed in patient utilization of hospital-based services since the new model was implemented?
- Please describe in as much detail as possible. To what do you attribute these changes in your hospital/hospital system?
27. What, if any, hospital policies have been implemented as part of the new model that might impact health care costs and utilization—both hospital based and non-hospital based?
- Are you aware of any unintended consequences have you observed from these policies?
28. What initiatives(s) (for example, accountable care organizations [ACOs], gainsharing, etc.) have you observed that your hospital or hospital system uses to align physician behavior with hospitals' global budgets?
29. Are you aware of other informal incentive strategies used to align physician behaviors with your hospitals' global budgets?

Hospital consolidation and market power

These next set of questions aim to better understand the strategic behavior and decisions around hospital consolidation and market power.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

30. Please describe your observations regarding your hospitals' strategic or market environment. How has the strategic environment changed for your facility since implementation of the new model?
31. What types of strategic behaviors were common prior to the new model's implementation, including mergers and acquisitions, investments in disease specific have hospitals engaged in?
32. What, if any, changes in services has your facility made since implementation of the new model?
33. What, if any, changes or shifting in your organization's overall market share have you observed?

Spillover effects

The next section includes questions about unintended consequences or spillover effects of the new model.

Probe: Ask these questions only as appropriate to individual/organizations expertise/experience/responsibility.

34. What, if any, spillover effects on other providers have arisen since the new model was implemented? For example, have changes within your facility had impacts on outpatient, post-acute care, primary care or any other health care sectors?
35. What, if any, factors within the state are driving any spillover effects?

Successes, challenges, lessons, the future

This final section attempts to assess the successes, challenges, and lessons learned. We also are interested in the future trajectory of the hospital progress in implementing the new model.

36. What, if any, implementation successes has your organization observed/accomplished since the new model was introduced last year?
37. What, if any, implementation challenges has your organization observed/accomplished since the new model was introduced last year?
38. What do you think might happen if Maryland transitioned from its all-payer payment model to an Inpatient Prospective Payment System/Outpatient Prospective Payment System model?
39. Are there any other questions or observations you would like to share with our evaluation team?

APPENDIX B:
FOCUS GROUP PROTOCOL

Maryland All-Payer Evaluation

Focus Group Guide for Hospital Staff

Welcome

Hello and thank you for agreeing to meet with us today.

My name is [], and I work for RTI International, a nonprofit research institute located in Research Triangle Park, North Carolina.

We are working on a project funded by the Centers for Medicare & Medicaid Services (CMS)—the federal agency that oversees the Medicare and Medicaid programs. We'd like to learn about the impact the new All-Payer model is having on how you practice health care in participation with hospitals. Our discussion will last no more than about 90 minutes.

Informed Consent

Everyone should have received and signed an informed consent form for today's group when you checked in (MODERATOR: CONFIRM ALL HAVE RECEIVED).

The consent form states that you have agreed to be part of today's discussion about the new Maryland All-Payer model. Your participation is completely voluntary. Your decision to participate (or not participate) in today's discussion will not in any way impact your participation with Medicare, Medicaid, or any other CMS program. You are free to decline to answer any of our questions. You can end your participation and leave the room at any time.

To make sure that we understand everything people say today, we are making an audio recording of this discussion and taking notes. We will only use this recording to double check our notes and clarify what we have heard today.

We will not share any of your comments with anyone in such a way that you could be identified. We will not list your name in the written notes, transcripts or reports, and all data that we collect will be kept private and secure.

Focus Group Procedures and Logistics

My role is to guide our discussion and encourage everyone to share their experiences on the topics we will discuss. Please keep in mind that there are no right or wrong views or answers.

Does anyone have any questions before we get started?

Introductions

To begin, let's go around and introduce ourselves.

- 1. Please tell us your first name (only), how long you have been working at this hospital, and your role at this facility.**

PROBE for additional detail as appropriate: You can include details such as whether you are a salaried or contract employee; the multiple roles at the hospital you may fulfill i.e., teaching, conducting clinical research, or seeing patients; and the departments within the hospital you are affiliated with.

Implementation of the New Model

- 2. Polling activity: Maryland adopted a new All-Payer hospital payment system in 2014 and all hospitals implemented a variant of global budgeting either through a Total Patient Revenue model or a Global Budget Revenue model. Can you tell us what you've heard about this change?**

PROBES:

- Look specifically for knowledge of global budget.
- For those that indicated they were aware of the changes ask:
 - i. how they knew?
 - ii. when they found out?
- For those that indicated that they were not aware of the changes ask:
 - i. What changes, if any, have you observed taking place in the hospital in the past year?
 - ii. In your opinion, are any of these changes related to the new payment model? Why or why not?

- 3. How, if at all, have these changes affected how this hospital works on an operational basis?**

PROBES: Ask about new or changed roles and functions; Changes in expected reporting; Changes in hospital structure; Changes in communication with other hospital staff or your manager; and Changes in your or your practice's communication with patients.

- 4. Have you noticed anything different about the way this hospital/hospital system spends resources over the past year? If so, what is different?**

Clinical Care, Care Coordination and Care Transitions

This next section focuses more on clinical care, particularly care coordination and care transitions.

5. In the past year, what (if anything) has changed in how clinical care is delivered—either by you and your practice, or at the hospital level?

PROBES:

- Has anything changed? See if there is a general consensus that there has been any change that these providers have noticed.
- These could be either formal policies and protocol changes or informal ones. For example:
 - i. Are there new clinical protocols?
 - ii. New initiatives or areas of emphasis?
 - iii. Do the clinical staff sense a new direction?

6. If you have noticed changes in clinical care delivery, do any of these changes relate to coordination or management of patient care—either within the hospital or with other facilities outside of the hospital system?

PROBE: Look for specifics. If providers cannot offer specifics, consider probing from the following list.

- Using electronic health records, clinical information systems
- Employing care coordinators
- Setting up an internal specialty referral tracking system

7. Do you attribute any of these changes in clinical care (including care coordination) to? Why? Or why not?

PROBE: What makes you think they are related to the new model?

Quality of Care

8. Tell us how this hospital monitors and improves quality of care.

9. Have you noticed any changes in quality monitoring and improvement systems in the last year? If so, can you describe them? Do you think these recent changes are the result of the new hospital budget?

PROBE: Look for specifics to understand how staff identified these changes, any impacts these changes assert, and why they think they might be associated with the new model or possibly other health care reform initiatives.

Health Care Costs and Utilization

- 10. Has this hospital implemented any new initiatives to control costs and utilization in the last year? Give us as many details as you can.**

PROBE: Look for mention of specific strategies like ACOs, gainsharing, pay for performance etc. If none of these strategies are named, perhaps probe to see if they ring a bell with any of the participants.

- 11. If you see changes, do you think these are the result of the new All-Payer payment model? Why or why not?**

Transformation of the Maryland Health Care Workforce

- 12. Have you noticed any changes in staffing at this hospital in the last year? Changes like the number of staff (clinical or support), or the training or type of staff who work with you to provide care? Can you describe these changes for us?**

PROBE: Based on what they volunteer, probe for things like staffing cutbacks that impact clinical care, changes in the level of education or training, etc. Get them to give as many details as possible.

- 13. If you have noticed staffing changes, do you think they are related to the new model? Why or why not?**

PROBE: Get specifics whenever possible.

Conclusion

We've been discussing some topics related to the new Maryland hospital All-Payer model. Now we'd like to get any general impressions you have about these policy changes.

- 14. What do you think of the new model? Is it a good idea? Is it a bad idea? How has it affected your practice?**

These are all of my questions. Is there anything else you would like to share about the topics that we discussed?

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APPENDIX C: MEASURE SPECIFICATIONS

We present estimates from claims and other secondary data for eight domains of performance: (1) hospital revenue and rate adherence²⁹; (2) market dynamics; (3) service mix; (4) service utilization and expenditures; (5) quality of care; (6) spillover effects; (7) transformation of the Maryland health care workforce; and (8) comparison of payment rates in Maryland hospitals with payment rates for hospitals operating under the Inpatient Prospective Payment System (IPPS). In this first annual report, we present claims-based measures for the Medicare population only. Results for commercial and Medicaid populations will be provided in future annual reports. Specifications for measures in all of these domains except hospital global budget and rate adherence and the IPPS rate comparison are provided below.

Market Dynamics

To evaluate the change in market dynamics for Maryland hospitals, we calculated the following measures.

- **Total hospital beds:** We used the HSCRC's revenue and volumes reports to calculate annual acute-care bed counts at the state level. We created an annual count of beds at each acute-care hospital by averaging monthly counts of beds at each hospital in each calendar year. We then summed hospital-level bed counts in each year to obtain a count of total hospital beds in Maryland by year.
- **Hospital beds by service line:** We used the HSCRC's revenue and volumes data to report on the number of hospital beds by year in Maryland for seven service lines:
 - Medical/surgical (acute).
 - Pediatrics (acute).
 - Psychiatric (acute).
 - Obstetrics (acute).
 - Newborn nursery.
 - Medical/surgical intensive care unit (ICU).
 - Neonatal ICU.

We created annual, state-level counts of hospital beds by service line in two steps. First, for each service line, we averaged each hospital's monthly bed count to create an annual, hospital-level bed count. Next, we summed annual, hospital-level bed counts by service line to produce state-level bed counts by service line and year.

²⁹ Future reports will also include analyses of hospital revenues, costs, and volume.

- **Total volumes by service line:** We calculated total volumes by service line in Maryland in each year using the HSCRC's revenue and volumes reports. First, we summed monthly volumes by service line at the hospital level to create annual volumes by service line for each hospital in Maryland. Second, we summed annual, hospital-level volumes by service line to create state-level estimates of volumes by service line and year.

Service Mix

To evaluate the impact of the All-Payer Model on service mix, we report the following measures for Medicare beneficiaries. For all measures, inpatient admissions were identified as defined below in the “probability of any inpatient use” description.

- **DRG weight per admission:** This represents the diagnosis-related group relative weight of the admission.
- **Probability that an admission is classified as major or extreme using the 3M All-Patient Refined (APR)-DRG Grouper:** The denominator included all admissions to Maryland or comparison group hospitals by residents of the respective area. The numerator included any admission classified as major/extreme by the grouper.
- **Probability that an admission includes an ICU stay:** The denominator was all acute admissions as defined in the all-cause hospitalizations description below. The numerator identified admissions for which REV_CTR = 200, 201, 202, 203, 204, 206, 207, 208, 209, 210, 211, 212, 213, 214, or 219.
- **Case-mix-adjusted charge per discharge:** This represents the sum of net facility payments to a hospital for covered services provided during an inpatient admission, divided by the DRG relative weight for the institution of the admission.
- **Probability of robotic hysterectomy among hysterectomies:** This represents the probability of having had a robotic hysterectomy among individuals who had a hysterectomy. The denominator consisted of all female inpatient admissions that included a hysterectomy (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 68.31, 68.39, 68.41, 68.49, 68.51, 68.59, 68.9). The numerator included any denominator admissions that included a robotic-assisted hysterectomy (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 17.41, 17.42, 17.43, 17.44, 17.49).
- **Probability of robotic prostatectomy among prostatectomies:** This represents the probability of having had a robotic prostatectomy among individuals who had a prostatectomy. The denominator consisted of all male inpatient admissions that included a prostatectomy (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 60.3, 60.4, 60.5, 60.62, 60.69). The numerator included any denominator admissions that included a robotic-assisted prostatectomy (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 17.41, 17.42, 17.43, 17.44, 17.49).

- **Probability of endovascular surgery among heart valve replacements:** This represents the probability of having had endovascular surgery among individuals who had heart valve replacements. The denominator consisted of all inpatient admissions that included heart valve replacements (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 35.05, 35.06, 35.07, 35.08, 35.09, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28). The numerator included any denominator admissions that included endovascular surgery (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 35.05, 35.07, 35.09).
- **Probability of endovascular intracranial surgery among intracranial vascular surgeries:** This represents the probability of having had endovascular intracranial surgery among individuals who had intracranial vascular surgeries. The denominator consists of all inpatient admissions that included intracranial vascular surgeries (DRG = 020, 021, or 022). The numerator includes any denominator admissions that included endovascular intracranial surgery (ICD_PRCDR_CD1 through ICD_PRCDR_CD25 variables = 39.72, 39.74, 39.75, 39.76).
- **Proportion of hospital revenue from inpatient admissions:** This represents the proportion of an individual hospital's revenue that is derived from inpatient admissions. The denominator was the hospital revenue derived from inpatient, outpatient emergency department (ED), and other hospital outpatient payments. Inpatient, outpatient ED, and other hospital outpatient payments were classified as described below. The proportion of inpatient payments for a hospital was calculated as the sum of all inpatient payments for which the hospital was listed as the provider, divided by the total (inpatient + outpatient ED + other hospital outpatient) payments for which the hospital was listed as the provider.
- **Proportion of hospital revenue from ED visits:** This represents the proportion of an individual hospital's revenue that is derived from outpatient ED. The denominator was the hospital revenue derived from inpatient, outpatient ED, and other hospital outpatient payments. Inpatient, outpatient ED, and other hospital outpatient payments were classified as described below. The proportion of outpatient ED payments for a hospital was calculated as the sum of all outpatient ED payments for which the hospital was listed as the provider, divided by the total (inpatient + outpatient ED + other hospital outpatient) payments for which the hospital was listed as the provider.
- **Surgical-to-medical admission ratio:** This represents the proportion of total admissions that were surgical and medical. Surgical and medical admissions were identified on the basis of the type of DRG associated with the admission.

Service Utilization and Expenditures

Utilization

Utilization measures are reported as percentages. For each measure, the numerator was an indicator of having had at least one event (inpatient admission or ED visit that did not lead to a hospitalization). Events were included in a period's total if discharge or service date on the claim

was during the period. The denominator was the number of eligible beneficiaries in the state enrolled during the period.

