
Performance Measurement Work Group

April 20, 2016

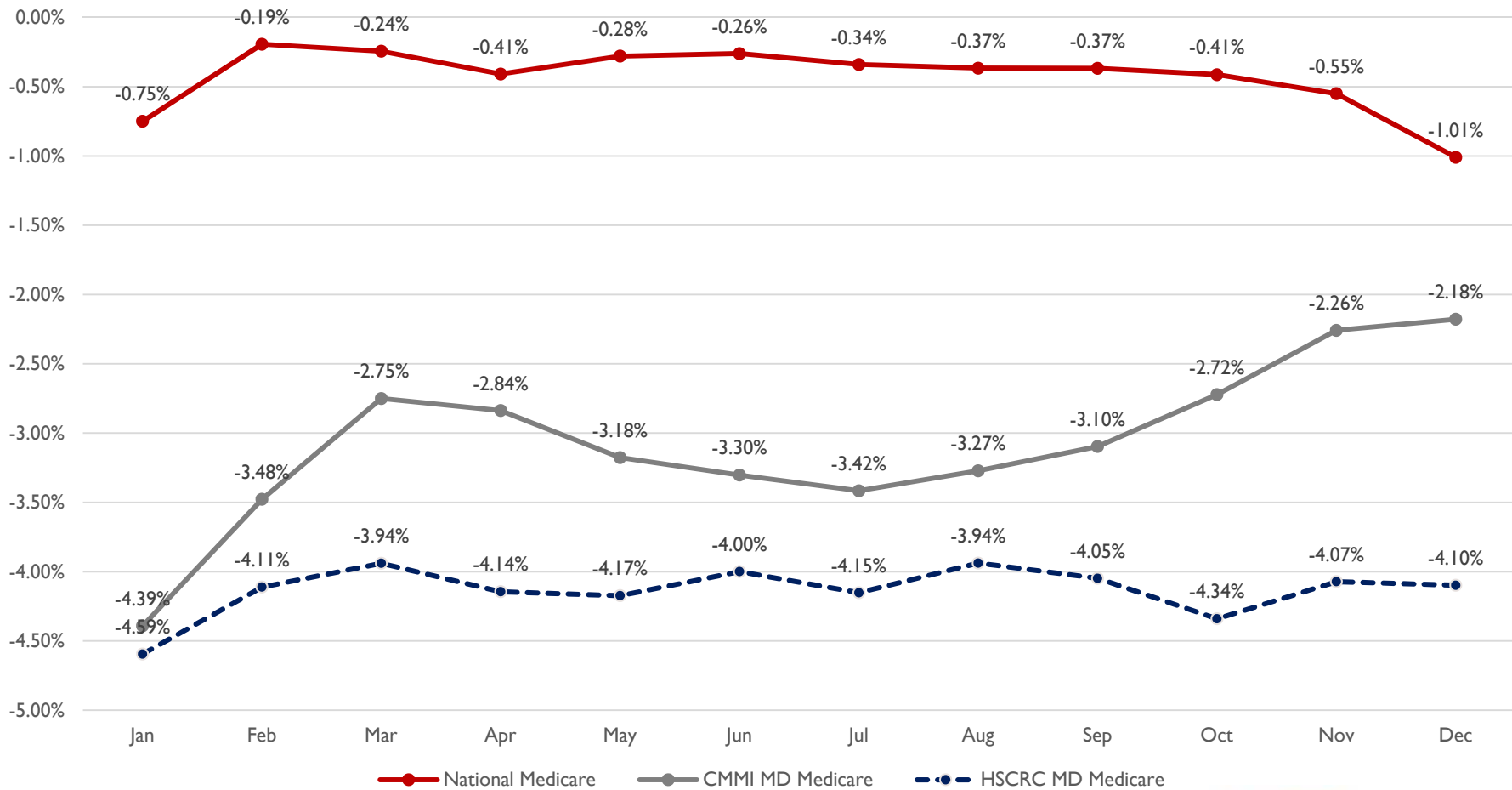
HSCRC

Health Services Cost
Review Commission

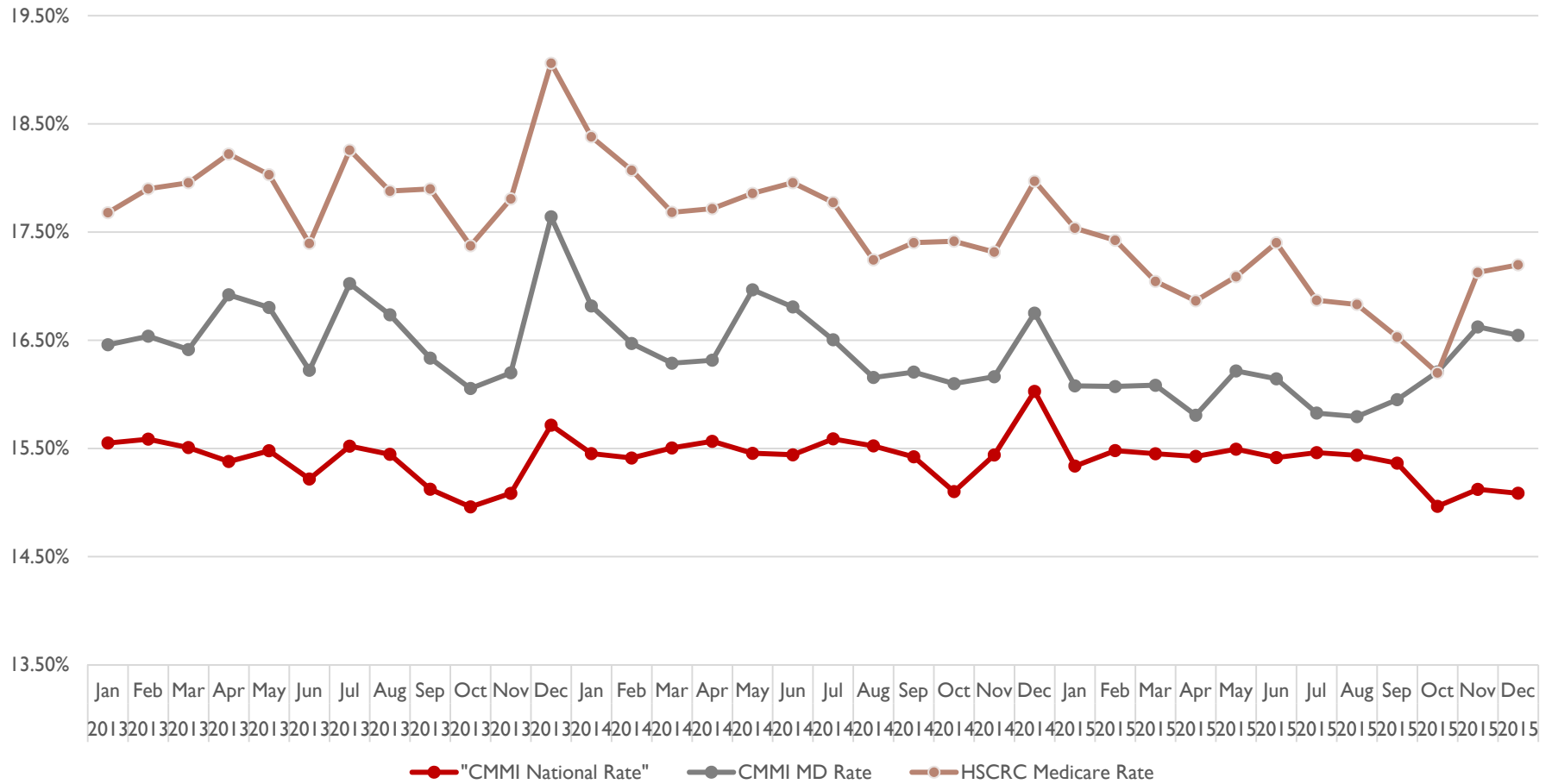
Readmission Reduction Incentive Program (RRIP) Update Considerations

