Maryland Model Analytics: Evaluation of Maryland Medicare Spending on Inpatient Care

Acumen, LLC

March 10, 2023

12-1pm ET

Outline

- Project Introduction
- Evaluation Approach
- Findings
- Summary

Outline

- **Project Introduction**
- Evaluation Approach
- Findings
- Summary

Maryland Medicare Reimbursement for Hospitals Differs from Other States

- Since the 1970s, Maryland has set prices for hospital services that Medicare paid within the state
- The Total Cost of Care (TCOC) Model continues the use of hospital global budgets first piloted by the All-Payer Model (2014 – 2018)
- The global budget approach encourages hospitals to avoid unnecessary inpatient utilization, while TCOC also expands emphasis on voluntary inclusion of physicians and other providers in value-based models

Our Research Focuses on Analyzing Cost Performance

- We compare the cost of inpatient stays in Maryland to other states, using several different levels of analysis (e.g., different ways of categorizing stays)
- We further assess metrics of cost and resource use that can provide insights into differences between Maryland and other states

Outline

- Project Introduction
- **Evaluation Approach**
- Findings
- Summary

Data Sources

- Data sources
  - Chronic Condition Warehouse (CCW) Parts A and B claims
  - CCW Beneficiary Cohort Enrollment Data
- Cost variables
  - Allowed amount
- Sample
  - Maryland: All Medicare beneficiaries
  - Other states: 5% sample
- Study period
  - Inpatient stays ending in 2019

Inpatient Stay Costs are Compared in Various Ways

Metric	Description
Medicare Severity Diagnosis Related Group (MS-DRG)	MS-DRGs are the most granular way of categorizing stays. They are defined based on information including the principal diagnosis, secondary diagnoses, surgical procedures, and discharge status. A severity level indicates complications or comorbidities (w/CC), or major complications or comorbidities (w/MCC).
Major Diagnostic Categories (MDCs)	MS-DRGs are grouped into 26 mutually exclusive and exhaustive MDCs for stays related to a particular organ system (e.g., eye, respiratory) or condition (e.g., burns, trauma).
Medical vs surgical stays	Inpatient stays can be categorized as medical or surgical. Surgical stays are determined based by inpatient procedures.
Ratio of cost of inpatient stay to mean cost of all inpatient stays	Since the analyses use allowed amounts (i.e., they are not standardized to remove geographic or other variation), comparing cost breakdowns to the mean cost of all inpatient stays in Maryland and other states respectively neutralizes some of these underlying differences to facilitate cost comparisons.

Other Metrics are Useful for Understanding Inpatient Costs

Metric	Description
30-day post-discharge spending	This metric includes all allowed amounts for inpatient, outpatient, and Part B physician/supplier claims in the 30 days after discharge. Limitations: does not reflect relatedness of costs to inpatient stay (e.g., chemotherapy after a trauma hospitalization).
Length of stay	This metric can provide information about patient case mix and severity. It excludes observation stays.
Medicare Severity (MS) level	The share of stays at each severity level within a base DRG can show differences in case mix.
Number of 3-digit diagnoses in a 120-day lookback period	This is a way to approximate patient complexity. Limitations: variation in diagnosis coding practices, heterogeneity in how complex a patient is with different diagnoses.

Outline

- Project Introduction
- Evaluation Approach
- **Findings**
- Summary

Outline of Findings

1. Cost of Inpatient Stays
   a) Major Diagnostic Categories (MDCs)
   b) Medical vs Surgical Medicare Severity Diagnosis-Related Groups (MS-DRGs)
   c) MS-DRGs
   d) Selected Mean Ratios of Above Metrics
2. Related Metrics and Patient Complexity
   a) 30-day Post-Discharge Spending
   b) Length of Stay
   c) Severity Level of Inpatient Stays

Outline of Findings

1. Cost of Inpatient Stays
   a) Major Diagnostic Categories (MDCs)
   b) Medical vs Surgical Medicare Severity Diagnosis-Related Groups (MS-DRGs)
   c) MS-DRGs
   d) Selected Mean Ratios of Above Metrics
2. Related Metrics and Patient Complexity
   a) 30-day Post-Discharge Spending
   b) Length of Stay
   c) Severity Level of Inpatient Stays