- **Probability of having any inpatient use:** This is an indicator of whether the beneficiary had at least one admission to an acute-care hospital reported in the inpatient file for the period, divided by the number of beneficiaries in the same period. We identified all hospital admissions in which the last four digits of the provider values were 0001–0879 (acute inpatient) or 1300–1399 (critical access hospitals [CAHs]). Some records in the inpatient claims files may appear to be multiple admissions but are in fact transfers between facilities; these records are counted as a single admission. To combine transfers into one acute admission, we identified claims that had no more than 1 elapsed day between discharge date of the index claim and 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.
- **Probability of having any ED visits that did not lead to a hospitalization (outpatient ED) use:** This is an indicator of whether the beneficiary had at least one visit to the ED that did not result in an inpatient hospital admission, divided by the number of beneficiaries in the same period. ED visits, including observation stays, are identified in the outpatient services file as visits with a revenue center line item equal to 045X, 0981 (ED care), 0760 (and HCPCS_CD = G0378 and REV_UNIT ≥ 8), or 0762 (treatment or observation room, thus counting observation stays in the overall count). If the procedure code on every line item of the ED claim equals 70000–79999 or 80000–89999, or is equal to G0106, G0120, G0122, G0130, G0202, G0204, G0206, G0219, G0235, G0252, G0255, G0288, G0389, S8035, S8037, S8040, S8042, S8080, S8085, S8092, or S9024, and no line items have a revenue center code equal to 0760 or 0762, that claim was excluded (thus excluding claims for which only radiological or pathology/laboratory services were provided unless they were observation stays).
- **Length of stay:** This represents the number of days elapsed during an acute inpatient admission (as defined above). The length of stay = (discharge date – admission date) + 1. Values were assigned to a period based on discharge date.

Expenditures

Weighted average expenditures were calculated on a PBPM basis. For each individual, PBPM payments were estimated as one-third of his or her quarterly payments. Expenditures were defined as payments made by Medicare; beneficiary cost-sharing was reported separately. The beneficiary cost sharing liability measures comprised the sum of coinsurance and deductible payments for all categories. All individuals enrolled in the period were included in calculating the averages, so that the figures also reflect the presence of individuals with zero medical costs. The payments were not risk adjusted³⁰ or price standardized across geographic areas. Claims

³⁰ Although the expenditures were not formally risk adjusted, the comparison groups were weighted by the propensity score (see *Appendix E*), which includes some risk adjustment measures.

were included in a period's total if discharge or thru date on the claim was during the period. We present the following categories of expenditures:

- **Total:** This represents overall net payment amounts from all Part A and Part B inpatient and outpatient (facility and professional) claims. This excludes Part D pharmacy component expenditures.
- **Inpatient facility:** This represents the sum of net facility payments to a hospital for covered services provided during all inpatient admissions. Inpatient admissions were assigned to a period on the basis of the discharge date. Inpatient admissions were defined as above.
- **Outpatient ED:** This is the overall payment amount for ED visits that did not lead to a hospitalization, including observation stays.
- **Other hospital outpatient department:** This includes the overall payment amount for hospital outpatient department services, excluding ED payments.
- **Professional:** This is the overall net payment amounts from all inpatient and outpatient professional claims.
- **Other:** This represents the sum of net payments for noninpatient and other services, including those made for outpatient, home health, hospice, and SNF 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:

- **Average expenditures per hospital admission:** This represents the sum of net facility payments to a hospital for covered services provided during an inpatient admission. Inpatient admissions were defined as above and were assigned to a period on the basis of the discharge date.
- **Average expenditures per outpatient ED visit:** This represents the sum of net facility payments to a hospital for covered services provided during a visit to the ED that did not result in an inpatient hospitalization. ED visits were defined as above and were assigned to a period on the basis of the thru date.

We present the following expenditure categories for beneficiary cost sharing:

- **Total:** This represents the sum of coinsurance and deductible payments from institutional (inpatient, outpatient, short-term nursing facility) and noninstitutional (physician, durable medical equipment) claims. Home health and hospice claims are not applicable and were excluded.

- **Inpatient:** This represents the sum of coinsurance and deductible payments from inpatient claims as defined above.
- **Outpatient ED:** This represents the sum of coinsurance and deductible payments for covered services provided during a visit to the ED that did not result in an inpatient hospitalization as defined above.
- **Other hospital outpatient department:** This represents the sum of coinsurance and deductible payments for covered services provided during a visit to the hospital outpatient department, excluding ED visits.
- **Professional:** This represents the sum of coinsurance and deductible payments from physician claims.

Quality of Care

To evaluate the impact on quality of care, we report the following quality measure for Medicare beneficiaries.

- **Probability of having a follow-up visit within 14 days of hospital discharge:** Discharges were eligible for the denominator if they were billed by short-term acute-care (STAC) facilities (under the IPPS), for Maryland, hospitals that would have operated under IPPS in the absence of the state's exemption from IPPS. IPPS hospitals can be identified through the hospital ID known as the CMS Certification Number (CCN). IPPS hospitals have CCNs whose last four bytes are in the range 0001 to 0879 (see Table C-1). In the case of Maryland hospitals, those whose CCNs would have classified them as IPPS are considered STAC hospitals. All of the Maryland hospitals in the All-Payer Model and all of the comparison group hospitals meet the IPPS facility criterion. For a discharge to be eligible, the beneficiary also had to be enrolled in Medicare fee-for-service (FFS) at the time of admission.

A given discharge was excluded if there was a subsequent admission within 14 days, if the beneficiary was originally admitted to a PPS-exempt cancer hospital, did not have 30 days of postdischarge enrollment in Part A or Part B, was discharged against medical advice, was admitted for rehabilitation, was admitted for medical treatment of cancer, died during the hospitalization, was transferred to another STAC, or was readmitted to a STAC within 14 days.

An eligible discharge was flagged as having a follow-up visit if one of the following *Current Procedural Terminology* (CPT) codes was listed on the outpatient or Part B physician/supplier 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, 99441, 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)

- **Probability of having an ED visit within 30 days of hospital discharge:** Discharges were eligible for the denominator if they were billed by IPPS STAC facilities and if the beneficiary was enrolled in Medicare FFS at the time of admission.

A given discharge was excluded if the beneficiary was originally admitted to a PPS-exempt cancer hospital, did not have 30 days of postdischarge enrollment in Part A or Part B, was discharged against medical advice, was admitted for rehabilitation, was admitted for medical treatment of cancer, was admitted for a primary psychiatric diagnosis, died during the hospitalization, was transferred to another STAC, or was readmitted to a STAC within 30 days.

ED visits were identified in hospital outpatient claims as described above in the description for “Probability of having any ED visits that did not lead to a hospitalization.”

- **Probability of having a readmission within 30 days of hospital discharge:** This is the total number of unplanned hospital readmissions within 30 days of discharge, divided by the total number of index admissions in the period. An index hospital discharge was identified as an inpatient stay with a discharge date within the given measurement period (12 months) minus 30 days from the end of the period. An index admission was kept if the beneficiary was enrolled in Medicare FFS at admission, was age 65 or older at admission, did not die during the hospitalization, and was not transferred to another STAC hospital. We excluded index admissions to PPS-exempt cancer hospitals and those for which the beneficiary did not have 30 days of post-discharge enrollment in Medicare Part A, was discharged against medical advice, was admitted for a primary psychiatric diagnosis, was admitted for rehabilitation, or was admitted for medical treatment of cancer. Planned admissions were not counted as readmissions. These included bone marrow, kidney, or other organ transplants; maintenance chemotherapy or rehabilitation; and a list of potentially planned procedures if they were not acute or complications of care.

Probability of having an admission for an ambulatory care sensitive condition (Agency for Healthcare Research and Quality, 2013): The denominator included the Medicare population ages 18 and older who were residents of Maryland or the comparison group. The numerator was discharges, for patients ages 18 and older, that met the inclusion and exclusion rules for the numerator in any of the following prevention quality indicators (PQIs).

The **Overall Composite (PQI #90)**, includes 12 of the 14 individual PQIs:

- PQI #01 Diabetes Short-Term Complications Admission Rate
- PQI #11 Bacterial Pneumonia Admission Rate

- PQI #03 Diabetes Long-Term Complications Admission Rate
- PQI #12 Urinary Tract Infection Admission Rate
- PQI #05 Chronic Obstructive Pulmonary Disease or Asthma in Older Adults Admission Rate
- PQI #13 Angina Without Procedure Admission Rate
- PQI #07 Hypertension Admission Rate
- PQI #14 Uncontrolled Diabetes Admission Rate
- PQI #08 Heart Failure Admission Rate
- PQI #15 Asthma in Younger Adults Admission Rate
- PQI #10 Dehydration Admission Rate
- PQI #16 Rate of Lower-Extremity Amputation Among Patients With Diabetes

Spillover Effects

To evaluate the impact of the All-Payer Model on spillover effects, we report the following measures for Medicare beneficiaries.

- **Avoidance of complex inpatient cases:** Medicare inpatient claims from IPPS STAC hospitals were used as units of observation in the analyses.

Several outcome variables for the STAC inpatient claims were created for these analyses, as follows.

- **Admission through the ED:** An admission through the ED was defined as having a revenue center code on the claim equal to 0450–0459 or 0981.
- **IPPS transfer:** Each claim for a STAC admission was examined to ascertain whether it was followed by a claim at another STAC hospital. IPPS transfer rules (even for Maryland STAC hospitals) were applied 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 STAC claim or only one day after. In addition, the initial STAC must have been 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 (Medicare Payment Advisory Commission, 2014).
- **IPPS transfer classified as major or extreme severity:** Case severity was determined using 3M’s APR-DRG Grouper.

- **PAC transfer:** Each claim for a STAC admission was examined to ascertain whether it was followed by a claim at a post-acute care (PAC) provider. The following are considered PAC providers: long-term care hospital, rehabilitation hospital or unit, psychiatric hospital or unit, skilled nursing facility or unit, and home health agency. PAC transfer rules (even Maryland STAC hospitals) were applied to determine whether the following claim qualified as a PAC transfer. The admission date on the PAC claim must have been within 3 days of the discharge date on the initial STAC claim. In addition, the initial STAC must have been 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 is that the DRG had to have been classified as a “PAC DRG” (Medicare Payment Advisory Commission, 2014).
- **PAC transfer classified as major or extreme severity:** Case severity was determined using 3M’s APR-DRG Grouper.
- **Urgent care visits:** Claims in the Chronic Condition Warehouse (CCW) carrier file that had Taxpayer Identification Numbers (TINs) belonging to Maryland urgent care centers were used. The TINs were made available by the HSCRC. The claims were subset to those that were allowed for payment and to those for services provided to Maryland’s Medicare FFS beneficiaries. All visits that met these requirements were used to count the number of urgent care visits.
- **Sites of care visits:** Claims from the CCW carrier file were used to count primary care visits at physician practices, urgent care centers, and hospital outpatient departments (claim type = 71 or 72). Claims from the CCW “outpatient” file were used to count primary care visits at FQHCs (bill type = 77), rural health clinics (RHCs; bill type = 71), and Method II critical access (CAH2) hospitals (bill type = 85 plus revenue center code = 096x, 097x, or 098x). The claims were subset to those that were allowed for payment and to those for services provided to Medicare FFS beneficiaries in Maryland and the comparison group.

The analytic places (sites) of care categories were (1) physician practices, urgent care centers, and CAH2; (2) hospital outpatient departments; and (3) FQHCs and RHCs.

- The carrier place of service codes used for the first category were 11 (physician office), 17 (walk-in clinic), 20 (urgent care), or 49 (independent clinic).
 - For the visit to have been counted as a primary care visit, the procedure codes had to have been any one of the following: CPT codes 99201–99205 or 99211–99215 or HCPCS Level II codes G0402, G0438, or G0439.
 - In addition to the bill type and revenue center code requirements listed above for CAHs, the procedure code had to have been one of the codes in the preceding bullet.

- The carrier place of service code used for the second category was 22 (hospital outpatient department.) For the visit to have been counted as a primary care visit, the procedure codes had to have been any one of the following: CPT codes 99201–99205 or 99211–99215 or Healthcare Common Procedure Coding System (HCPCS) Level II codes G0402, G0438, or G0439.
- The code requirements for the third category were as follows:
 - FQHCs. For the visit to have been counted as a primary care visit, the procedure codes had to have been any one of the following: CPT codes 99201–99205 or 99211–99215 or HCPCS Level II codes G0402, G0438, or G0439.
 - RHCs. For the visit to have been counted as a primary care visit, the procedure codes had to have been any one of the following: revenue center code 0521 or HCPCS Level II codes G0402, G0438, or G0439.
- **Border Crossing:** Medicare inpatient claims from STAC hospitals (IPPS and CAHs) were used. 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, hospitals outside Maryland were classified as being located in either border states or all other states. The border states were Delaware (hosp_state_cd = 08), the District of Columbia (09), Pennsylvania (39), Virginia (49), and West Virginia (51).

Table C-1
CMS facility classification coding for the last four bytes of the CMS certification numbers

0001–0879	Short-term (General and Specialty) Hospitals
0880–0899	Reserved for hospitals participating in ORD demonstration project
0900–0999	Multiple Hospital Component in a Medical Complex (Numbers Retired)
1000–1199	Federally Qualified Health Centers
1200–1224	Alcohol/Drug Hospitals (Numbers Retired)
1225–1299	Medical Assistance Facilities
1300–1399	Critical Access Hospitals
1400–1499	Continuation of Community Mental Health Centers (4900–4999 series)
1500–1799	Hospices
1800–1989	Federally Qualified Health Centers
1990–1999	Religious Non-medical Health Care Institutions (formerly Christian Science Sanatoria (Hospital Services))
2000–2299	Long-Term Hospitals (Excluded from PPS)
2300–2499	Hospital Based Renal Dialysis Facilities
2500–2899	Independent Renal Dialysis Facilities
2900–2999	Independent Special Purpose Renal Dialysis Facility
3000–3024	Formerly Tuberculosis Hospitals (Numbers Retired)
3025–3099	Rehabilitation Hospitals (Excluded from PPS)
3100–3199	Home Health Agencies
3200–3299	Continuation of Comprehensive Outpatient Rehabilitation Facilities (4800–4899) Series
3300–3399	Children’s Hospitals (Excluded from PPS)
3400–3499	Continuation of Rural Health Clinics (Provider-based) (3975–3999) Series
3500–3699	Hospital Based Satellite Renal Dialysis Facilities
3700–3799	Hospital Based Special Purpose Renal Dialysis Facility
3800–3974	Rural Health Clinics (Free-Standing)
3975–3999	Rural Health Clinics (Provider-Based)
4000–4499	Psychiatric Hospitals (Excluded from PPS)
4500–4599	Comprehensive Outpatient Rehabilitation Facilities
4600–4799	Community Mental Health Centers
4800–4899	Continuation of Comprehensive Outpatient Rehabilitation Facilities (4500–4599 Series)
4900–4999	Continuation of Community Mental Health Centers (4600–4799) Series
5000–6499	Skilled Nursing Facilities
6500–6989	Outpatient Physical Therapy Services
6990–6999	Numbers Reserved (formerly Christian Science Sanatoria (Skilled Nursing Services))
7000–8499	Continuation of Home Health Agencies (3100–3199) Series
8500–8899	Continuation of Rural Health Clinics (Provider-Based) (3400–3499) Series
8900–8999	Continuation of Rural Health Clinics (Free-Standing) (3800–3974) Series
9000–9799	Continuation of Home Health Agencies (8000–8499) Series
9800–9899	Transplant Centers
9900–9999	Reserved for Future Use

NOTE: ORD = Office of Research and Demonstrations; PPS = prospective payment system.