ICD-10 issue has been identified in CMMI Medicare Readmission Trend

Cumulative Readmission Rate Change by Month CY15 vs CY14: Maryland vs Nation



Medicare Readmission Rates- 2013 - Present



CMMI Target Calculation

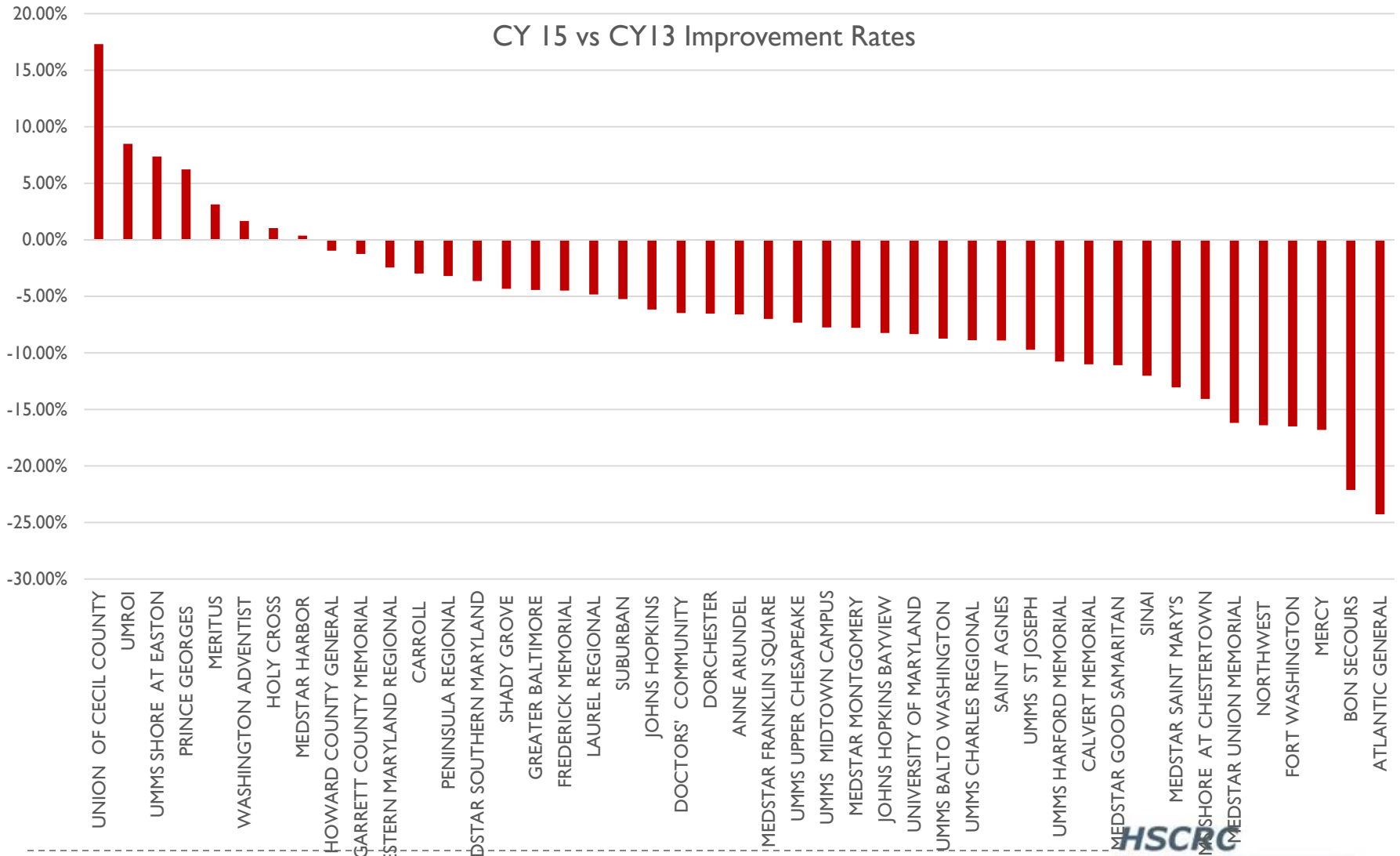
Base Year Statistics

CY 2013 National Medicare Readmission Rate	A	15.39%
CY 2013 MD Medicare Readmission Rate	B	16.61%
MD vs National Difference	C=B-A	1.22%
Annual Requirement to Close the Gap	D=C/5	0.24%