1a) Across All but One MDC, Maryland Has Higher Mean Inpatient Spending

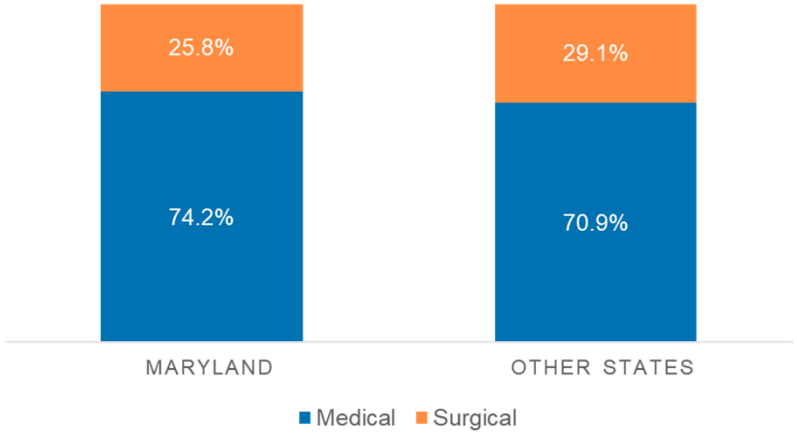
- Maryland has higher mean and median allowed amounts per inpatient stay than other states across all MDCs except one (MDC 22, "Burns")
- The patient complexity case mix is mostly similar for Maryland and other states
  - Most MDCs have a difference of +/- 2 diagnosis codes
- Higher inpatient costs for Maryland are expected
  - Maryland pays higher rates than CMS' Inpatient Prospective Payment System, and pays on a per-service basis rather than based on DRG

1a) Maryland Inpatient Costs have Greater Variation than Other States

- The standard deviation in inpatient costs across MDCs is higher for Maryland than other states (i.e., greater variation in allowed amounts from the mean)
- For most MDCs, cheaper hospitalizations are less expensive in Maryland compared to other states while more expensive hospitalizations are costlier
- These results are expected
  - Maryland's payments are more sensitive to actual services delivered, driving variance at the low and high ends of the distribution

1b) Maryland Has a Higher Share of Medical MS-DRGs than Other States

- Figure shows the breakdown of inpatient stays into medical and surgical MS-DRGs



- The number of prior diagnoses is similar for Maryland and other states
  - Medical: Mean of 29 diagnoses
  - Surgical: Mean of 24 (Maryland) vs. 23 (other states) diagnoses

1b) Maryland's Mean Spending Is Greater for Both Medical and Surgical MS-DRGs

- Maryland's mean allowed amount per inpatient stay is around 1.4 times greater than other states for medical stays, and 1.3 for surgical stays

MS-DRG Type	State	Mean	Distribution of Stay's Allowed Amounts (by Percentile)				
			10th	25th	50th	75th	90th
Medical	Maryland	$17,704	$4,830	$6,728	$10,200	$17,540	$33,414
	Other	$12,655	$5,415	$6,640	$8,977	$12,966	$22,008
Surgical	Maryland	$42,380	$12,088	$16,450	$25,728	$46,003	$83,715
	Other	$32,236	$11,114	$13,528	$19,563	$34,635	$60,587

1c) Maryland Has Higher Spending for Almost All MS-DRGs

- As expected, Maryland has higher allowed amounts for inpatient stays across almost all MS-DRGs
- There are six MS-DRGs where Maryland has lower mean allowed amounts than other states
  - Only one is statistically significantly lower: MS-DRG 895 Alcohol/Drug Abuse Or Dependence W Rehabilitation Therapy
  - All have low counts

1c) MS-DRGs Where Maryland Has Lower Mean Cost Than Other States

MS-DRG	# of Maryland Stays	Distribution of Maryland Inpatient Allowed Amount as % of Other States					
		Mean	10th	25th	50th	75th	90th
250 Perc Cardiovasc Proc W/O Coronary Artery Stent W MCC	69	99%	79%	105%	110%	101%	95%
307 Cardiac Congenital & Valvular Disorders W/O MCC	97	94%	69%	86%	113%	148%	123%
405 Pancreas, Liver & Shunt Procedures W MCC	98	95%	89%	116%	116%	95%	80%
717 Other Male Reproductive System O.R. Proc Exc Malignancy W CC/MCC	62	90%	75%	86%	86%	96%	71%
894 Alcohol/Drug Abuse Or Dependence, Left AMA	88	92%	74%	87%	98%	117%	142%
895 Alcohol/Drug Abuse Or Dependence W Rehabilitation Therapy	178	75%*	100%	100%	76%	75%	66%