SOURCE: Centers for Medicare & Medicaid Services. (n.d.) The certification process. In *Medicare state operations manual* (Chapter 2). Retrieved from <https://www.cms.gov/manuals/downloads/som107c02.pdf>

Transformation of the Maryland Health Care Workforce

To assess the baseline profile of Maryland's physician workforce, we classified providers as practicing in primary care or a specialty according to the categories shown in Table C-2.

Table C-2
Primary and specialty provider types

Primary care providers	Specialty providers
Family practice	Addiction medicine
General pediatrics	Allergy/immunology
General practice	Anesthesiology
Geriatric medicine	Cardiac surgery
Internal medicine	Cardiology
Multispecialty clinic or group practice	Colorectal surgery
Nurse practitioner	Critical care (intensivists)
Obstetrics/gynecology	Dermatology
Physician assistant	Diagnostic radiology
Preventive medicine	Emergency medicine
	Endocrinology
	Gastroenterology
	General surgery
	Geriatric psychiatry
	Hand surgery
	Hematology/oncology
	Infectious disease
	Maxillofacial surgery
	Medical oncology
	Nephrology
	Neurology
	Neuropsychiatry
	Neurosurgery
	Nuclear medicine
	Ophthalmology
	Oral surgery (dentists only)
	Orthopedic surgery
	Osteopathic
	Otolaryngology
	Pain management
	Palliative medicine
	Pathology
	Pediatric subspecialists
	Peripheral vascular disease
	Physical medicine and rehabilitation
	Plastic and reconstructive surgery
	Psychiatry
	Pulmonary disease
	Radiology
	Rheumatology
	Sleep medicine
	Sports medicine
	Surgical oncology
	Thoracic surgery
	Urology
	Vascular surgery

APPENDIX D: DATA SOURCES USED FOR SECONDARY ANALYSIS

Data source	Data provider	Unit of analysis			Data period used	Contents/variables of interest
		Facility	Patient	State		
Medicare Part A and Part B fee-for-service claims and enrollment in the Chronic Conditions Warehouse data enclave	CMS	X	X		January 2011–March 2015	Patient-level inpatient and outpatient claims and enrollment data
Maryland revenue and volumes report	HSCRC	X			January 1, 2014–July 31, 2016	Hospital revenue, charge, and volume data
Inpatient Prospective Payment System Impact file	CMS	X			2013	Hospital characteristics
Health care provider licensure data	Maryland Board of Physicians			X	2013	Age, gender, specialty (physician), and years of practice (nurses)
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
Certificate of Need data	MHCC	X			January 1, 2011–July 31, 2015	Hospital beds, hospital market action information
Annual Report on Selected Maryland Acute Care and Special Hospital Services	MHCC	X			FY 2015	Hospital system affiliation, hospital beds, hospital services
Wage and salary survey results	HSCRC	X			2015	Wage/salary and benefit data for 75 categories of hospital workers
Area Health Resource File (AHRF)	Health Resources and Services Administration			X	AHRF is produced annually, but the data 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

CMS = Centers for Medicare & Medicaid Services; HSCRC = Maryland Health Services Cost Review Commission; MHCC = Maryland Health Care Commission.

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APPENDIX E: COMPARISON HOSPITAL COVARIATE BALANCE AND PROPENSITY SCORE METHODOLOGY

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

Continuous:

$$d = \frac{(\bar{x}_{treatment} - \bar{x}_{control})}{\sqrt{\frac{s_{treatment}^2 + s_{control}^2}{2}}},$$

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

Dichotomous:

$$d = \frac{(\hat{p}_{treatment} - \hat{p}_{control})}{\sqrt{\frac{\hat{p}_{treatment}(1 - \hat{p}_{treatment}) + \hat{p}_{control}(1 - \hat{p}_{control})}{2}}},$$

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

Genetic Matching

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.

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 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, nonteaching, 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 postmatching balance was generally substantially improved from prematching 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 E-1.

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

Option	Mean std. diff	Positives	Negatives
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

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.

Comparison Hospital Covariate Balance

Table E-2 shows the standardized differences for covariates for Maryland hospitals compared with those for the final matched comparison hospitals.

Table E-2
Covariate balance for Maryland and comparison hospitals before and after genetic matching

Covariate	Unmatched			Matched		
	MD	CG	St. Diff	MD	CG	St. Diff
Hospital beds	245.78	211.60	0.19	245.78	254.17	0.05
Hospital transfer-adjusted case mix	1.46	1.49	0.14	1.46	1.53	0.25
Hospital DSH percentage	0.26	0.29	0.18	0.26	0.25	0.03
Hospital resident-to-bed ratio	0.07	0.08	0.07	0.07	0.08	0.08
Average HCC of beneficiaries (C)	1.04	1.00	0.37	1.04	1.02	0.22
Total standardized risk adjusted costs per bene (C)	9,480.10	9,258.90	0.58	9,480.10	9,625.00	0.21
Percent change in inpatient covered stays per 1,000 benes 2008–2013 (C)	–0.22	–0.16	1.18	–0.22	–0.21	0.08
Percentage of hospital discharges billed to Medicare	0.44	0.41	0.38	0.44	0.46	0.11
Hospital operating capacity (census/beds)	0.68	0.50	1.52	0.68	0.64	0.25
Medicare Advantage penetration (C)	11.12	29.22	3.57	11.12	12.45	0.12
Median household income (C)	65,769	51,923	0.64	65,769	63,152	0.15
Total hospital beds to total hospital beds in county	0.46	0.51	0.13	0.46	0.47	0.04
		Mean	0.75		Mean	0.13

NOTES: C = county-level covariate; CG = non-Maryland hospitals; DSH = disproportionate share hospital; HCC = hierarchical condition category; MD = Maryland hospitals; St. Diff. = absolute standardized difference

The covariate balance for Maryland and comparison hospitals can also be examined visually with variable density plots before and after matching. The following set of density plots, Figures E-1 through E-12, visually depict improved overlap between Maryland hospitals and the selected comparison group hospitals.

Figure E-1
Hospital bed balance between Maryland and comparison group hospitals before and after matching

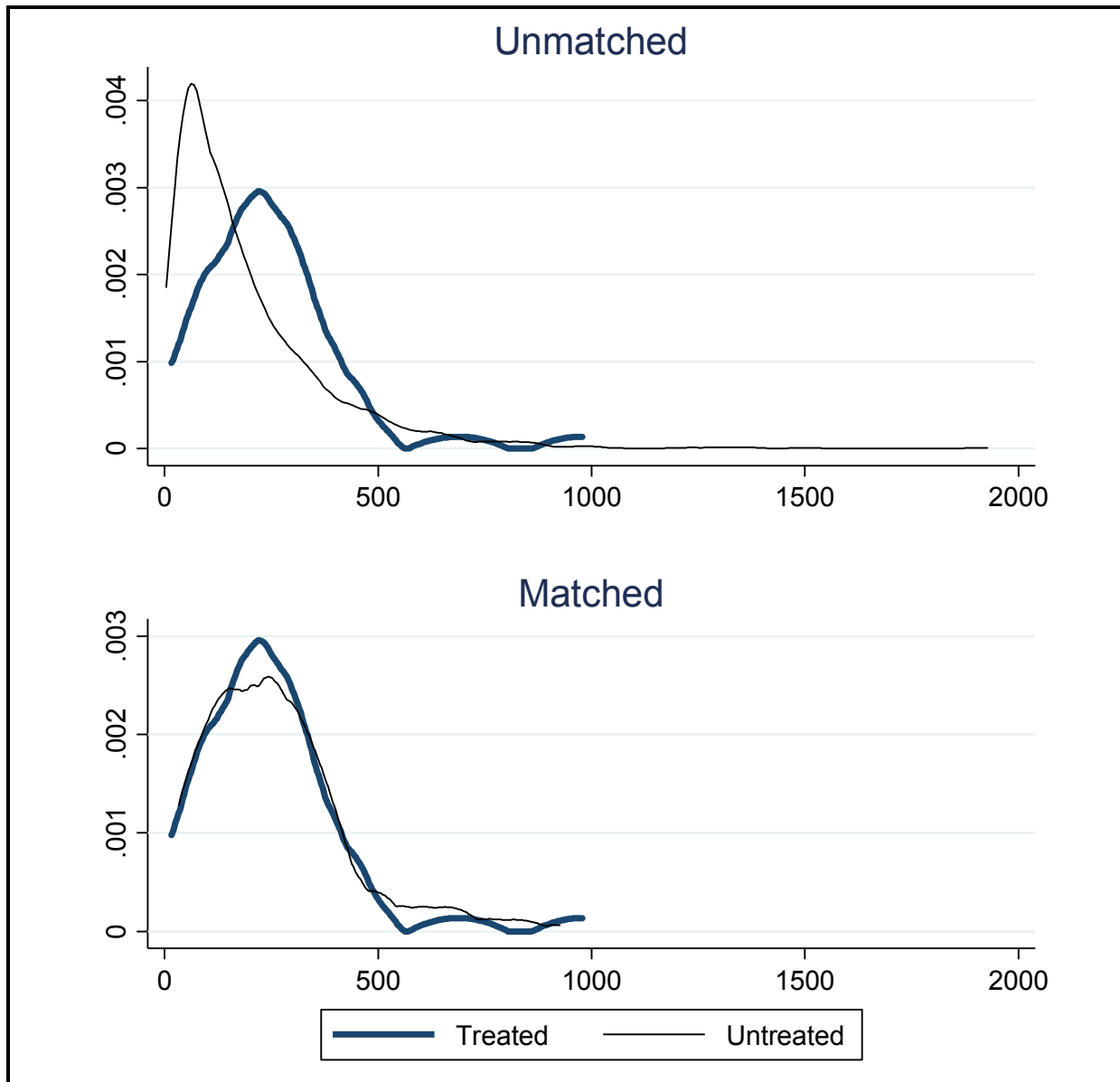


Figure E-2.
Transfer-adjusted case-mix severity for Maryland and comparison group hospitals before and after matching

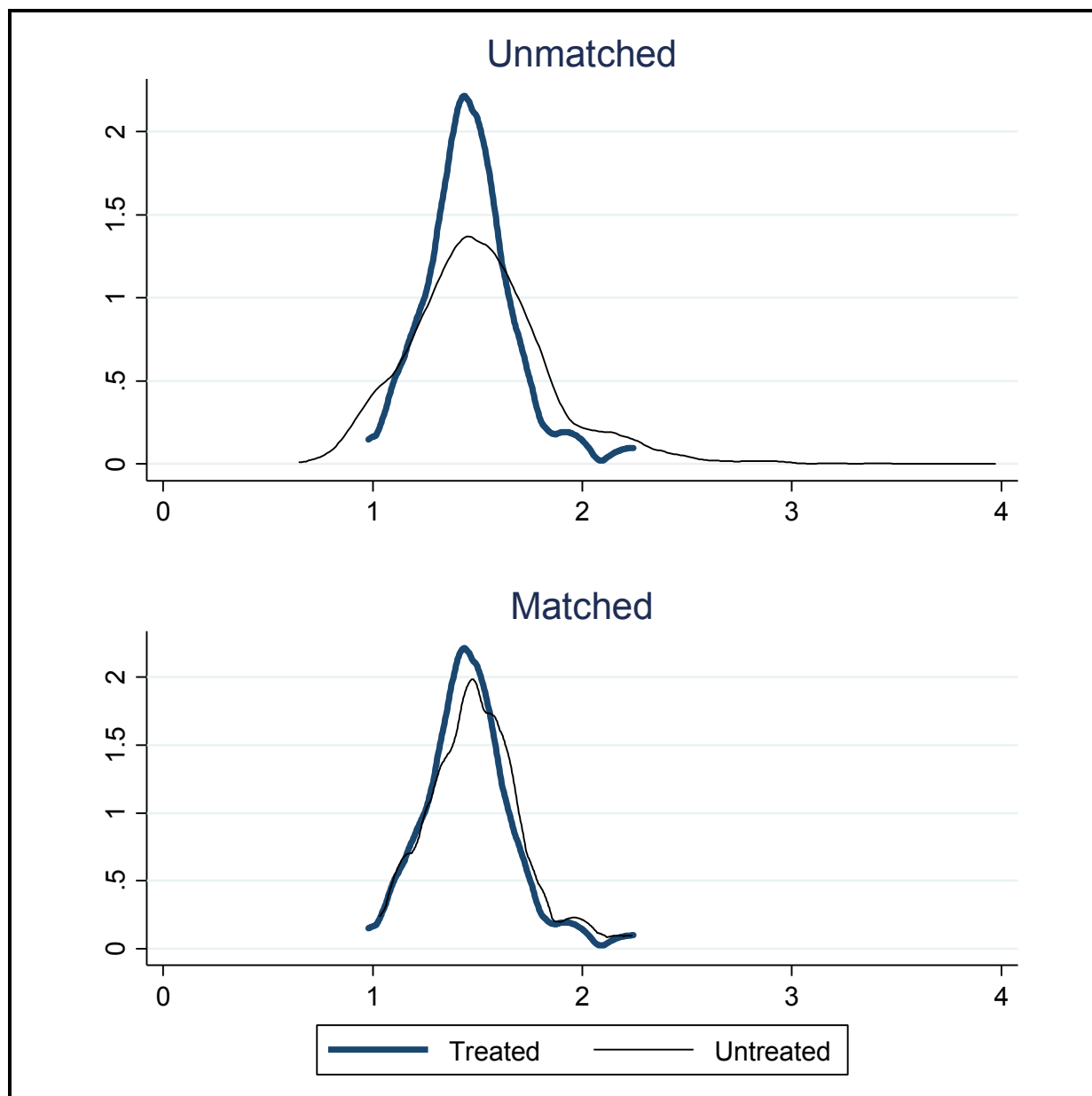


Figure E-3.
Disproportionate share percentage among Maryland and comparison group hospitals
before and after matching