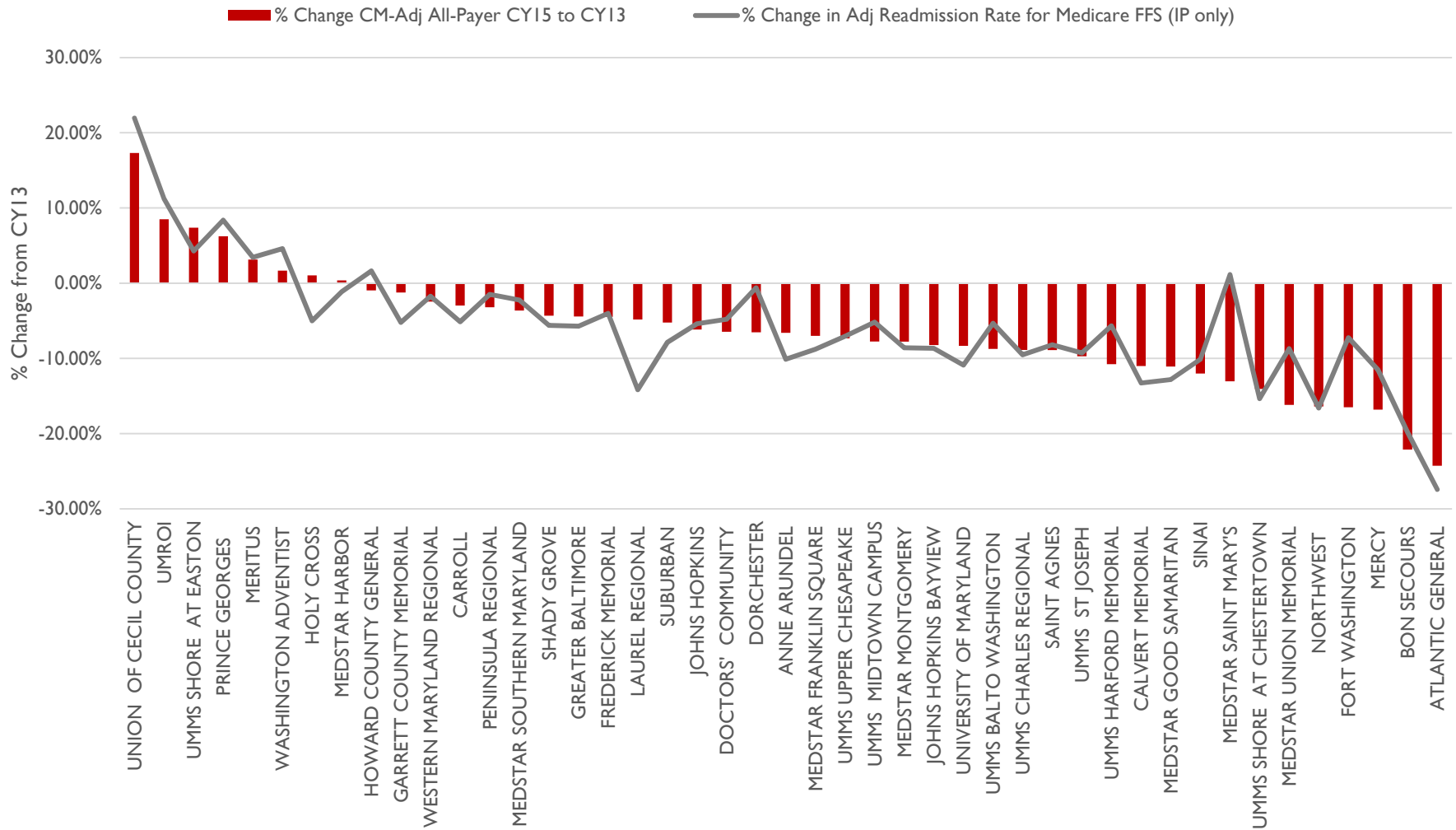
CY 2014 Results and CY 2015 Projections

	National	MD-National Difference	MD Target	MD Actual	National % Annual Change	MD % Annual Target	MD % Actual Change
CY14	15.50%	0.98%	16.48%	16.47%	0.71%	-0.81%	-0.84%
CY15-November Trend	15.41%	0.73%	16.15%	16.10%	-0.55%	-2.00%	-2.26%
CY 15-December Trend	15.34%	0.73%	16.08%	16.12%	-1.01%	-2.43%	-2.18%