*Statistically significantly lower mean

1d) Ratio of Stay Cost to Mean Overall Stay Cost Helps Neutralize Differences

- Maryland has greater variation in spending for inpatient stays than other states, with lower ratios at the 10th percentile and higher ratios at the 90th percentile
- This suggests that the spending for Maryland's inpatient stays is skewed to the right end of the distribution which has the effect of pulling up the mean

MS-DRG Type	State	Ratio to Mean IP Stay	Distribution of Ratio of Stay's Allowed Amounts to Mean IP Stay (by Percentile)				
			10th	25th	50th	75th	90th
Medical	Maryland	0.74	0.20	0.28	0.42	0.73	1.39
	Other	0.69	0.29	0.36	0.49	0.71	1.20
Surgical	Maryland	1.76	0.50	0.68	1.07	1.91	3.48
	Other	1.76	0.61	0.74	1.07	1.89	3.30

1d) Mean Ratios for High Frequency MDCs are Mixed

Compared to their respective means, Maryland spends more for respiratory and musculoskeletal MDCs than other states, and less for circulatory and infectious disease MDCs.

MDC	State	% of Stays	Ratio to Mean IP Stay	Distribution of Ratio of Stay's Allowed Amounts to Mean IP Stay (by Percentile)				
				10th	25th	50th	75th	90th
04 Diseases & Disorders of the Respiratory System	Maryland	12.5%	0.83	0.23	0.31	0.46	0.81	1.58
	Other	12.2%	0.75	0.32	0.40	0.50	0.75	1.41
05 Diseases & Disorders of the Circulatory System	Maryland	19.0%	1.04	0.21	0.31	0.53	1.14	2.28
	Other	20.7%	1.12	0.30	0.41	0.61	1.21	2.29
08 Diseases & Disorders of the Musculoskeletal System & Connective Tissue	Maryland	12.8%	1.20	0.33	0.55	0.82	1.36	2.33
	Other	13.7%	1.17	0.40	0.63	0.80	1.23	2.22
18 Infectious & Parasitic Diseases, Systemic or Unspecified Sites	Maryland	9.7%	1.16	0.26	0.38	0.62	1.21	2.33
	Other	10.6%	1.19	0.41	0.60	0.73	1.18	2.25

1d) Most MDCs with Large Differences in Ratio Have Few Stays

- We examined MDCs where the magnitude of the difference in ratio to mean overall cost is greatest
- Only 2 MDCs (below) had more than 1,000 stays in Maryland
  - MDC 23 "Factors Influencing Health Status & Other Contacts with Health Services" is excluded because of high degree of heterogeneity within MS-DRGs

MDC	State	# of Stays	Ratio to Mean IP Stay	Distribution of Ratio of Stay's Allowed Amounts to Mean IP Stay (by Percentile)				
				10th	25th	50th	75th	90th
17 Myeloproliferative Diseases & Disorders, Poorly Differentiated Neoplasms	Maryland	1,418	2.45	0.33	0.49	0.96	2.29	4.81
	Other	3,196	1.96	0.49	0.65	1.06	1.97	3.91
19 Mental Diseases & Disorders	Maryland	6,671	0.78	0.20	0.29	0.45	0.82	1.62
	Other	4,714	0.62	0.35	0.42	0.48	0.58	1.00

Outline of Findings

1. Cost of Inpatient Stays
   a) Major Diagnostic Categories (MDCs)
   b) Medical vs Surgical Medicare Severity Diagnosis-Related Groups (MS-DRGs)
   c) MS-DRGs
   d) Selected Mean Ratios of Above Metrics
2. Related Metrics and Patient Complexity
   a) 30-day Post-Discharge Spending
   b) Length of Stay
   c) Severity Level of Inpatient Stays

2a) Difference in Maryland Spending Decreases w/ Addition of 30 Day Post-Discharge Cost (1 of 2)