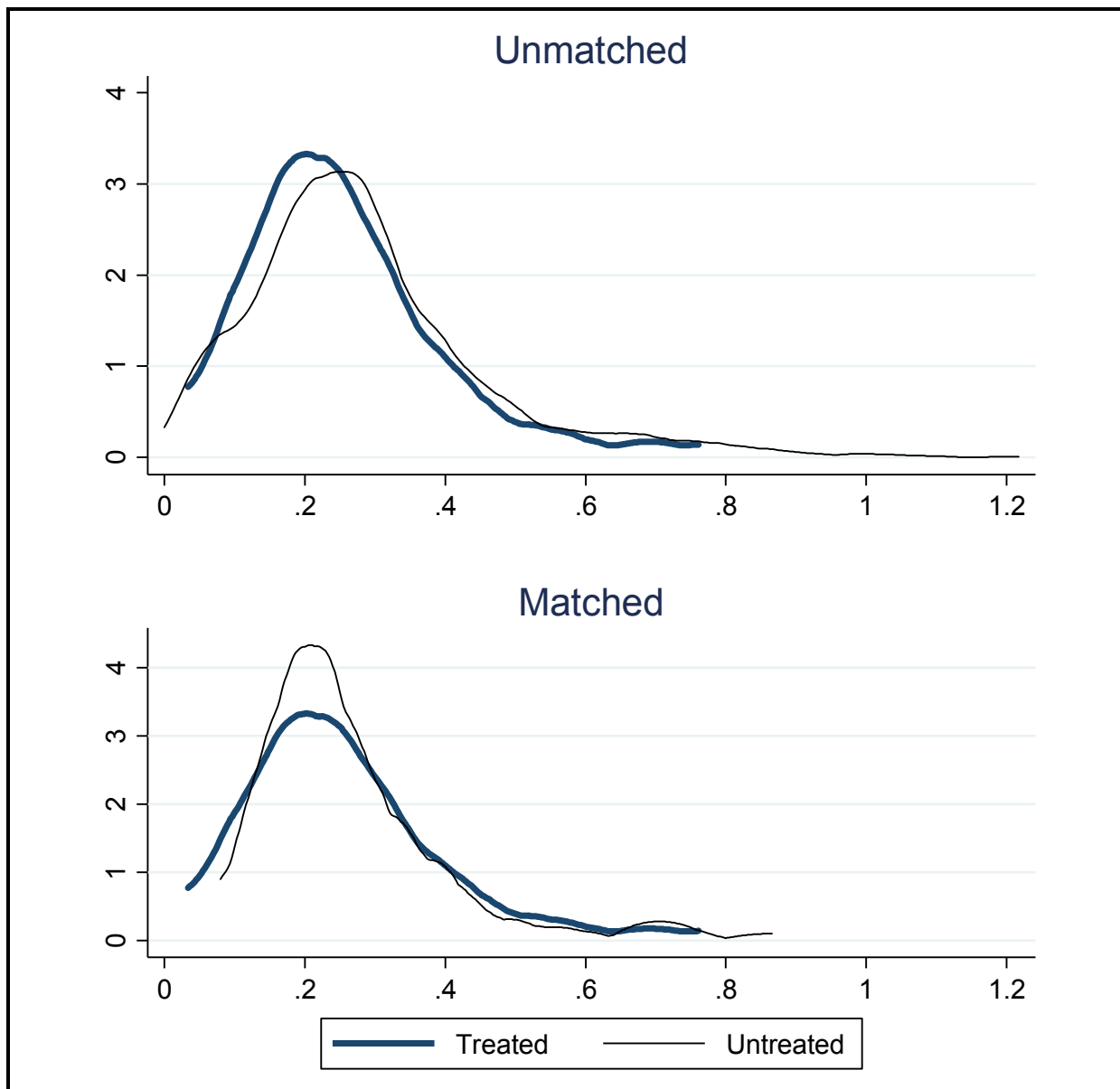


Figure E-4.
Resident-to-bed ratio balance between Maryland and comparison group hospitals before and after matching

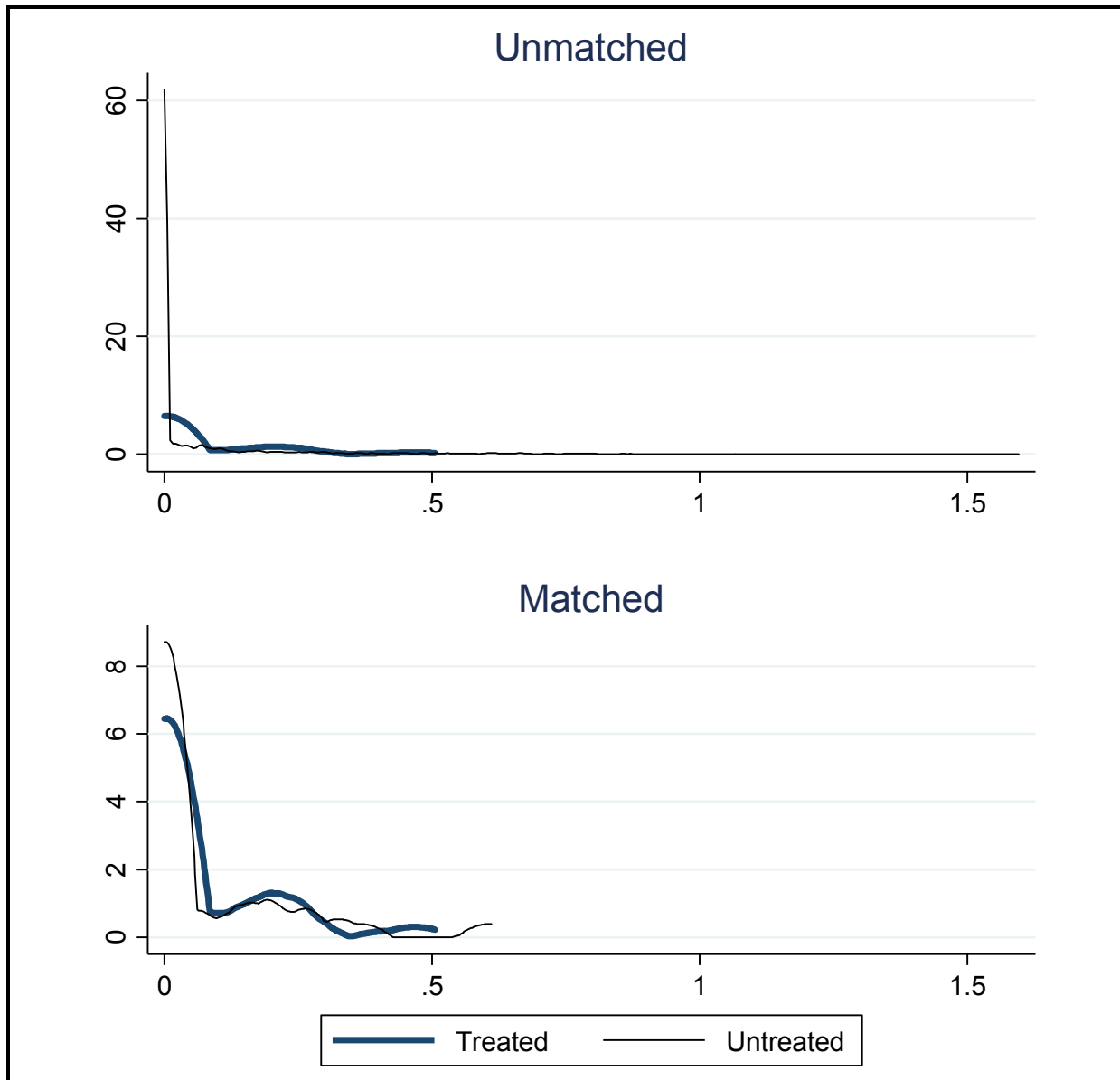


Figure E-5.
Average county Hierarchical Condition Category score for Maryland and comparison group hospitals before and after matching

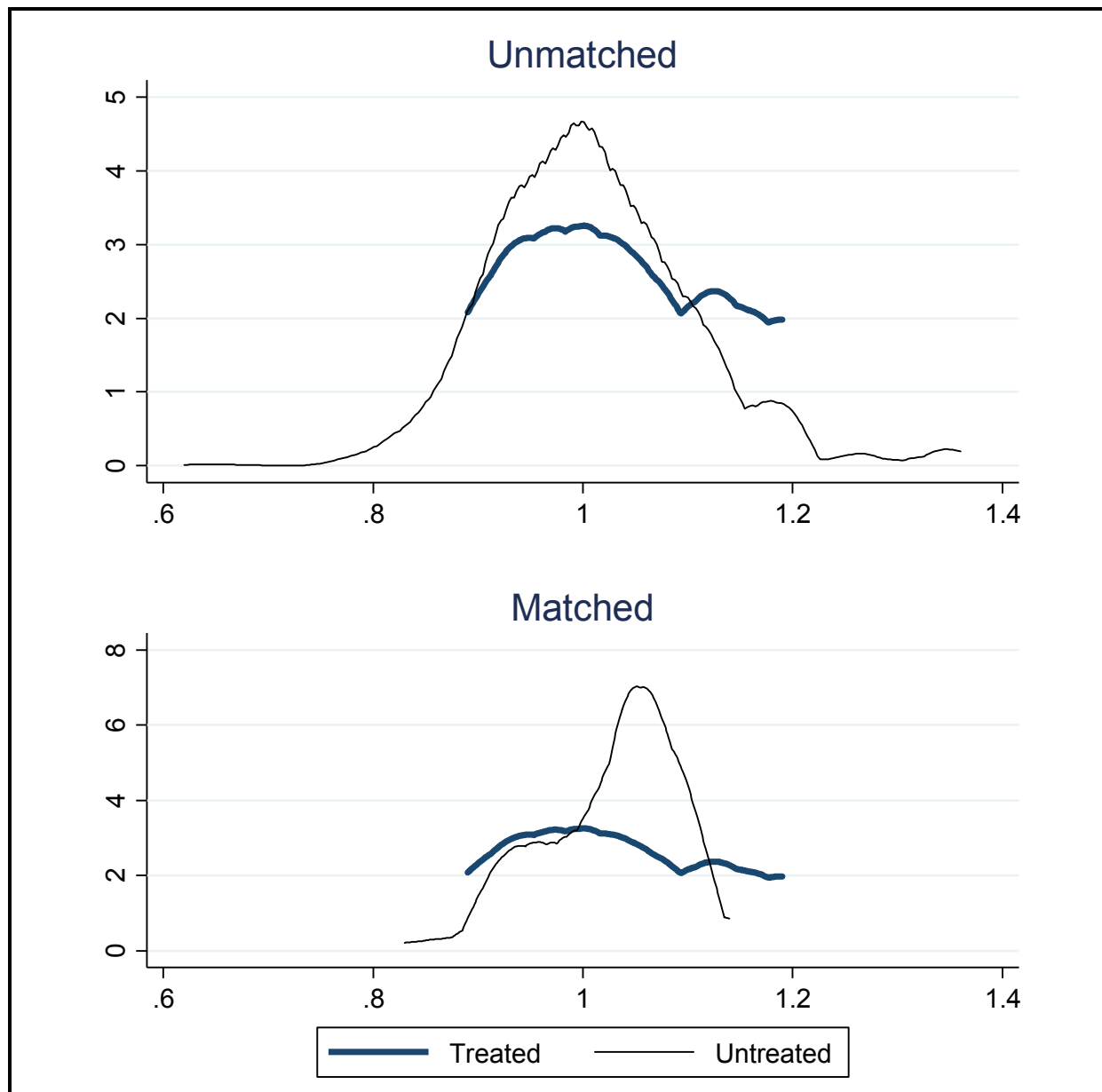


Figure E-6.
County average standardized risk-adjusted expenditures per Medicare beneficiary among Maryland and comparison group hospitals before and after matching

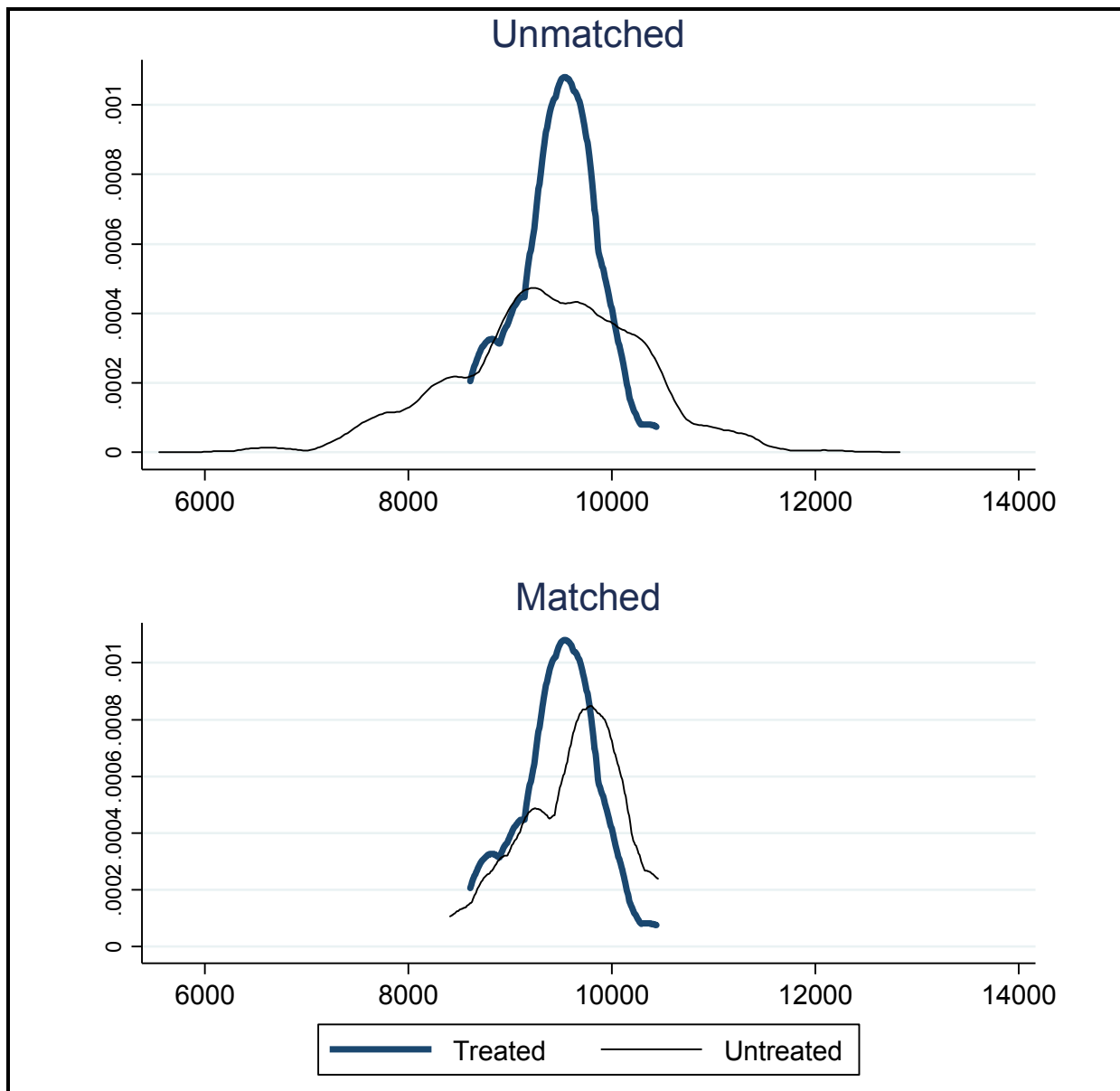


Figure E-7.
Percent change in inpatient covered stays 2008–2013 among Maryland and comparison group hospitals before and after matching