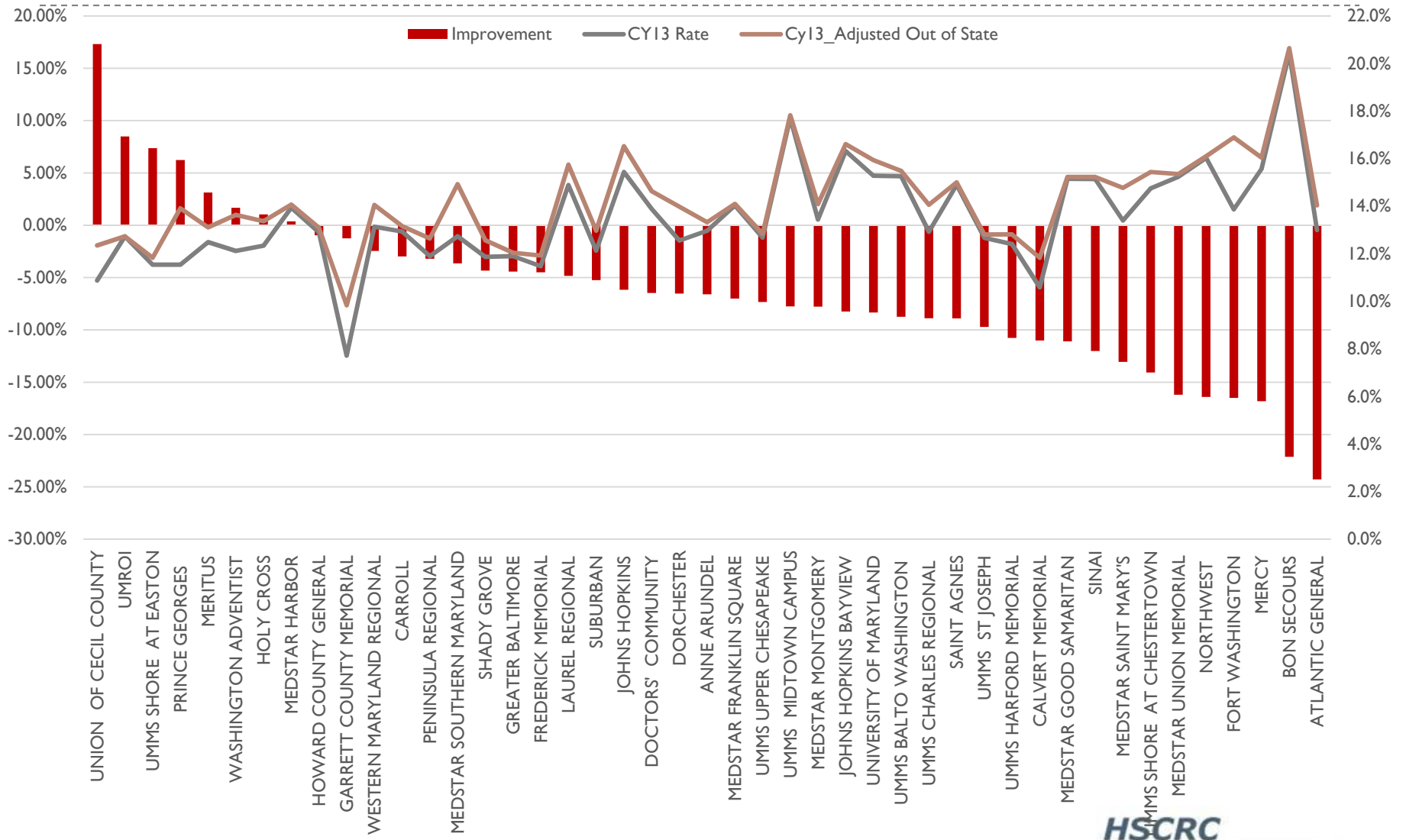
FY 2017 RRIP Results



All Payer vs. Medicare Improvement



Improvement Rates vs Base Rate



Development of a Risk-Adjusted
Readmission Rate
Preliminary Results

April 20, 2016

Matthew Sweeney



Overview of recent work

- ▶ **Develops regression-based adjustment model**
 - ▶ **Converts current approach to use regression-based approach**
 - ▶ APR-DRG SOI fixed effects model
 - ▶ **Assesses model fit and predictive properties**
 - ▶ **Tests whether simpler model yields similar results**
 - ▶ Reduces the number of variables needed in the model

- ▶ **Tests impacts of adding covariates to the model**
 - ▶ **Impacts on model fit**
 - ▶ **Impacts on hospital rates, and improvement from CY2013 to CY2015**
 - ▶ **Covariates tested:**
 - ▶ Age
 - ▶ Gender
 - ▶ Elixhauser co-morbidities
 - ▶ Primary payer
 - ▶ ADI

Converting Current Approach

▶ Indirect standardization

- ▶ Calculate statewide readmission norms for each APR-DRG SOI category
- ▶ Calculate hospital-level predicted readmission, based on relative frequency of APR-DRG SOI categories

▶ Fixed effects regression

- ▶ Mathematically, yields identical number of predicted readmissions
- ▶ Stay-level regression
 - ▶ Dependent variable: 0/1 indicator for 30-day readmission
 - ▶ Independent variables: 0/1 indicator for each of the ~1100 APR-DRG SOI categories
- ▶ **Pros:**
 - ▶ Facilitates assessment of explanatory power and predictive ability
 - ▶ Easy to measure impact of additional covariates
- ▶ **Con:**
 - ▶ Computationally intensive

Alternate Models

▶ “Norms” – based regression

- ▶ **Replace APR-DRG SOI indicators with CY 2013 norms (single variable)**
 - ▶ Proxy for a readmission-based APR-DRG weight
 - ▶ Log-transformation improves model fit

▶ Test impact of additional covariates

- ▶ **Patient age and gender**
- ▶ **Elixhauser co-morbidities**
 - ▶ 31 indicators for various conditions
 - ▶ Calculated based on information from the index stay
- ▶ **Primary payer**
 - ▶ Medicare FFS
 - ▶ Medicare Managed Care
 - ▶ Medicaid
 - ▶ Commercial
 - ▶ Self pay
 - ▶ Other
- ▶ **ADI**
 - ▶ Indicators for each of the 20 quantiles of the ADI distribution

Data and Methods

▶ Data:

- ▶ CY 2013 and CY 2015 inpatient data

▶ Methods:

▶ Regressions

- ▶ Estimate logistic model on CY 2013 stays
- ▶ Calculate predicted probability of readmission for both CY 2013 and CY 2015 stays
 - CY 2015 predicted values are benchmarked to CY 2013, similar to current approach
- ▶ Measure R-square and c-statistic
 - R-square: how much variation is explained by the model?
 - C- statistic: how well does model predict readmission?

▶ Hospital-level rates

- ▶ Calculate sum of predicted probabilities for each hospital
- ▶ Calculate O/E ratio (where E = sum of predicted probabilities)
- ▶ $O/E \times \text{State Rate in CY 2013} = \text{risk-adjusted rate}$
- ▶ Calculate percent improvement between CY 2013 and CY 2015 for each hospital

Summary of Models

Model	APR-SOI Fixed Effects	CY 2013 Norms	Age and Gender	Elixhauser Comorbidities	Payer	ADI
Baseline	Yes	No	No	No	No	No
15	No	Yes	No	No	No	No
18	No	Yes	Yes	Yes	No	No
19	No	Yes	Yes	Yes	Yes	No
20	No	Yes	Yes	Yes	Yes	Yes

Model Fit Statistics

Model	Controls	Number of Observations	c-statistic	Max-rescaled R square
Baseline	APR-DRG SOI Fixed Effects	561,903	0.712	0.128
15	CY 2013 Norms	561,903	0.712	0.127
18	Model 15 Plus: Age, Gender, Comorbidities	561,903	0.726	0.142
19	Model 18 Plus: Primary Payer	561,903	0.730	0.147
20	Model 19 Plus: ADI	561,903	0.731	0.148