MS-DRG Type	State	Distribution of Inpatient Stay Allowed Amounts					
		Mean	10th	25th	50th	75th	90th
Medical	Maryland	$17,704	$4,830	$6,728	$10,200	$17,540	$33,414
	Other	$12,655	$5,415	$6,640	$8,977	$12,966	$22,008
Surgical	Maryland	$42,380	$12,088	$16,450	$25,728	$46,003	$83,715
	Other	$32,236	$11,114	$13,528	$19,563	$34,635	$60,587

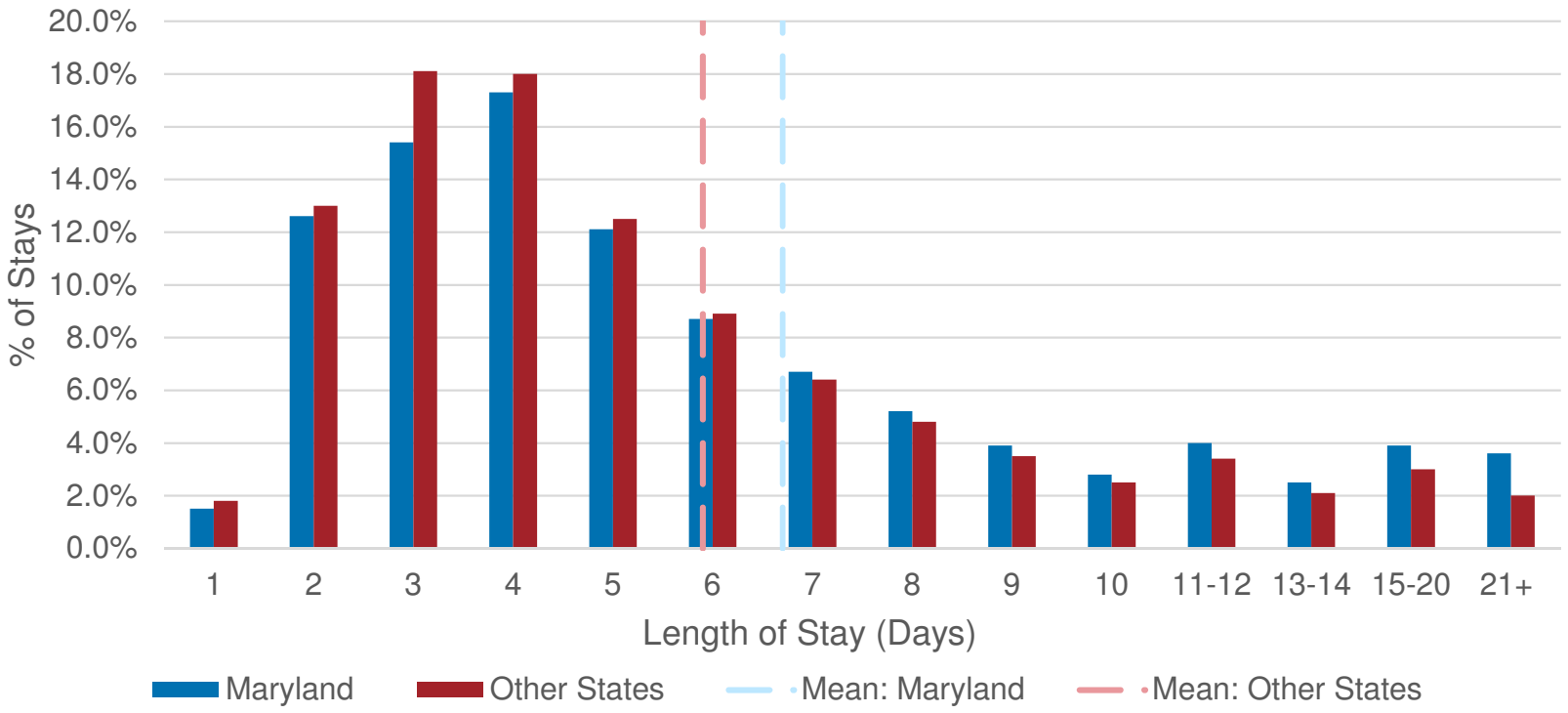
- Maryland Inpatient Stay Allowed Amounts as a Percent of Other States
  - Medical: 139.9%
  - Surgical: 131.5%

2a) Difference in Maryland Spending Decreases w/ Addition of 30 Day Post-Discharge Cost (2 of 2)