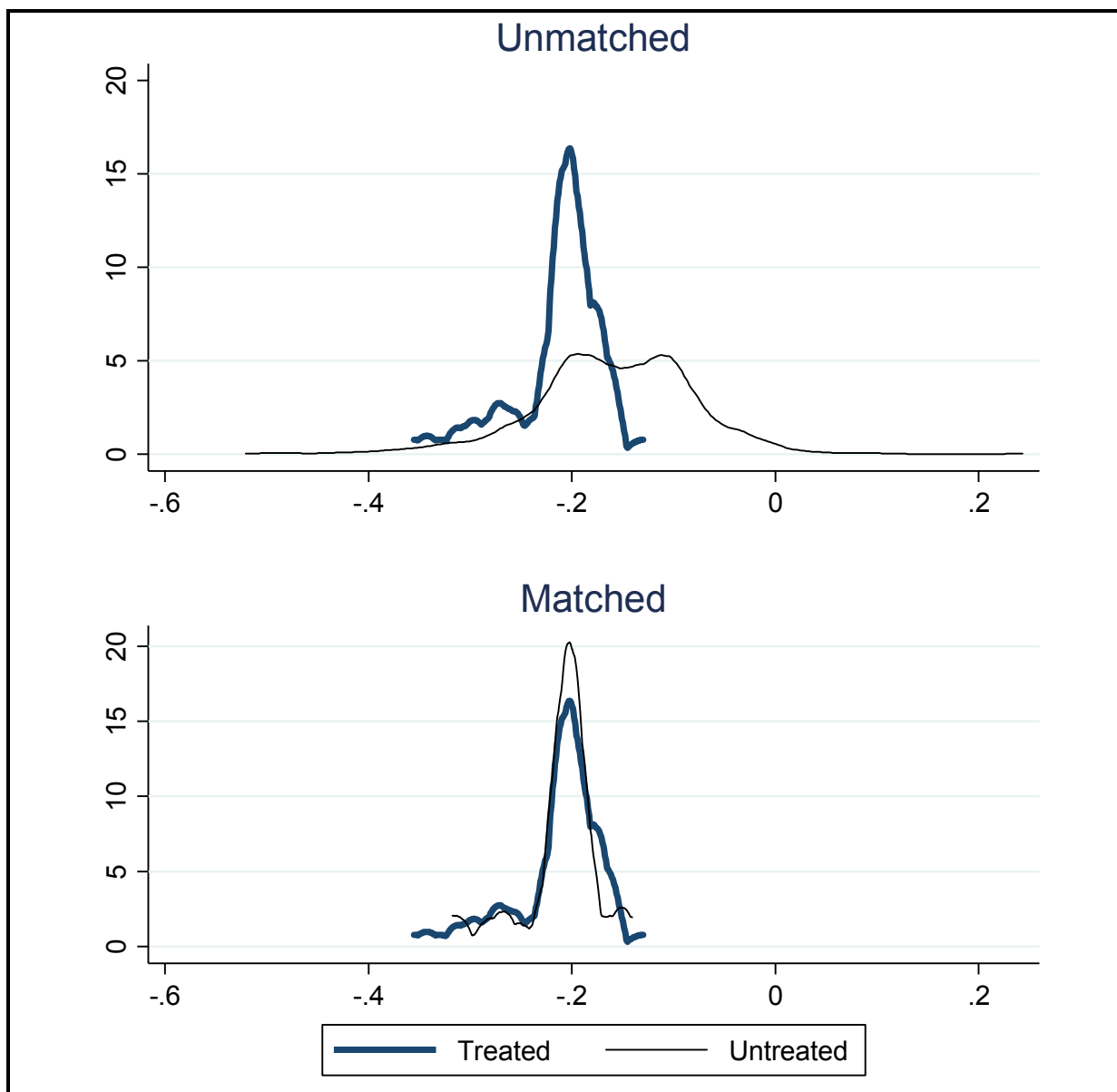


Figure E-8.
Medicare discharges as a percentage of total volume among Maryland and comparison group hospitals before and after matching

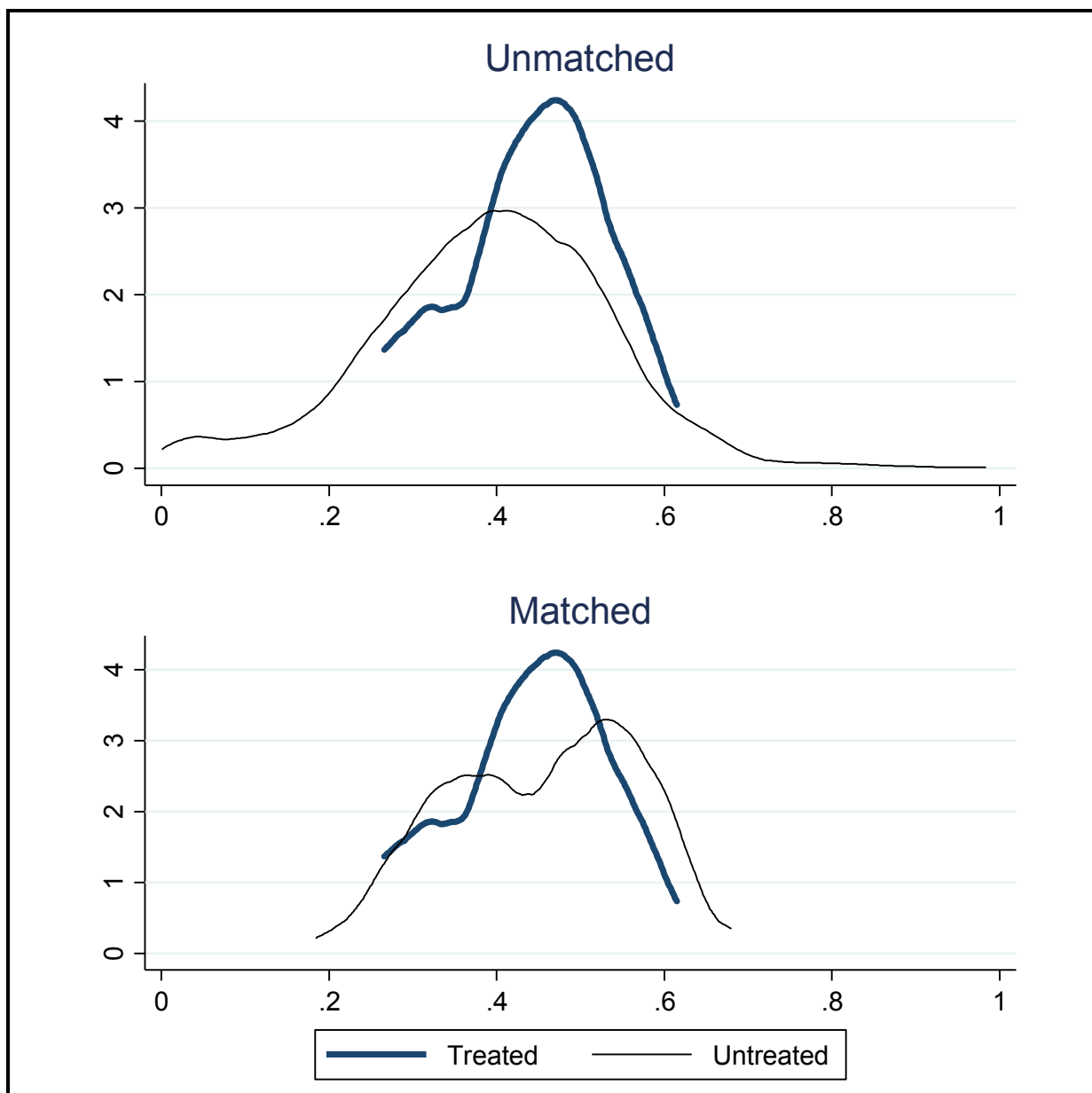


Figure E-9.
Hospital operating capacity among Maryland and comparison group hospitals before and after matching

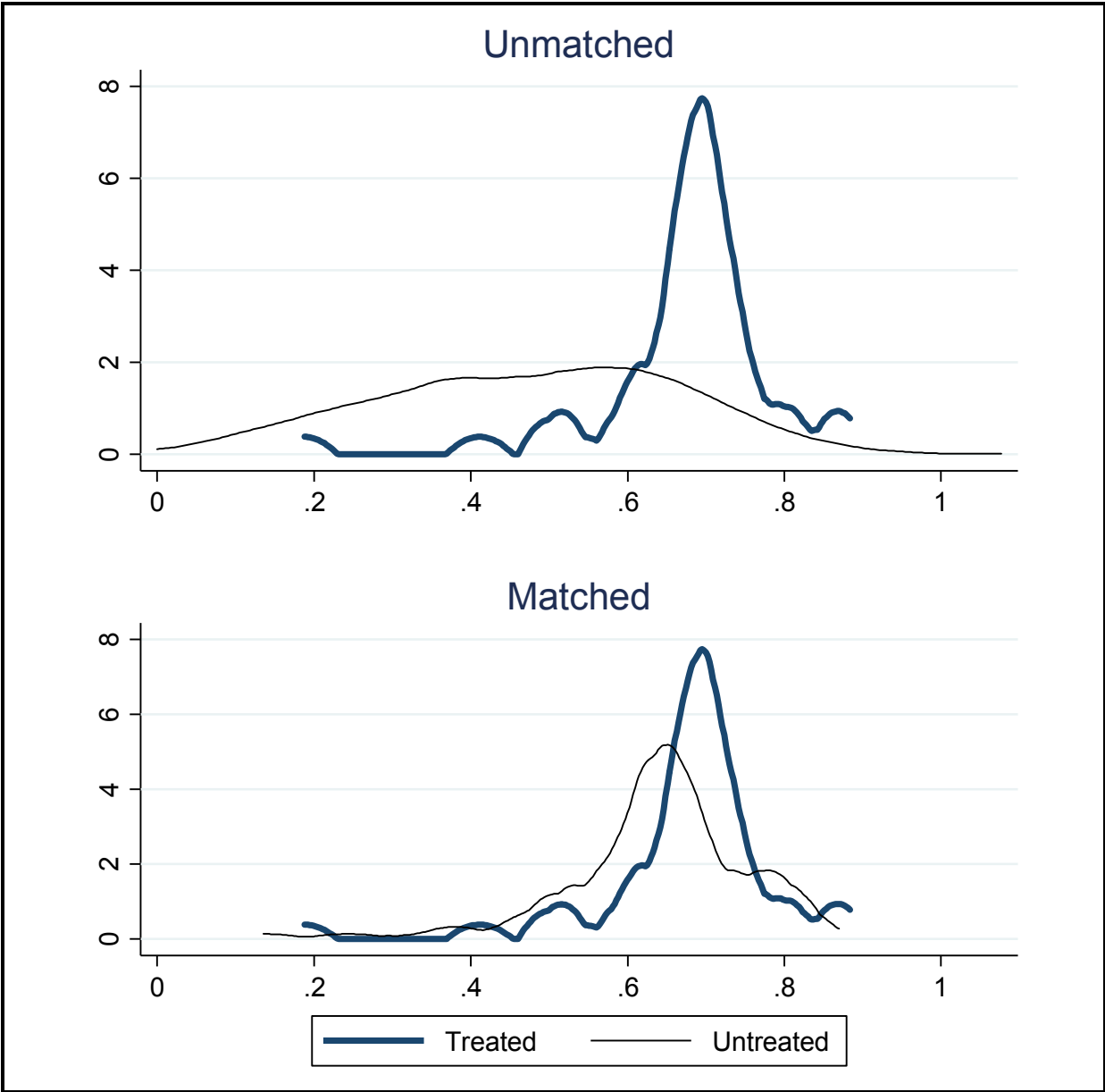


Figure E-10.
Medicare Advantage penetration among Maryland and comparison group hospitals before and after matching