Model Coefficients: Fully Adjusted Model

	<u>Coefficient</u>	<u>Odds Ratio</u>		<u>Coefficient</u>	<u>Odds Ratio</u>
CY-Norms (logged)	-0.942	-2.566			
Male	0.045	1.046			
Age Group	<u>Coefficient</u>	<u>Odds Ratio</u>	Primary Payer	<u>Coefficient</u>	<u>Odds Ratio</u>
0 - 17 years	-0.374	0.688	Medicare FFS	0.355	1.426
18 - 39 years	<i>Ref.</i>	<i>Ref.</i>	Medicare MCO	0.381	1.464
40 - 64 years	-0.077	0.926	Medicaid	0.398	1.488
65 - 84 years	-0.305	0.737	Commercial	<i>Ref.</i>	<i>Ref.</i>
85 and older	-0.379	0.685	Self	-0.052	0.949
Individual Elixhauser Comorbidities:	<u>Coefficient</u>	<u>Odds Ratio</u>	<i>Other</i>	<i>0.027</i>	<i>1.027</i>
Congestive Heart Failure	<i>Ref.</i>	<i>Ref.</i>	ADI Quintile	<u>Coefficient</u>	<u>Odds Ratio</u>
Cardiac Arrhythmia	-0.091	0.913	1st (lowest)	<i>Ref.</i>	<i>Ref.</i>
Valvular Disease	-0.218	0.804	2nd	<i>0.063</i>	<i>1.065</i>
Pulmonary Circulation Disorders	-0.138	0.871	3rd	<i>0.045</i>	<i>1.046</i>
Peripheral Vascular Disorders	-0.087	0.917	4th	0.073	1.075
Hypertension Uncomplicated	-0.138	0.871	5th	<i>0.021</i>	<i>1.021</i>
Hypertension Complicated	-0.161	0.852	6th	<i>0.040</i>	<i>1.040</i>
Paralysis	-0.060	0.942	7th	<i>0.021</i>	<i>1.021</i>
<i>Other Neurological Disorders</i>	<i>-0.028</i>	<i>0.972</i>	8th	0.103	1.108
Chronic Pulmonary Disease	-0.073	0.930	9th	<i>0.058</i>	<i>1.059</i>
Diabetes Uncomplicated	-0.063	0.939	10th	0.107	1.113
<i>Diabetes Complicated</i>	<i>0.022</i>	<i>1.023</i>	11th	0.102	1.107
Hypothyroidism	-0.133	0.876	12th	<i>0.051</i>	<i>1.052</i>
Renal Failure	0.170	1.185	13th	<i>0.030</i>	<i>1.031</i>
<i>Liver Disease</i>	<i>-0.018</i>	<i>0.982</i>	14th	0.113	1.120
<i>Peptic Ulcer Disease excluding bleeding</i>	<i>-0.037</i>	<i>0.964</i>	15th	0.113	1.119
<i>AIDS/HIV</i>	<i>0.046</i>	<i>1.047</i>	16th	0.119	1.127
Lymphoma	0.105	1.110	17th	0.130	1.138
Metastatic Cancer	0.125	1.134	18th	0.116	1.123
Solid Tumor without Metastasis	0.088	1.092	19th	0.175	1.191
Rheumatoid Arthritis/collagen	-0.059	0.943	20th (highest)	0.161	1.175
Coagulopathy	-0.174	0.840	ADI Missing	-0.160	0.853
Obesity	-0.299	0.741			
Weight Loss	-0.060	0.941			
Fluid and Electrolyte Disorders	-0.157	0.854			
Blood Loss Anemia	-0.126	0.881			
Deficiency Anemia	-0.142	0.868			
Alcohol Abuse	-0.101	0.904			
<i>Drug Abuse</i>	<i>0.008</i>	<i>1.008</i>			
<i>Psychoses</i>	<i>0.014</i>	<i>1.014</i>			
<i>Depression</i>	<i>-0.024</i>	<i>0.976</i>			
Number of Comorbidities (Elixhauser)	0.165	1.180			

Note: coefficients in italics are not statistically significant at the 5 percent level

Impact on Rates: CY2013

	Baseline	Model 15	Model 18	Model 19	Model 20
Baseline	1.000	0.999	0.964	0.943	0.908
Model 15	0.999	1.000	0.965	0.944	0.909
Model 18	0.964	0.965	1.000	0.992	0.978
Model 19	0.943	0.944	0.992	1.000	0.992
Model 20	0.908	0.909	0.978	0.992	1.000

Source: Mathematica analysis of CY 2013 Readmissions data provided by HSCRC.

Notes:

- (1) Each of the correlation coefficients reported in the table are statistically significant at the <.0001 level.
- (2) Baseline model controls for APR-DRG SOI fixed effects
- (3) Model 15: controls for (logged) CY 2013 norms
- (4) Model 18: Model 15 plus age, gender, and co-morbidity controls
- (5) Model 19: Model 18 plus primary payer controls
- (6) Model 20: Model 19 plus ADI controls