MS-DRG Type	State	Distribution of Inpatient Stay and 30-Day Post-Discharge Inpatient, Outpatient, and Physician/Supplier Allowed Amounts					
		Mean	10th	25th	50th	75th	90th
Medical	Maryland	$35,486	$7,541	$12,116	$22,829	$40,980	$70,550
	Other	$28,223	$8,028	$11,648	$19,681	$34,310	$54,129
Surgical	Maryland	$62,347	$17,171	$25,834	$42,949	$71,115	$120,141
	Other	$50,041	$15,386	$21,354	$34,913	$56,868	$93,787

- Maryland Inpatient Stay and 30-Day Post-Discharge Allowed Amounts as a Percent of Other States
  - Medical: 125.7% (Decrease in 14.2 percentage points)
  - Surgical: 124.6% (Decrease in 6.9 percentage points)
- Limitations: Maryland's higher inpatient costs are not accounted for, nor does this distinguish between the types of post-discharge care (e.g., related vs unrelated costs to the inpatient stay, costs expected due to patient acuity)

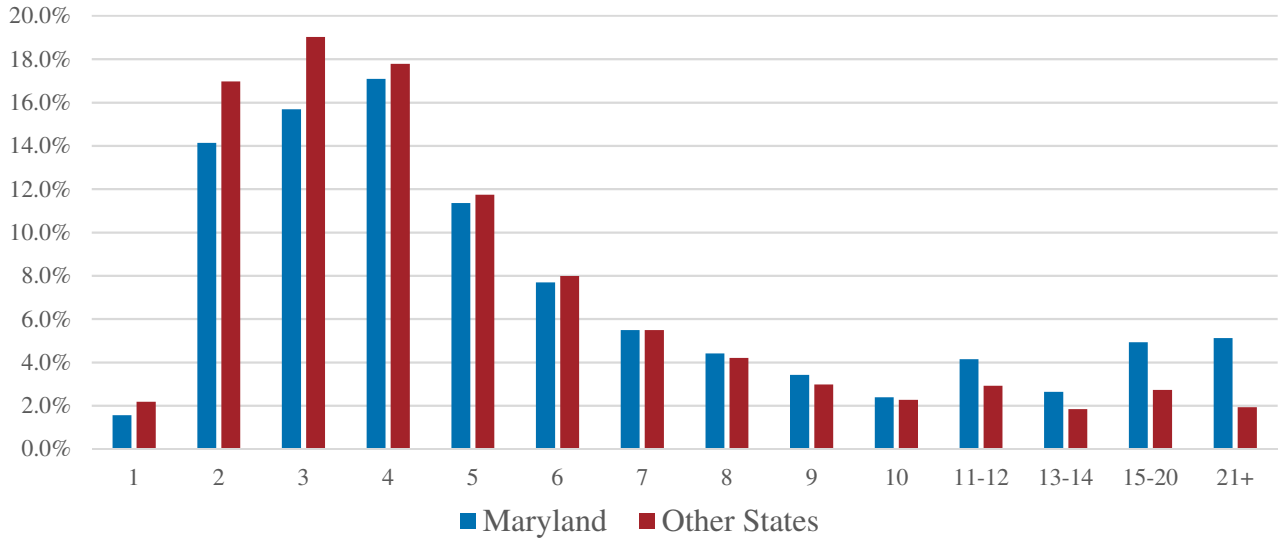
2b) Maryland Has Longer Mean Length of Stay & Larger Share of Long Stays