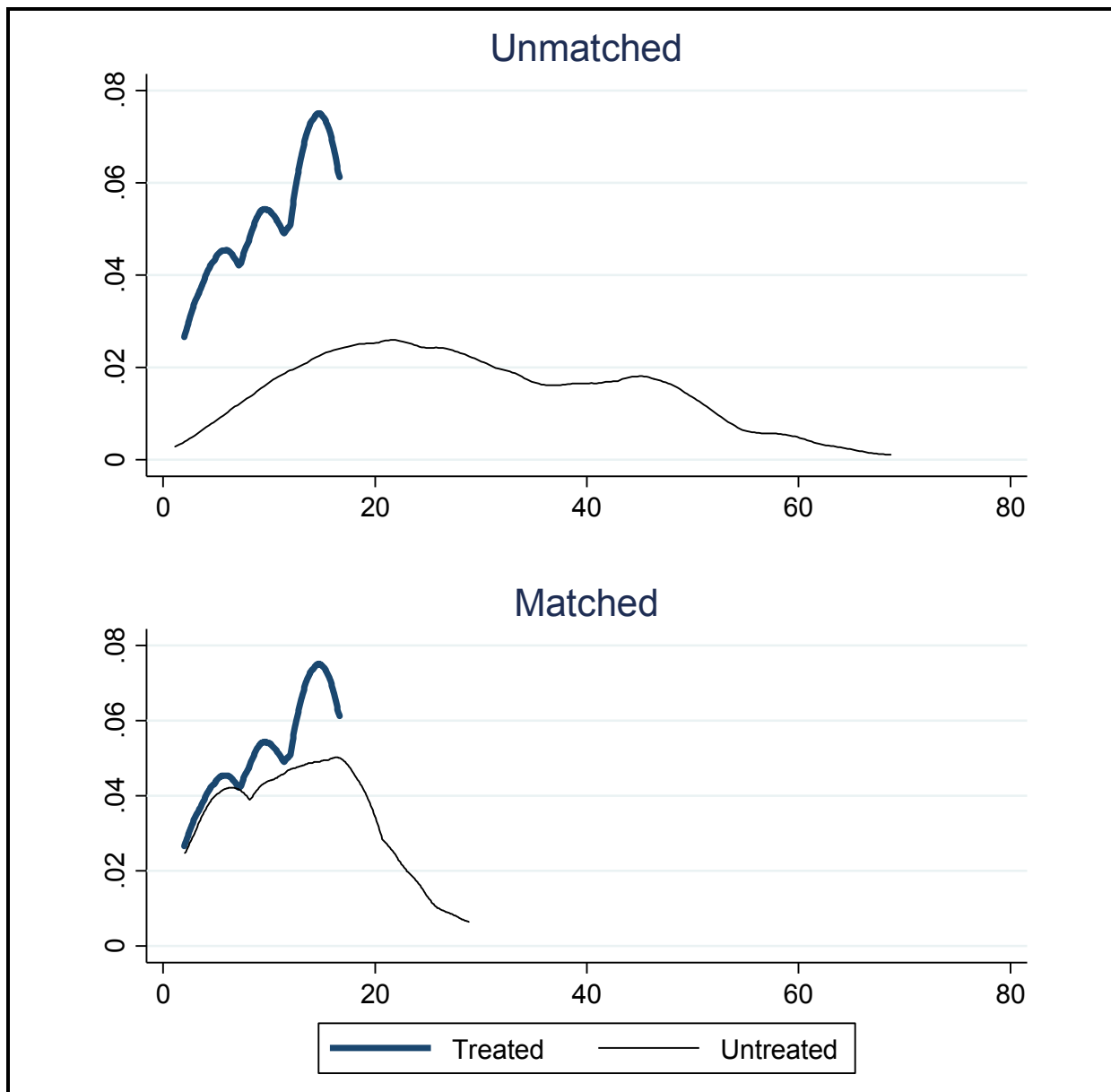


Figure E-11.
County median household income for Maryland and comparison group hospitals before and after matching

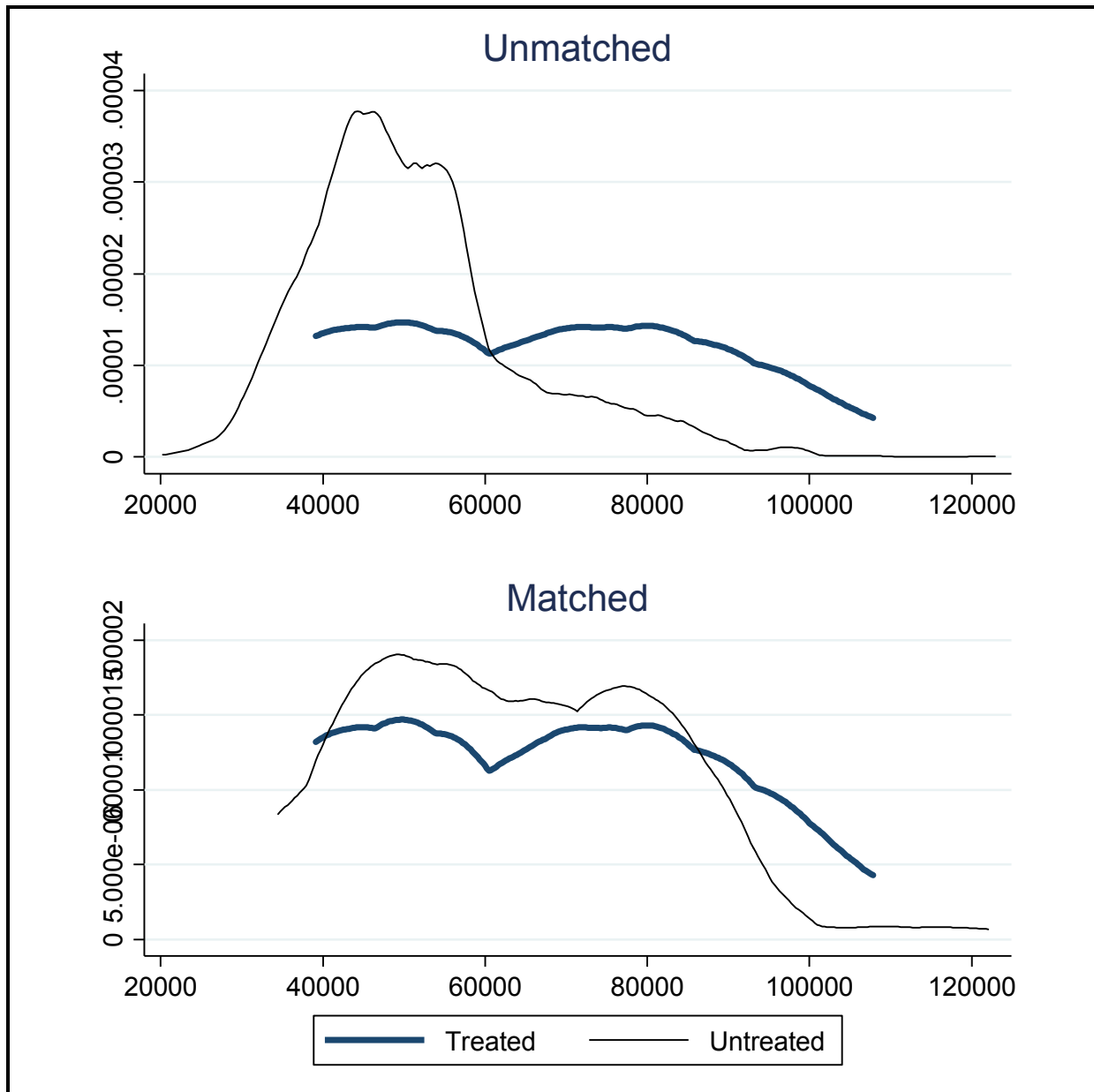
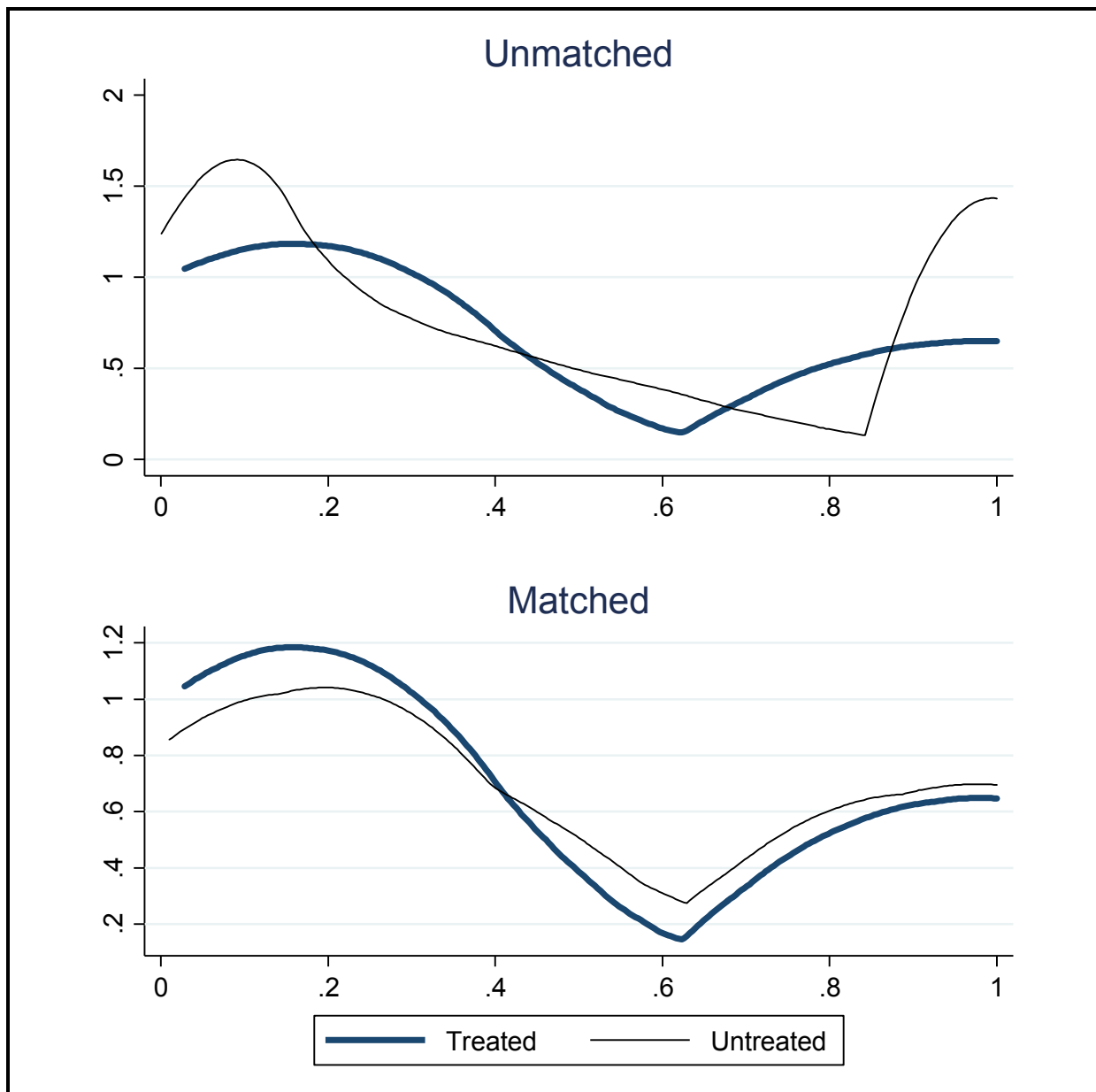


Figure E-12.
Hospital bed-to-county bed ratio among Maryland and comparison group hospitals before and after matching



The final list of comparison hospitals is shown in Table E-3.

Table E-3
Final list of comparison hospitals

State	Name	Provider ID
IL	Presence Saint Joseph Medical Center	140007
IL	Sherman Hospital	140030
IL	St Mary's Hospital	140034
IL	MacNeal Hospital	140054
IL	Morris Hospital & Healthcare Centers	140101
IL	Swedish Covenant Hospital	140114
IL	Hinsdale Hospital	140122
IL	Franciscan St James Health	140172
IL	Presence Saints Mary and Elizabeth Medical Center	140180
IL	Riverside Medical Center	140186
IL	Advocate Condell Medical Center	140202
IL	Norwegian-American Hospital	140206
IL	Advocate Christ Hospital & Medical Center	140208
IL	Harrisburg Medical Center	140210
IL	Edward Hospital	140231
IL	Westlake Community Hospital	140240
IL	Central DuPage Hospital	140242
IL	Alexian Brothers Medical Center	140258
IL	Kishwaukee Community Hospital	140286
KS	Great Bend Regional Hospital	170191
LA	Byrd Regional Hospital	190164
MA	Marlborough Hospital	220049
MA	Lowell General Hospital	220063
MA	Massachusetts General Hospital	220071
MA	South Shore Hospital	220100
MA	Brigham and Women's Hospital	220110
MA	Good Samaritan Medical Center	220111
NC	Lenoir Memorial Hospital	340027
NC	Carolina East Medical Center	340131
NJ	Univ Medical Center of Princeton at Plainsboro	310010
NJ	Cape Regional Medical Center Inc	310011
NJ	Trinitas Regional Medical Center	310027
NJ	Newton Memorial Hospital	310028

(continued)

Table E-3 (continued)
Final list of comparison hospitals

State	Name	Provider ID
NJ	Riverview Medical Center	310034
NJ	Robert Wood Johnson University Hospital	310038
NJ	Jersey City Medical Center	310074
NJ	JFK Medical Ctr—Anthony M. Yelencsics Community	310108
NY	Orange Regional Medical Center	330126
NY	St Luke’s Cornwall Hospital	330264
OK	Memorial Hospital & Physician Group	370051
OK	Southwestern Medical Center	370097
PA	Pocono Medical Center	390201
TX	Guadalupe Regional Medical Center	450104
VA	Inova Loudoun Hospital	490043
VA	Reston Hospital Center	490107
VA	Sentara Northern Virginia Medical Center	490113
VA	Chesapeake General Hospital	490120
WV	Davis Memorial Hospital	510030

Hospital Market Area Construction

To create the hospital market areas for our selected comparison hospitals, we examined several alternative methodologies. One set of alternatives takes 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 is based on hospital volume. Under this method, ZIP codes are rank ordered based on the number of admissions to the hospital. ZIP codes that exceed a specified minimum share of a hospital’s admissions or that in combination account for a specified share of admissions are selected. Geographic distance and volume can also be used in combination (e.g., ZIP codes within a specified distance that meet a minimum volume threshold). A third alternative methodology is to use an existing hospital market area definition, such as the *Dartmouth Atlas of Health Care* hospital service areas (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.³¹ RTI also considered replicating the methodology used to define hospital primary service area in the GBR/TPR agreements with

³¹ <http://www.dartmouthatlas.org/downloads/methods/geogappdx.pdf>

Maryland hospitals. However, the HSCRC 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 HSAs. The first three methods rely solely on geographic distance, assigning all ZIP codes that fall within 5, 10, or 15 miles of the hospital ZIP code. The fourth variant uses 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. Henceforth, we refer to the 15-mile cutoff as Option 1 and use the other definitions as a reference. We created a fourth 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. Henceforth, 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 must weigh trade-offs between these criteria. It should also be noted that the share of market area admissions going to the selected hospital will be lower in markets with multiple competing hospitals. Table E-4 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.

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 captures 71 percent and 67 percent of hospital admissions in Maryland and the comparison hospitals, respectively. Under Option 1, however, the selected hospital covers a smaller proportion of the admissions in the market area, 25 percent (MD) and 24 percent (comparison group). The selected hospital covers a larger proportion of the market area admissions under Option 2, 43 percent (MD) and 49 percent (comparison group). Overall, Option 2 assigns a more tightly defined market area (fewer ZIP codes) and therefore, the hospital captures more of the overall market area admissions. However, the result of the more restricted

Table E-4.
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.

market area is that fewer of the overall hospital admissions are included. The Dartmouth definition performs 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 E-5 provides a count of the number of Maryland and comparison hospitals that have 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 account for more than 50 percent of the assigned market area by Option 1 and Option 2 is also shown.