Impact on Improvement Rate: CY 2015 vs CY 2013

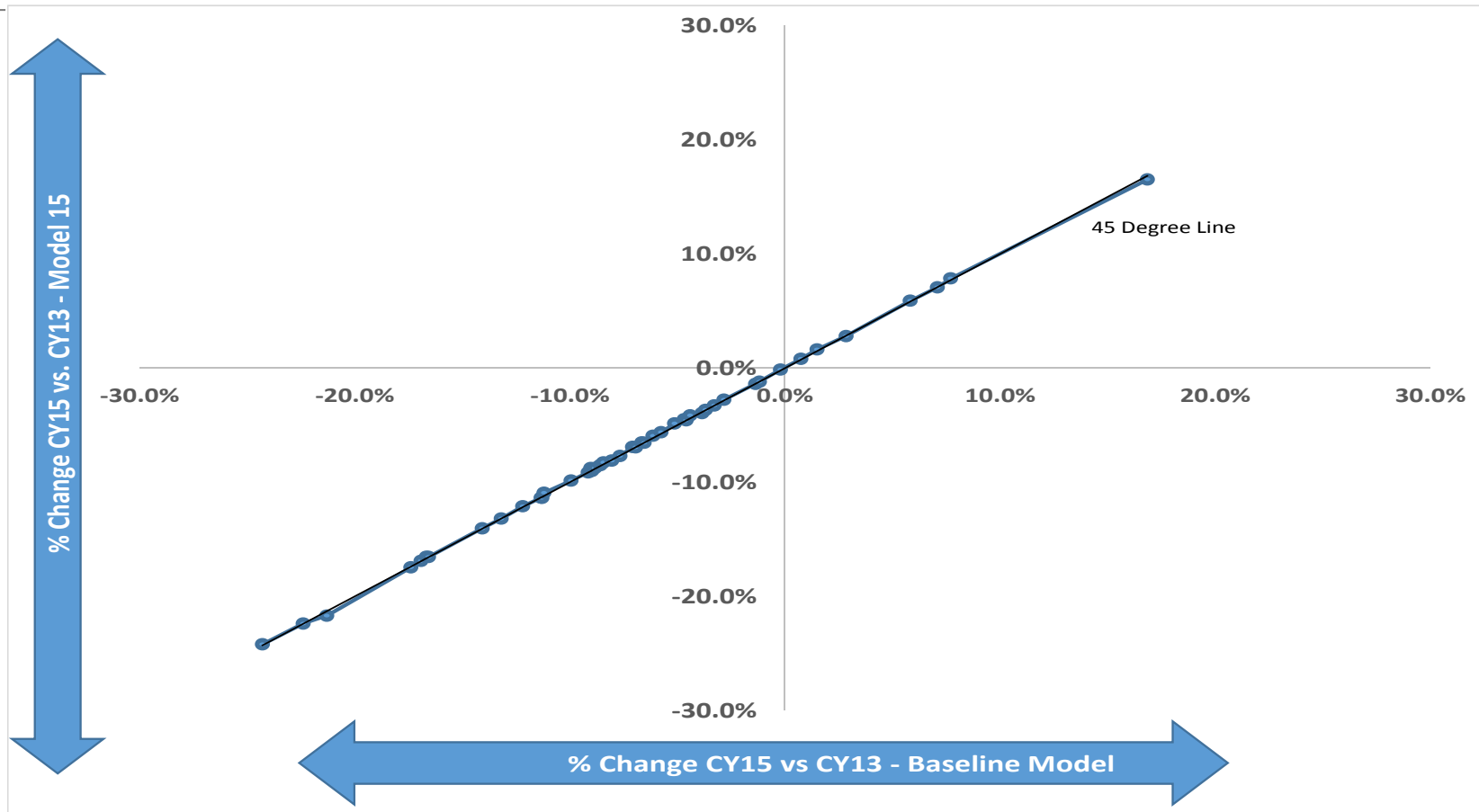
	Baseline	Model 15	Model 18	Model 19	Model 20
Baseline	1.000	0.999	0.977	0.980	0.981
Model 15	0.999	1.000	0.976	0.979	0.980
Model 18	0.977	0.976	1.000	0.989	0.989
Model 19	0.980	0.979	0.989	1.000	0.999
Model 20	0.981	0.980	0.989	0.999	1.000

Source: Mathematica analysis of CY 2013 and CY 2015 Readmissions data provided by HSCRC.

Notes:

- (1) Each of the correlation coefficients reported in the table are statistically significant at the <.0001 level.
- (2) Baseline model controls for APR-DRG SOI fixed effects
- (3) Model 15: controls for (logged) CY 2013 norms
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- (5) Model 19: Model 18 plus primary payer controls
- (6) Model 20: Model 19 plus ADI controls

Impact of Using Norm-based Regression

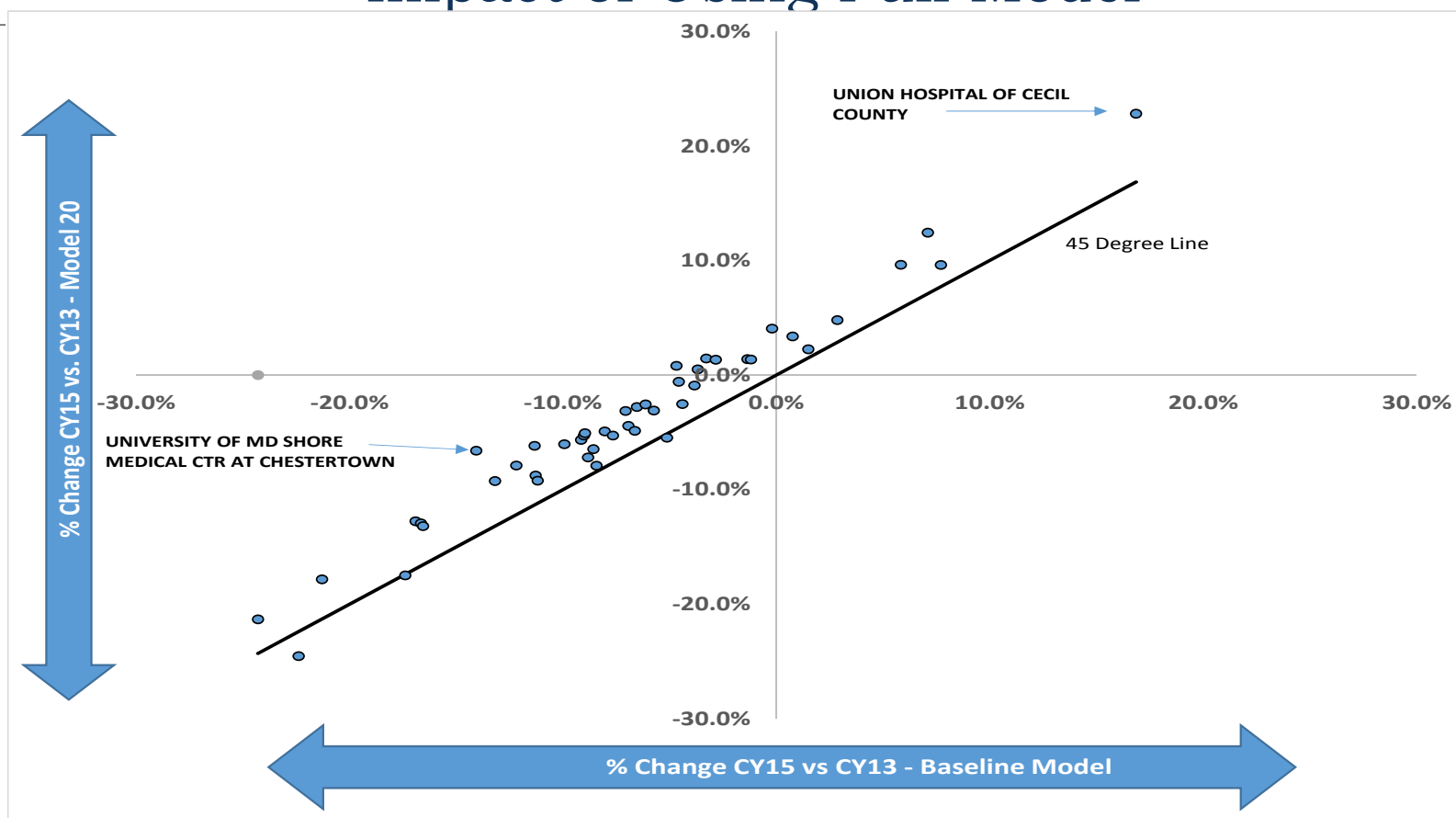


Source: Mathematica analysis of CY 2013 and CY 2015 Readmissions data provided by HSCRC.