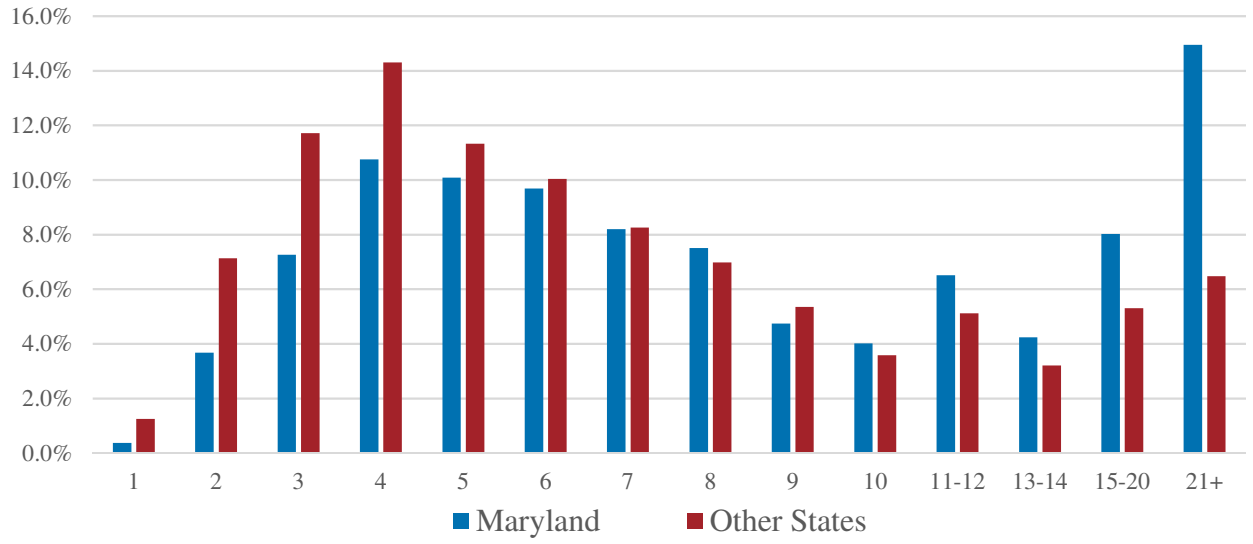
- Particular MDCs have notably different trends between Maryland and other states

2b) Maryland has Much Greater Share of Long Stays for 3 MDCs than Other States (1 of 2)

MDC 1 "Disease & Disorders Of The Nervous System"

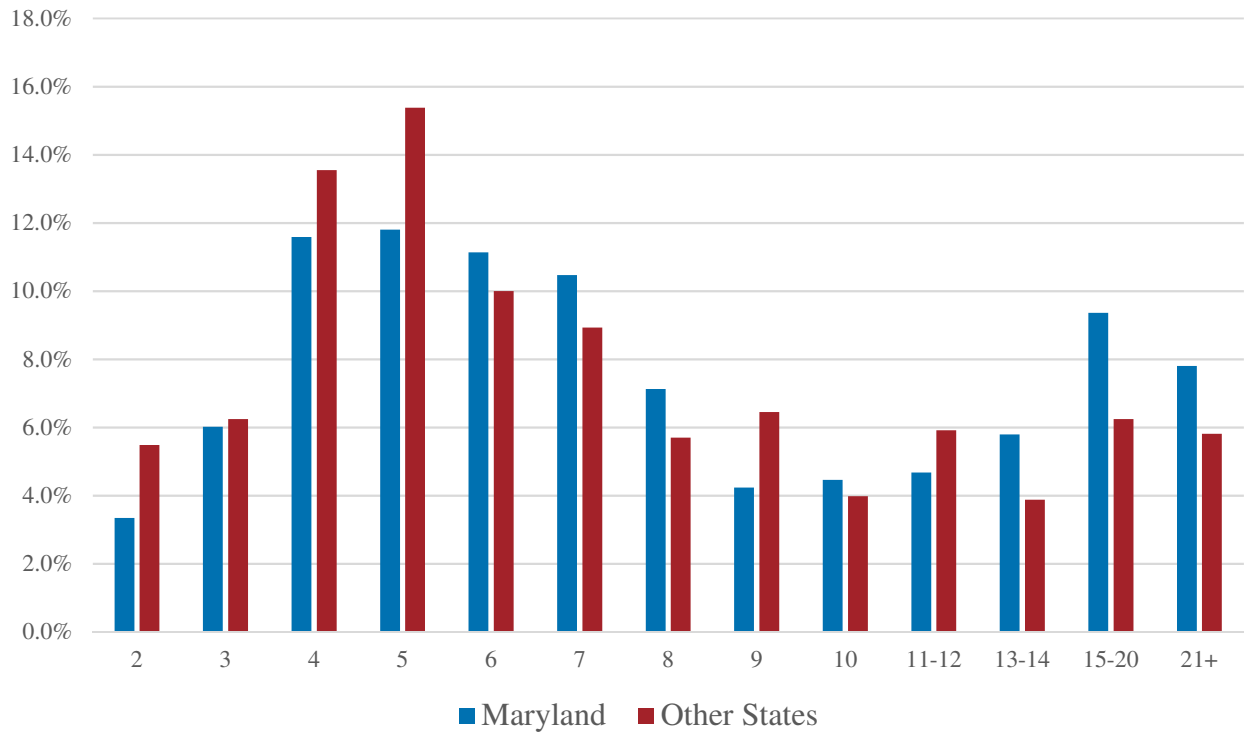


MDC 19 "Mental Diseases & Disorders"