Table E-5.
Count of hospitals based on performance on market area measures

Option	Count of hospitals with more than 50% of hospital admissions coming from assigned market area	Count of hospitals where more than 50% of assigned market area admissions going 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 do not find an advantage to using Option 1 or Option 2 on this basis.

Option 1 is attractive because market areas can 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 will be assigned to a HSA (85%). Finally, this method covers a higher percentage of hospital admissions for the academic medical centers in both Maryland and the comparison group. The downside of Option 1 is that the wider market area definition leads to a market area that is less affected by the given hospital, as measured by the percentage of market area admissions to the hospital.

Option 2 is an existing, recognized methodology that is likely to be acceptable among involved stakeholders. In addition, market area definitions in Option 2 are better aligned the geographic areas where patients are more likely to use the selected hospital. There are 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 are based on 2013 admission data and the Dartmouth market areas still performed well. Second, Option 2 assigns 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 that are 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 very small proportion of admissions. With Option 2, we would capture fewer of the hospital's actual patients, but we 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 is focused on outcomes among beneficiaries residing in a defined area. These outcomes are not entirely dependent on hospital utilization, yet 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 admission accounted for by the selected hospital. For this reason, combined with the fact that it is an accepted method that has been used in previous studies, we implemented Option 2 to define market areas for comparison hospitals.

Propensity Score Methodology

After selecting the comparison hospitals and hospital market areas, we constructed person-level propensity score weights using Maryland and comparison group residents to balance the groups on individual and market area characteristics. Logistic regressions were calculated for three populations corresponding to three different levels of analysis: (1) all residents of Maryland and of the comparison group hospital market areas; (2) residents of Maryland and of the comparison group hospital market areas who had at least one inpatient admission during the year; and (3) residents of Maryland and of the comparison group hospital market areas who had at least one emergency department (ED) visit during the year.

Model 1: Maryland Residents and Residents of Comparison Group Market Area

We estimated a logistic regression where the dependent variable was the probability of being a Maryland resident or not for each calendar year. 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, originally disabled status, end-stage renal disease (ESRD) status, hierarchical condition category (HCC) score, county population density, county unemployment rate, county percentage of persons 25+ years of age with a high school diploma 2009–2013, county percentage of persons 25+ years of age with 4 or more years of college 2009–2013, uninsured rate among individuals less than 65 years of age, short-term general acute-care beds per 1,000 residents, PCPs per 1,000 residents, urban area indicator, and whether the county was a health professional shortage area (HPSA) for primary care. Tables E-6 through E-10 contain covariate balance diagnostics for years 2011–2015, respectively.

Table E-6
Maryland Population-Level Propensity Score Balance 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	71.71	71.18	0.04	71.71	70.84	0.07
White	0.70	0.65	0.01	0.70	0.62	0.01
Number months dual	0.15	0.25	0.26	0.15	0.16	0.03
Male	0.44	0.44	0.00	0.44	0.44	0.00
Disabled	0.20	0.25	0.01	0.20	0.23	0.00
End-stage renal disease	0.01	0.01	0.00	0.01	0.01	0.00
Hierarchical condition category score	1.11	1.16	0.03	1.11	1.09	0.02
Metro	0.96	0.96	0.00	0.96	0.96	0.00
Population density 2013	1,905.20	4,307.82	0.86	1,905.20	1,616.17	0.12
Unemployment rate 2013	6.82	8.77	1.36	6.82	6.77	0.03
Poverty rate 2013	10.84	14.94	0.81	10.84	11.10	0.05
Percent <65 years uninsured	11.70	14.74	0.73	11.70	12.07	0.13
Percent ≥25 years without high school degree	0.12	0.14	0.52	0.12	0.11	0.30
Percent ≥25 years with 4 years college	0.36	0.35	0.06	0.36	0.37	0.08
Acute hospital beds per 1,000 residents	2.27	2.67	0.23	2.27	1.91	0.20
Primary care providers per 1,000 residents	0.87	0.92	0.14	0.87	0.81	0.18
Health professional shortage area primary care	0.74	0.91	0.02	0.74	0.83	0.01

Table E-7
Maryland Population-Level Propensity Score Balance 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	71.57	71.12	0.04	71.57	70.73	0.07
White	0.70	0.65	0.01	0.70	0.61	0.01
Number months dual	0.15	0.25	0.26	0.15	0.16	0.03
Male	0.44	0.44	0.00	0.44	0.45	0.00
Disabled	0.20	0.25	0.01	0.20	0.23	0.00
End-stage renal disease	0.01	0.01	0.00	0.01	0.01	0.00
Hierarchical condition category score	1.12	1.17	0.04	1.12	1.10	0.01
Metro	0.96	0.96	0.00	0.96	0.96	0.00
Population density 2013	1,897.60	4,289.34	0.86	1,897.60	1,602.05	0.13
Unemployment rate 2013	6.81	8.76	1.36	6.81	6.77	0.02
Poverty rate 2013	10.80	14.90	0.81	10.80	11.12	0.06
Percent <65 years uninsured	11.70	14.71	0.72	11.70	12.06	0.13
Percent ≥25 years without high school degree	0.12	0.13	0.52	0.12	0.11	0.29
Percent ≥25 years with 4 years college	0.36	0.35	0.07	0.36	0.36	0.07
Acute hospital beds per 1,000 residents	2.25	2.66	0.23	2.25	1.91	0.20
Primary care providers per 1,000 residents	0.87	0.92	0.14	0.87	0.81	0.19
Health professional shortage area primary care	0.74	0.90	0.01	0.74	0.84	0.01

Table E-8
Maryland Population-Level Propensity Score Balance 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	71.53	71.11	0.03	71.53	70.71	0.07
White	0.69	0.64	0.00	0.69	0.60	0.01
Number months dual	0.15	0.25	0.26	0.15	0.16	0.02
Male	0.44	0.44	0.00	0.44	0.45	0.00
Disabled	0.20	0.25	0.01	0.20	0.23	0.00
End-stage renal disease	0.01	0.01	0.00	0.01	0.01	0.00
Hierarchical condition category score	1.09	1.15	0.05	1.09	1.06	0.02
Metro	0.96	0.96	0.00	0.96	0.96	0.00
Population density 2013	1,890.24	4,275.60	0.85	1,890.24	1594.62	0.13
Unemployment rate 2013	6.80	8.76	1.37	6.80	6.77	0.02
Poverty rate 2013	10.77	14.86	0.81	10.77	11.13	0.07
Percent <65 years uninsured	11.70	14.69	0.72	11.70	12.06	0.13
Percent ≥25 years without high school degree	0.12	0.13	0.52	0.12	0.11	0.28
Percent ≥25 years with 4 years college	0.36	0.35	0.07	0.36	0.36	0.06
Acute hospital beds per 1,000 residents	2.24	2.65	0.24	2.24	1.90	0.19
Primary care providers per 1,000 residents	0.87	0.92	0.14	0.87	0.81	0.19
Health professional shortage area primary care	0.74	0.90	0.01	0.74	0.84	0.01

Table E-9
Maryland Population-Level Propensity Score Balance 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	71.54	71.11	0.04	71.54	70.72	0.07
White	0.68	0.64	0.00	0.68	0.59	0.01
Number months dual	0.16	0.26	0.26	0.16	0.17	0.03
Male	0.44	0.44	0.00	0.44	0.45	0.00
Disabled	0.20	0.25	0.01	0.20	0.23	0.00
End-stage renal disease	0.01	0.01	0.00	0.01	0.01	0.00
Hierarchical condition category score	1.11	1.16	0.05	1.11	1.09	0.02
Metro	0.96	0.96	0.00	0.96	0.96	0.00
Population density 2013	1,884.20	4,257.73	0.85	1,884.20	1,589.30	0.13
Unemployment rate 2013	6.79	8.75	1.37	6.79	6.78	0.01
Poverty rate 2013	10.73	14.82	0.81	10.73	11.15	0.08
Percent <65 years uninsured	11.70	14.66	0.71	11.70	12.05	0.13
Percent ≥25 years without high school degree	0.12	0.13	0.52	0.12	0.11	0.28
Percent ≥25 years with 4 years college	0.36	0.35	0.07	0.36	0.36	0.05
Acute hospital beds per 1,000 residents	2.23	2.65	0.24	2.23	1.90	0.19
Primary care providers per 1,000 residents	0.87	0.92	0.13	0.87	0.81	0.19
Health professional shortage area primary care	0.74	0.90	0.01	0.74	0.84	0.01

Table E-10
Maryland Population-Level Propensity Score Balance 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	71.55	71.13	0.03	71.55	70.72	0.07
White	0.67	0.63	0.00	0.67	0.59	0.01
Number months dual	0.15	0.23	0.21	0.15	0.16	0.01
Male	0.44	0.44	0.00	0.44	0.45	0.00
Disabled	0.20	0.25	0.01	0.20	0.23	0.01
End-stage renal disease	0.01	0.01	0.00	0.01	0.01	0.00
Hierarchical condition category score	1.02	1.08	0.05	1.02	1.03	0.01
Metro	0.96	0.96	0.00	0.96	0.96	0.00
Population density 2013	1,870.95	4,244.24	0.86	1,870.95	1,504.61	0.16
Unemployment rate 2013	6.78	8.74	1.37	6.78	6.79	0.00
Poverty rate 2013	10.67	14.79	0.82	10.67	11.25	0.12
Percent <65 years uninsured	11.67	14.64	0.71	11.67	11.99	0.12
Percent ≥25 years without high school degree	0.11	0.13	0.52	0.11	0.11	0.26
Percent ≥25 years with 4 years college	0.36	0.35	0.08	0.36	0.36	0.01
Acute hospital beds per 1,000 residents	2.22	2.64	0.25	2.22	1.89	0.19
Primary care providers per 1,000 residents	0.87	0.92	0.13	0.87	0.80	0.22
Health professional shortage area primary care	0.74	0.90	0.01	0.74	0.85	0.01

Model 2: Maryland Residents and Residents of Comparison Group Market Area With at Least One Inpatient Admission During the Year

We estimated a logistic regression among the subset of individuals with at least one inpatient admission during the year where the dependent variable was the probability of being a Maryland resident or not for each calendar year. We included the following covariates in the model: Age, race (white = 1), dual eligible status, gender, originally disabled status, ESRD status, HCC score, county population density, county unemployment rate, county percentage of persons 25+ years of age with a high school diploma 2009–2013, county percentage of persons 25+ years of age with 4 or more years of college 2009–2013, uninsured rate among individuals less than 65 years of age, short-term general acute-care beds per 1,000 residents, PCPs per 1,000 residents, urban area indicator, and whether the county was an HPSA for primary care. Tables E-11 through E-15 contain covariate balance diagnostics for years 2011–2015, respectively.

Table E-11
Maryland Inpatient Admission Level Propensity Score Balance 2011

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	74.07	73.06	0.07	74.07	73.29	0.06
White	0.71	0.66	0.00	0.71	0.64	0.01
Number months dual	0.23	0.37	0.30	0.23	0.27	0.08
Male	0.42	0.43	0.00	0.42	0.42	0.00
Disabled	0.26	0.31	0.01	0.26	0.29	0.00
End-stage renal disease	0.04	0.05	0.00	0.04	0.05	0.00
Hierarchical condition category score	1.96	2.06	0.05	1.96	2.01	0.03
Metro	0.95	0.95	0.00	0.95	0.92	0.00
Population density 2013	1,956.24	4,205.36	0.80	1,956.24	2,418.77	0.17
Unemployment rate 2013	6.95	8.85	1.34	6.95	7.40	0.29
Poverty rate 2013	11.21	14.99	0.73	11.21	13.57	0.43
Percent <65 years uninsured	11.60	14.77	0.78	11.60	12.56	0.20
Percent ≥25 years without high school degree	0.12	0.14	0.47	0.12	0.12	0.01
Percent ≥25 years with 4 years college	0.34	0.34	0.00	0.34	0.34	0.03
Acute hospital beds per 1,000 residents	2.41	2.67	0.14	2.41	2.42	0.01
Primary care providers per 1,000 residents	0.85	0.91	0.16	0.85	0.90	0.12
Health professional shortage area primary care	0.73	0.91	0.02	0.73	0.83	0.01

Table E-12
Maryland Inpatient Admission Level Propensity Score Balance 2012

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	73.98	72.98	0.07	73.98	73.14	0.06
White	0.71	0.66	0.00	0.71	0.63	0.01
Number months dual	0.23	0.37	0.30	0.23	0.27	0.08
Male	0.42	0.43	0.00	0.42	0.43	0.00
Disabled	0.26	0.32	0.01	0.26	0.30	0.01
End-stage renal disease	0.04	0.05	0.00	0.04	0.05	0.00
Hierarchical condition category score	2.06	2.17	0.05	2.06	2.12	0.02
Metro	0.96	0.95	0.00	0.96	0.92	0.00
Population density 2013	1,965.79	4,171.80	0.79	1,965.79	2,405.73	0.16
Unemployment rate 2013	6.94	8.85	1.35	6.94	7.39	0.29
Poverty rate 2013	11.18	14.97	0.73	11.18	13.62	0.44
Percent <65 years uninsured	11.60	14.76	0.78	11.60	12.60	0.21
Percent ≥25 years without high school degree	0.12	0.14	0.47	0.12	0.12	0.01
Percent ≥25 years with 4 years college	0.35	0.34	0.02	0.35	0.34	0.04
Acute hospital beds per 1,000 residents	2.40	2.66	0.14	2.40	2.42	0.01
Primary care providers per 1,000 residents	0.86	0.90	0.15	0.86	0.89	0.11
Health professional shortage area primary care	0.73	0.91	0.02	0.73	0.83	0.01

Table E-13
Maryland Inpatient Admission Level Propensity Score Balance 2013

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	73.94	72.98	0.07	73.94	73.22	0.05
White	0.70	0.66	0.00	0.70	0.62	0.01
Number months dual	0.24	0.37	0.29	0.24	0.28	0.08
Male	0.43	0.44	0.00	0.43	0.43	0.00
Disabled	0.27	0.32	0.01	0.27	0.30	0.00
End-stage renal disease	0.04	0.05	0.00	0.04	0.05	0.00
Hierarchical condition category score	1.99	2.14	0.07	1.99	2.04	0.02
Metro	0.96	0.95	0.00	0.96	0.92	0.00
Population density 2013	1,950.67	4,152.26	0.79	1,950.67	2,365.12	0.15
Unemployment rate 2013	6.94	8.84	1.33	6.94	7.40	0.29
Poverty rate 2013	11.17	14.90	0.72	11.17	13.65	0.45
Percent <65 years uninsured	11.60	14.72	0.77	11.60	12.68	0.23
Percent ≥25 years without high school degree	0.12	0.13	0.45	0.12	0.12	0.02
Percent ≥25 years with 4 years college	0.34	0.34	0.00	0.34	0.34	0.05
Acute hospital beds per 1,000 residents	2.39	2.65	0.14	2.39	2.41	0.01
Primary care providers per 1,000 residents	0.85	0.90	0.16	0.85	0.89	0.10
Health professional shortage area primary care	0.73	0.91	0.02	0.73	0.82	0.01