Notes:

- (1) Baseline model controls for APR-DRG SOI fixed effects
- (2) Model 15: controls for (logged) CY 2013 norms

Impact of Using Full Model

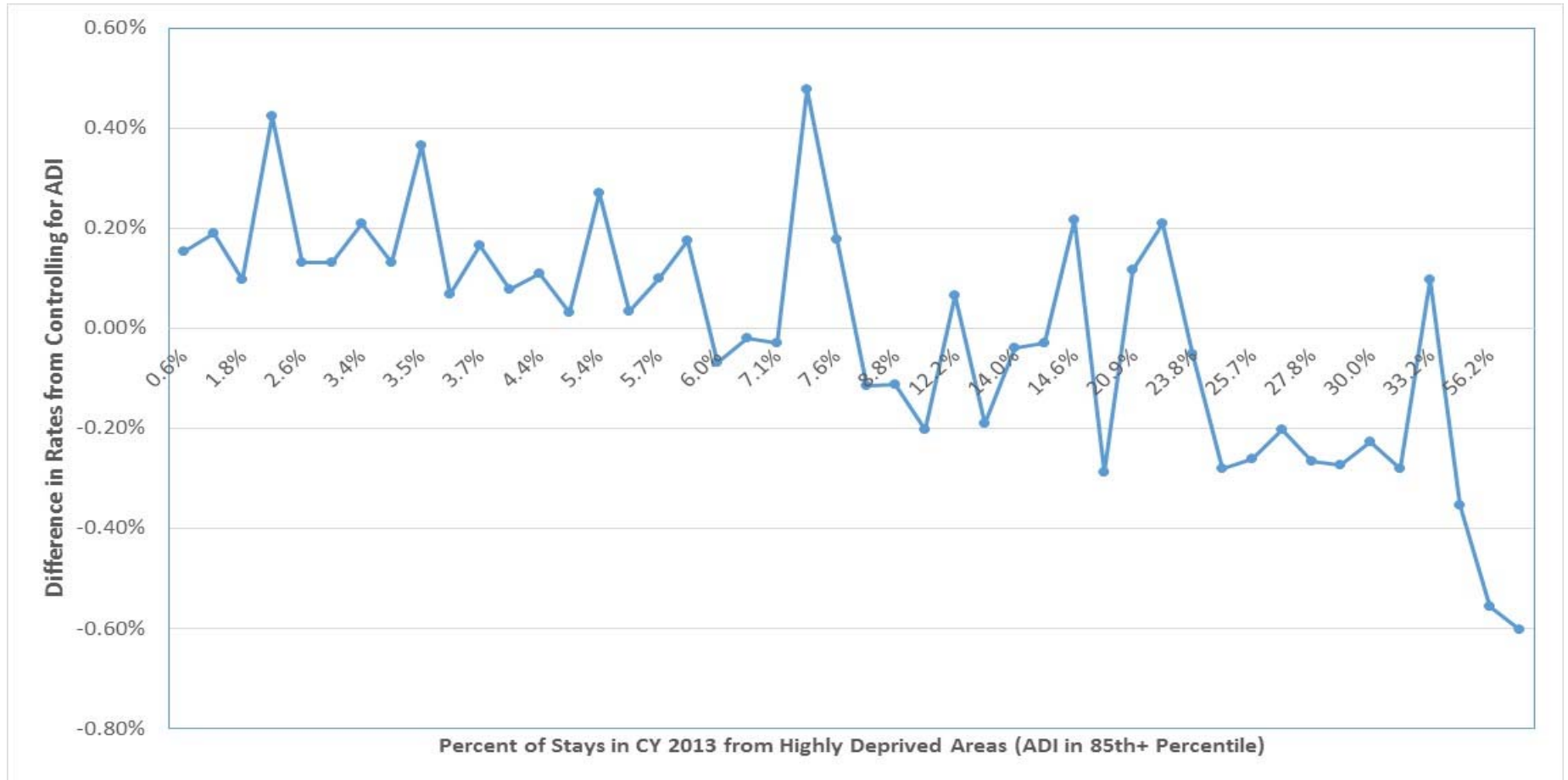


Source: Mathematica analysis of CY 2013 and CY 2015 Readmissions data provided by HSCRC.

Notes:

- (1) Baseline model controls for APR-DRG SOI fixed effects
- (2) Model 20: controls for (logged) CY 2013 norms, age, gender, comorbidities, primary payer, and ADI