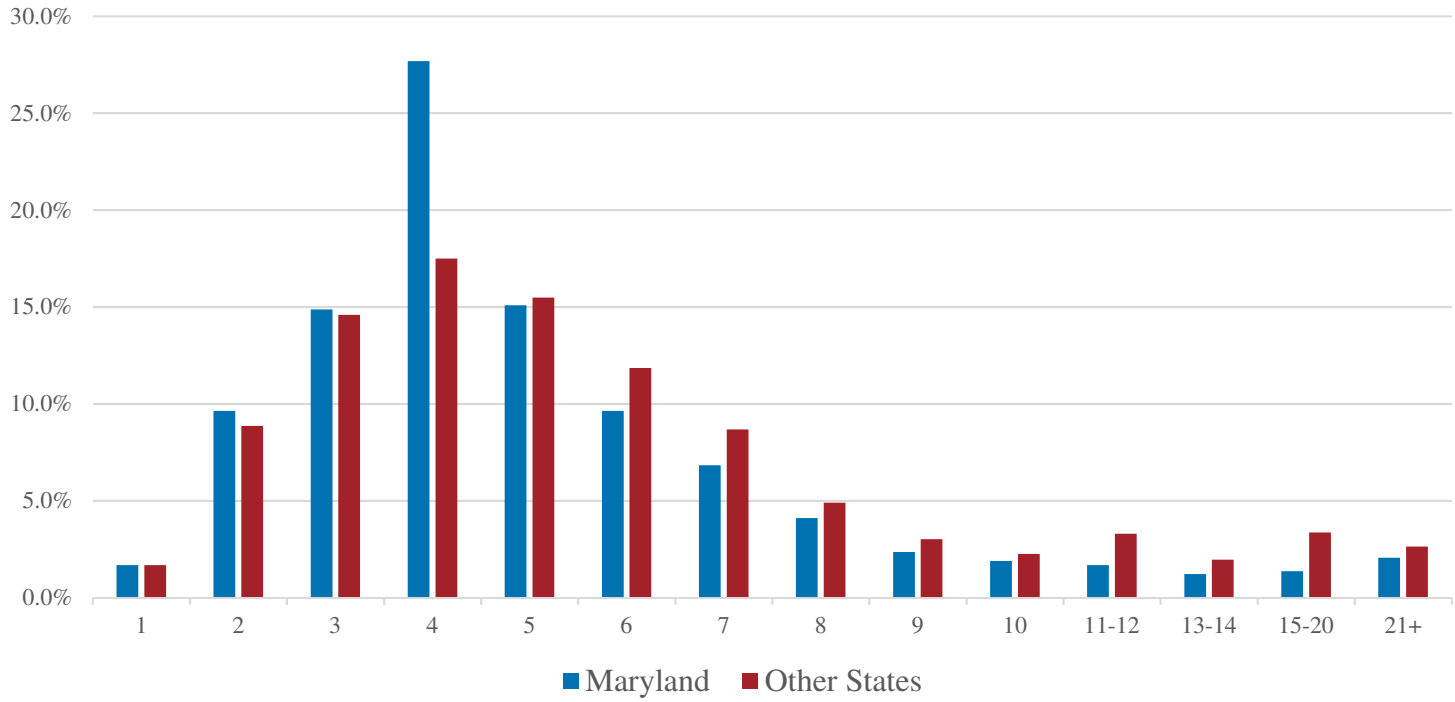
2b) Maryland has Much Greater Share of Long Stays for 3 MDCs than Other States (2 of 2)

MDC 24 "Multiple Significant Trauma"



2b) MDC 20: Maryland has Far More Short Stays than Other States

MDC 20 "Alcohol/Drug Use & Alcohol/Drug Induced Organic Mental Disorders"



2c) MD has Smaller Share of Stays at Highest Severity for Common DRGs (1 of 2)