Table E-14
Maryland Inpatient Admission Level Propensity Score Balance 2014

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	73.77	73.22	0.04	73.77	72.97	0.06
White	0.70	0.67	0.00	0.70	0.62	0.01
Number months dual	0.25	0.37	0.28	0.25	0.28	0.08
Male	0.43	0.44	0.00	0.43	0.43	0.00
Disabled	0.27	0.32	0.01	0.27	0.30	0.00
End-stage renal disease	0.04	0.05	0.00	0.04	0.05	0.00
Hierarchical condition category score	1.97	2.14	0.08	1.97	2.02	0.02
Metro	0.95	0.95	0.00	0.95	0.92	0.00
Population density 2013	1,938.64	4,124.18	0.78	1,938.64	2,331.20	0.14
Unemployment rate 2013	6.94	8.81	1.31	6.94	7.39	0.28
Poverty rate 2013	11.16	14.79	0.70	11.16	13.61	0.44
Percent <65 years uninsured	11.60	14.64	0.74	11.60	12.68	0.23
Percent ≥25 years without high school degree	0.12	0.13	0.44	0.12	0.12	0.02
Percent ≥25 years with 4 years college	0.35	0.35	0.00	0.35	0.34	0.06
Acute hospital beds per 1,000 residents	2.38	2.63	0.14	2.38	2.42	0.02
Primary care providers per 1,000 residents	0.86	0.90	0.15	0.86	0.88	0.08
Health professional shortage area primary care	0.73	0.91	0.02	0.73	0.83	0.01

Table E-15
Maryland Inpatient Admission Level Propensity Score Balance 2015

Variable	Maryland mean, unweighted	Comparison mean, unweighted	Standardized difference	Maryland mean, weighted	Comparison mean, weighted	Standardized difference
Age	73.89	71.13	0.21	73.89	72.38	0.11
White	0.69	0.64	0.00	0.69	0.65	0.00
Number months dual	0.28	0.21	0.17	0.28	0.26	0.05
Male	0.44	0.44	0.00	0.44	0.44	0.00
Disabled	0.31	0.23	0.01	0.31	0.28	0.01
End-stage renal disease	0.06	0.01	0.02	0.06	0.05	0.00
Hierarchical condition category score	2.03	1.02	0.62	2.03	1.69	0.17
Metro	0.95	0.96	0.00	0.95	0.96	0.00
Population density 2013	3405.79	3565.37	0.05	3405.79	3560.96	0.05
Unemployment rate 2013	8.19	8.18	0.01	8.19	8.20	0.01
Poverty rate 2013	13.58	13.60	0.00	13.58	13.69	0.02
Percent <65 years uninsured	13.50	13.79	0.06	13.50	13.77	0.05
Percent ≥25 years without high school degree	0.13	0.13	0.01	0.13	0.13	0.02
Percent ≥25 years with 4 years college	0.34	0.35	0.09	0.34	0.35	0.06
Acute hospital beds per 1,000 residents	2.55	2.52	0.02	2.55	2.54	0.01
Primary care providers per 1,000 residents	0.88	0.91	0.07	0.88	0.90	0.06
Health professional shortage area primary care	0.85	0.86	0.00	0.85	0.86	0.00

Model 3: Maryland Residents and Residents of Comparison Group Market Area With at Least One Emergency Department Visit During the Year

We estimated a logistic regression among the subset of individuals with at least one ED visit during the year where the dependent variable was the probability of being a Maryland resident or not for each calendar year. We included the following covariates in the model: Age, race (white = 1), dual eligible status, gender, originally disabled status, ESRD status, HCC score, county population density, county unemployment rate, county percentage of persons 25+ years of age with a high school diploma 2009–2013, county percentage of persons 25+ years of age with 4 or more years of college 2009–2013, uninsured rate among individuals less than 65 years of age, short-term general acute-care beds per 1,000 residents, PCPs per 1,000 residents, urban area indicator, and whether the county was an HPSA for primary care. Tables E-16 through E-20 contain covariate balance diagnostics for years 2011–2015, respectively.

Table E-16
Maryland 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	71.14	69.67	0.10	71.14	70.32	0.06
White	0.68	0.62	0.01	0.68	0.60	0.01
Number months dual	0.26	0.41	0.32	0.26	0.29	0.08
Male	0.40	0.40	0.00	0.40	0.40	0.00
Disabled	0.31	0.38	0.01	0.31	0.34	0.00
End-stage renal disease	0.03	0.03	0.00	0.03	0.03	0.00
Hierarchical condition category score	1.58	1.65	0.04	1.58	1.61	0.02
Metro	0.95	0.94	0.00	0.95	0.92	0.00
Population density 2013	1,938.32	4,351.30	0.82	1,938.32	2,425.03	0.18
Unemployment rate 2013	7.00	8.78	1.21	7.00	7.50	0.31
Poverty rate 2013	11.37	15.21	0.74	11.37	13.42	0.37
Percent <65 years uninsured	11.66	14.64	0.72	11.66	12.34	0.14
Percent ≥25 years without high school degree	0.12	0.14	0.47	0.12	0.12	0.02
Percent ≥25 years with 4 years college	0.34	0.34	0.04	0.34	0.34	0.02
Acute hospital beds per 1,000 residents	2.43	2.74	0.17	2.43	2.38	0.02
Primary care providers per 1,000 residents	0.84	0.92	0.23	0.84	0.90	0.15
Health professional shortage area primary care	0.75	0.91	0.01	0.75	0.84	0.01

Table E-17
Maryland 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	71.07	69.69	0.09	71.07	70.24	0.06
White	0.67	0.62	0.01	0.67	0.60	0.01
Number months dual	0.26	0.41	0.32	0.26	0.30	0.08
Male	0.40	0.40	0.00	0.40	0.40	0.00
Disabled	0.31	0.38	0.01	0.31	0.34	0.00
End-stage renal disease	0.03	0.03	0.00	0.03	0.03	0.00
Hierarchical condition category score	1.62	1.71	0.04	1.62	1.65	0.02
Metro	0.95	0.94	0.00	0.95	0.92	0.00
Population density 2013	1,917.52	4,330.05	0.83	1,917.52	2,400.08	0.18
Unemployment rate 2013	6.99	8.77	1.21	6.99	7.49	0.31
Poverty rate 2013	11.33	15.17	0.74	11.33	13.37	0.37
Percent <65 years uninsured	11.67	14.61	0.71	11.67	12.34	0.14
Percent ≥25 years without high school degree	0.12	0.14	0.47	0.12	0.12	0.02
Percent ≥25 years with 4 years college	0.34	0.34	0.04	0.34	0.34	0.02
Acute hospital beds per 1,000 residents	2.41	2.73	0.18	2.41	2.37	0.02
Primary care providers per 1,000 residents	0.84	0.92	0.24	0.84	0.89	0.15
Health professional shortage area primary care	0.75	0.91	0.01	0.75	0.84	0.01

Table E-18
Maryland 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	71.08	69.87	0.08	71.08	70.29	0.05
White	0.66	0.62	0.00	0.66	0.58	0.01
Number months dual	0.27	0.41	0.30	0.27	0.30	0.09
Male	0.40	0.41	0.00	0.40	0.41	0.00
Disabled	0.31	0.38	0.01	0.31	0.35	0.00
End-stage renal disease	0.03	0.03	0.00	0.03	0.03	0.00
Hierarchical condition category score	1.57	1.67	0.06	1.57	1.60	0.02
Metro	0.95	0.94	0.00	0.95	0.92	0.00
Population density 2013	1,931.45	4,281.07	0.80	1,931.45	2,403.80	0.17
Unemployment rate 2013	7.00	8.76	1.20	7.00	7.51	0.31
Poverty rate 2013	11.36	15.11	0.72	11.36	13.44	0.37
Percent <65 years uninsured	11.68	14.54	0.68	11.68	12.41	0.15
Percent ≥25 years without high school degree	0.12	0.14	0.45	0.12	0.12	0.02
Percent ≥25 years with 4 years college	0.34	0.34	0.04	0.34	0.34	0.01
Acute hospital beds per 1,000 residents	2.42	2.72	0.16	2.42	2.37	0.02
Primary care providers per 1,000 residents	0.84	0.92	0.23	0.84	0.89	0.14
Health professional shortage area primary care	0.76	0.91	0.01	0.76	0.84	0.01

Table E-19
Maryland 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	71.04	70.20	0.06	71.04	70.23	0.06
White	0.65	0.62	0.00	0.65	0.57	0.01
Number months dual	0.27	0.40	0.27	0.27	0.31	0.09
Male	0.40	0.41	0.00	0.40	0.41	0.00
Disabled	0.31	0.37	0.01	0.31	0.35	0.00
End-stage renal disease	0.03	0.03	0.00	0.03	0.03	0.00
Hierarchical condition category score	1.56	1.67	0.07	1.56	1.59	0.02
Metro	0.95	0.94	0.00	0.95	0.92	0.00
Population density 2013	1,949.48	4,227.69	0.78	1,949.48	2,431.85	0.17
Unemployment rate 2013	7.00	8.74	1.18	7.00	7.50	0.31
Poverty rate 2013	11.35	15.02	0.70	11.35	13.39	0.37
Percent <65 years uninsured	11.68	14.53	0.68	11.68	12.34	0.14
Percent ≥25 years without high school degree	0.12	0.14	0.43	0.12	0.12	0.03
Percent ≥25 years with 4 years college	0.34	0.34	0.05	0.34	0.34	0.03
Acute hospital beds per 1,000 residents	2.42	2.70	0.15	2.42	2.39	0.02
Primary care providers per 1,000 residents	0.84	0.91	0.24	0.84	0.89	0.16
Health professional shortage area primary care	0.75	0.91	0.01	0.75	0.84	0.01

Table E-20
Maryland 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	70.17	70.05	0.01	70.17	69.27	0.06
White	0.63	0.64	0.00	0.63	0.55	0.01
Number months dual	0.30	0.35	0.10	0.30	0.35	0.09
Male	0.40	0.41	0.00	0.40	0.41	0.00
Disabled	0.36	0.39	0.00	0.36	0.39	0.00
End-stage renal disease	0.03	0.04	0.00	0.03	0.04	0.00
Hierarchical condition category score	1.55	1.63	0.05	1.55	1.58	0.02
Metro	0.95	0.93	0.00	0.95	0.92	0.00
Population density 2013	1,996.73	4,104.74	0.69	1,996.73	2,498.92	0.18
Unemployment rate 2013	7.06	8.65	1.05	7.06	7.56	0.31
Poverty rate 2013	11.58	14.89	0.62	11.58	13.45	0.33
Percent <65 years uninsured	11.72	14.26	0.59	11.72	12.23	0.11
Percent ≥25 years without high school degree	0.12	0.13	0.35	0.12	0.12	0.05
Percent ≥25 years with 4 years college	0.34	0.34	0.07	0.34	0.34	0.05
Acute hospital beds per 1,000 residents	2.49	2.69	0.10	2.49	2.41	0.04
Primary care providers per 1,000 residents	0.83	0.91	0.23	0.83	0.89	0.18
Health professional shortage area primary care	0.76	0.90	0.01	0.76	0.84	0.01

**APPENDIX F:
DENOMINATORS USED FOR KEY OUTCOMES**

Table F.1
Denominators used for key outcomes

		Population level outcomes	Admission level outcomes	30-day Unplanned Readmissions	14 day follow-up	ED visit within 30 days
Maryland						
2011	Q1	657,189	53,579	36,970	36,310	32,347
	Q2	660,691	51,649	35,401	35,015	31,092
	Q3	670,491	49,645	33,808	34,026	30,265
	Q4	677,774	51,150	34,465	33,980	30,193
2012	Q1	676,357	50,404	34,452	34,593	30,755
	Q2	682,872	49,444	33,653	33,830	29,988
	Q3	693,863	48,220	32,349	32,932	29,316
	Q4	700,980	49,520	33,264	32,738	29,267
2013	Q1	701,623	50,229	34,197	34,572	31,011
	Q2	707,896	48,928	33,226	33,852	30,258
	Q3	718,406	47,314	31,742	32,979	29,315
	Q4	724,500	48,293	32,286	32,285	28,632
2014	Q1	724,181	47,761	32,199	32,806	29,343
	Q2	729,217	48,065	32,256	33,374	29,663
	Q3	741,614	46,648	31,140	32,528	28,922
	Q4	748,433	48,832	32,916	32,621	29,089
2015	Q1	751,743	46,918	22,755	21,135	19,871
Comparison group						
2011	Q1	1,075,296	42,730	31,747	30,650	27,780
	Q2	1,082,151	42,509	31,723	30,681	27,655
	Q3	1,096,796	41,349	30,554	29,907	26,967
	Q4	1,107,980	41,665	30,663	29,534	26,747
2012	Q1	1,093,650	40,968	30,412	29,901	27,047
	Q2	1,102,728	40,662	30,020	29,518	26,686
	Q3	1,119,246	39,550	29,355	29,061	26,269
	Q4	1,127,360	40,465	29,692	28,923	26,202

(continued)

Table F.1 (continued)
Denominators used for key outcomes

		Population level outcomes	Admission level outcomes	30-day Unplanned Readmissions	14 day follow-up	ED visit within 30 days
2013	Q1	1,116,823	40,281	29,934	29,651	26,914
	Q2	1,124,396	39,663	29,294	29,394	26,639
	Q3	1,139,070	38,051	27,979	28,251	25,549
	Q4	1,147,666	37,909	27,704	27,317	24,825
2014	Q1	1,133,832	36,889	27,004	27,002	24,510
	Q2	1,120,342	38,256	28,067	28,166	25,487
	Q3	1,108,080	36,466	27,072	26,831	24,403
	Q4	1,106,900	37,809	27,793	27,213	24,714
2015	Q1	1,072,919	35,824	18,477	16,889	16,059