- For 8 of the 10 most frequently billed MS-DRGs across all states, Maryland has a smaller share of stays falling into the highest severity level

MS -DRG		Maryland		Other	Difference in Share of Highest Severity (pp)
		# of Stays	% of Stays in Base DRG	% of Stays in Base DRG	
64	Intracranial Hemorrhage Or Cerebral Infarction W MCC	1,940	32.20%	35.70%	-3.5
65	Intracranial Hemorrhage Or Cerebral Infarction W CC Or Tpa In 24 Hrs	3,144	52.20%	49.10%	
66	Intracranial Hemorrhage Or Cerebral Infarction W/O CC/MCC	941	15.60%	15.20%	
190	Chronic Obstructive Pulmonary Disease W MCC	3,785	60.50%	59.30%	1.2
191	Chronic Obstructive Pulmonary Disease W CC	1,835	29.30%	30.20%	
192	Chronic Obstructive Pulmonary Disease W/O CC/MCC	637	10.20%	10.40%	
193	Simple Pneumonia & Pleurisy W MCC	2,247	38.70%	54.10%	-15.4
194	Simple Pneumonia & Pleurisy W CC	2,929	50.50%	37.10%	
195	Simple Pneumonia & Pleurisy W/O CC/MCC	623	10.70%	8.80%	
291	Heart Failure & Shock W MCC Or Peripheral Extracorporeal Membrane Oxygenation (ECMO)	8,063	69.70%	79.30%	-9.6
292	Heart Failure & Shock W CC	2,798	24.20%	15.90%	
293	Heart Failure & Shock W/O CC/MCC	703	6.10%	4.80%	
308	Cardiac Arrhythmia & Conduction Disorders W MCC	1,423	34.40%	33.20%	1.2
309	Cardiac Arrhythmia & Conduction Disorders W CC	1,808	43.70%	40.80%	
310	Cardiac Arrhythmia & Conduction Disorders W/O CC/MCC	909	22.00%	26.10%	

2c) MD has Smaller Share of Stays at Highest Severity for Common DRGs (2 of 2)

MS -DRG		Maryland		Other	Difference in Share of Highest Severity (pp)
		# of Stays	% of Stays in Base DRG	% of Stays in Base DRG	
377	G.I. Hemorrhage W MCC	1,356	29.4%	32.8%	-3.4
378	G.I. Hemorrhage W CC	2,688	58.3%	60.0%	
379	G.I. Hemorrhage W/O CC/MCC	566	12.3%	7.1%	
469	Major Hip And Knee Joint Replacement Or Reattachment Of Lower Extremity W MCC Or Total Ankle Replacement	470	5.6%	5.9%	-0.3
470	Major Hip And Knee Joint Replacement Or Reattachment Of Lower Extremity W/O MCC	7,859	94.4%	94.1%	
682	Renal Failure W MCC	1,831	40.0%	43.5%	-3.5
683	Renal Failure W CC	2,475	54.0%	50.5%	
684	Renal Failure W/O CC/MCC	276	6.0%	6.0%	
689	Kidney & Urinary Tract Infections W MCC	1,286	25.4%	39.5%	-14.1
690	Kidney & Urinary Tract Infections W/O MCC	3,768	74.6%	60.5%	
871	Septicemia Or Severe Sepsis W/O Mv >96 Hours W MCC	12,011	72.4%	77.0%	-4.6
872	Septicemia Or Severe Sepsis W/O Mv >96 Hours W/O MCC	3,975	23.9%	19.0%	

Outline

- Project Introduction
- Evaluation Approach
- Findings
- **Summary**

Future Research Could Address Study Limitations

- Increase sample size and study additional years
- Use payment standardized costs to remove variation unrelated to care decisions
- Account for the impact of patient complexity and case mix on inpatient cost through risk adjustment
- Assess patient outcomes alongside cost metrics

Summary of Findings

- Across several ways of aggregating inpatient stays, Maryland has higher inpatient spending than other states
- Maryland's inpatient spending has greater variation than other states
- Difference in Maryland spending decreases when considering 30-day post-discharge cost
- Maryland has a higher average length of stay than other states, with some types of stays showing markedly different trends
- For the 10 most frequently billed MS-DRGs, Maryland has a lower share of inpatient stays at the highest severity level
- Analyses can be refined to take into account patient complexity and differences in payment unrelated to care decisions

Thank You