Impact of Adjusting for ADI

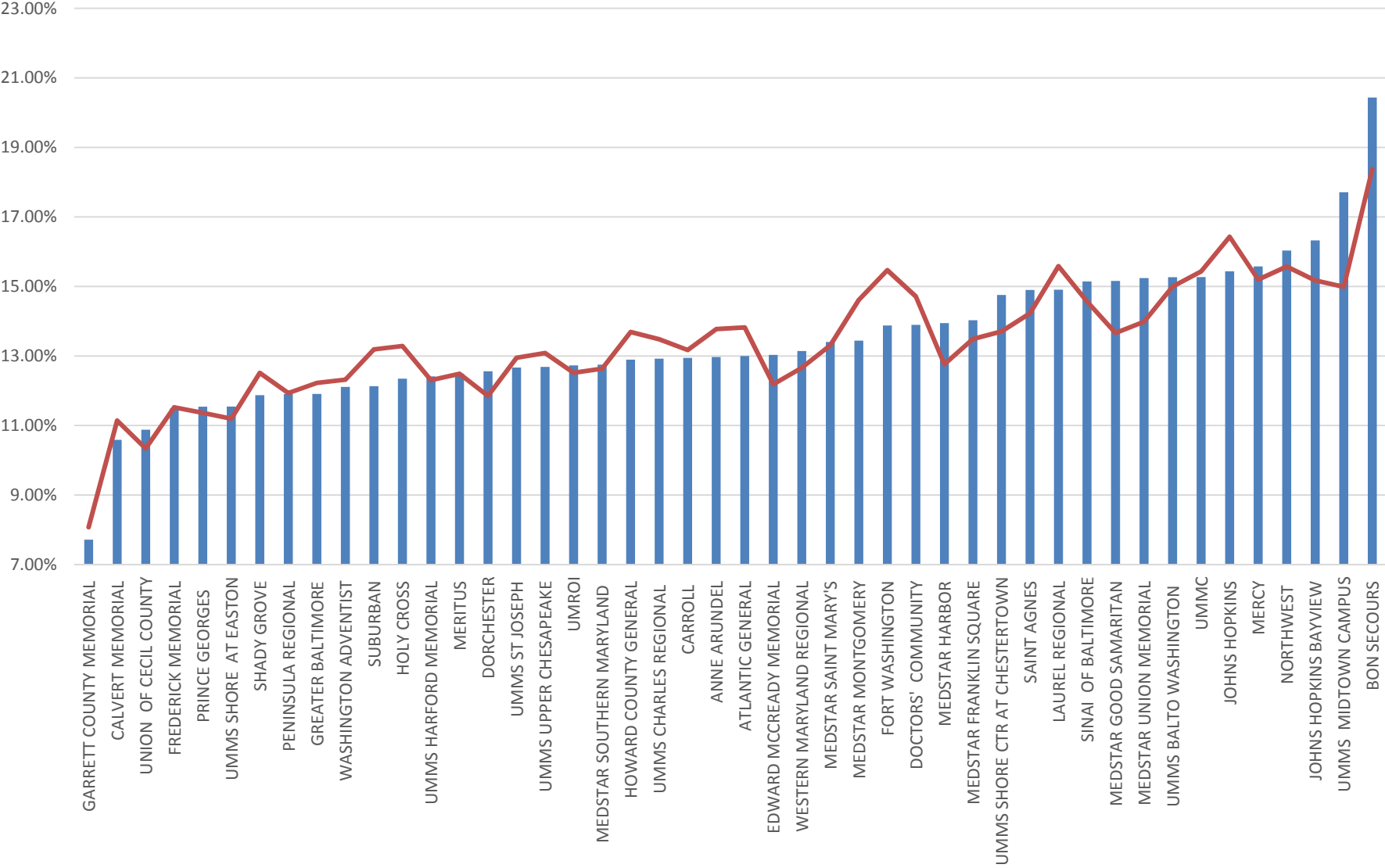


Source: Mathematica analysis of CY 2013 Readmissions data provided by HSCRC.

Notes:

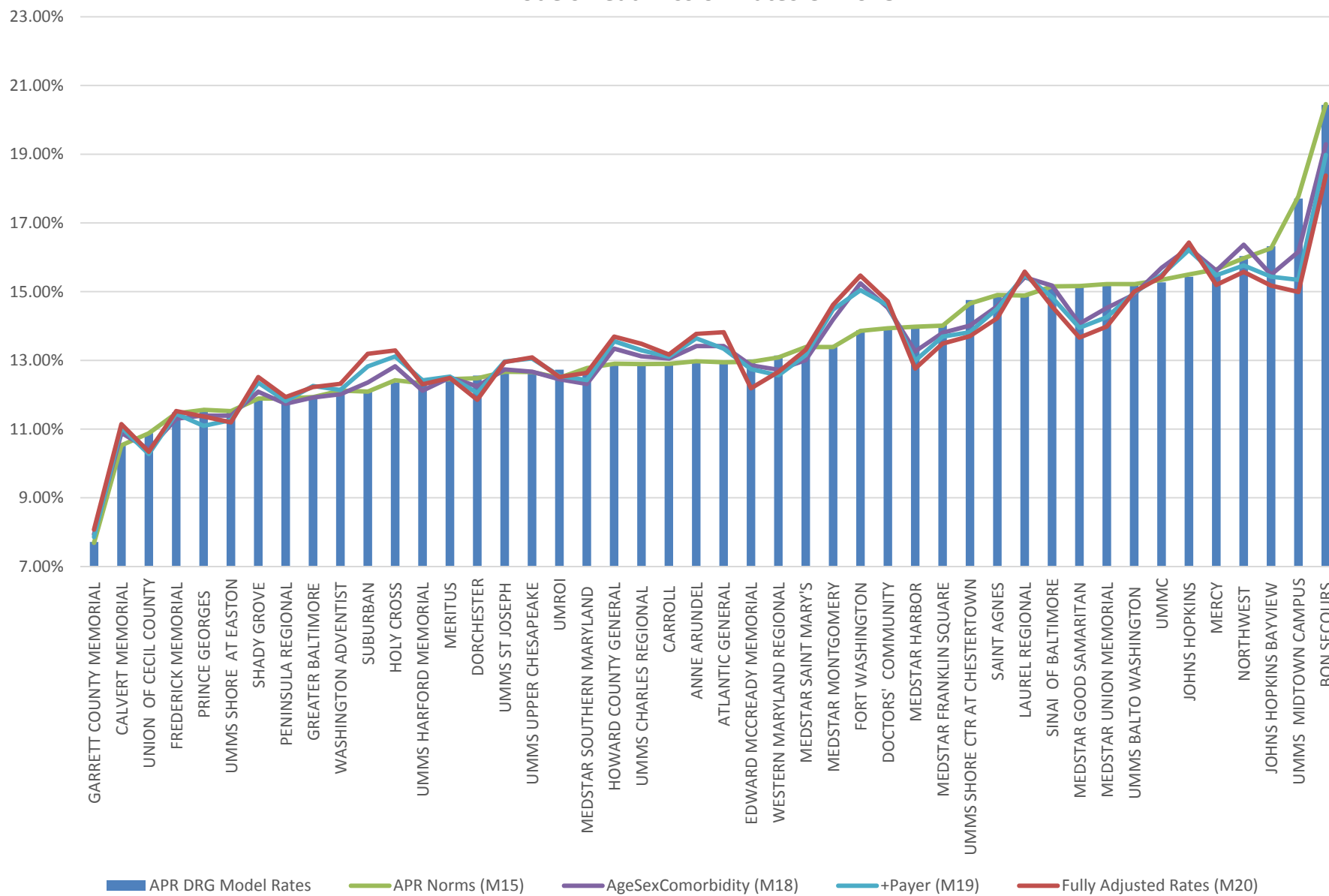
(1) Vertical axis depicts difference in Model 20 vs Model 19 rates. Model 19 controls for CY 2013 norms (logged), age, gender, co-morbidities, and primary payer. Model 20 includes Model 19 controls and also controls for ADI.

Risk Adjustment- Readmission Rates CY 2013

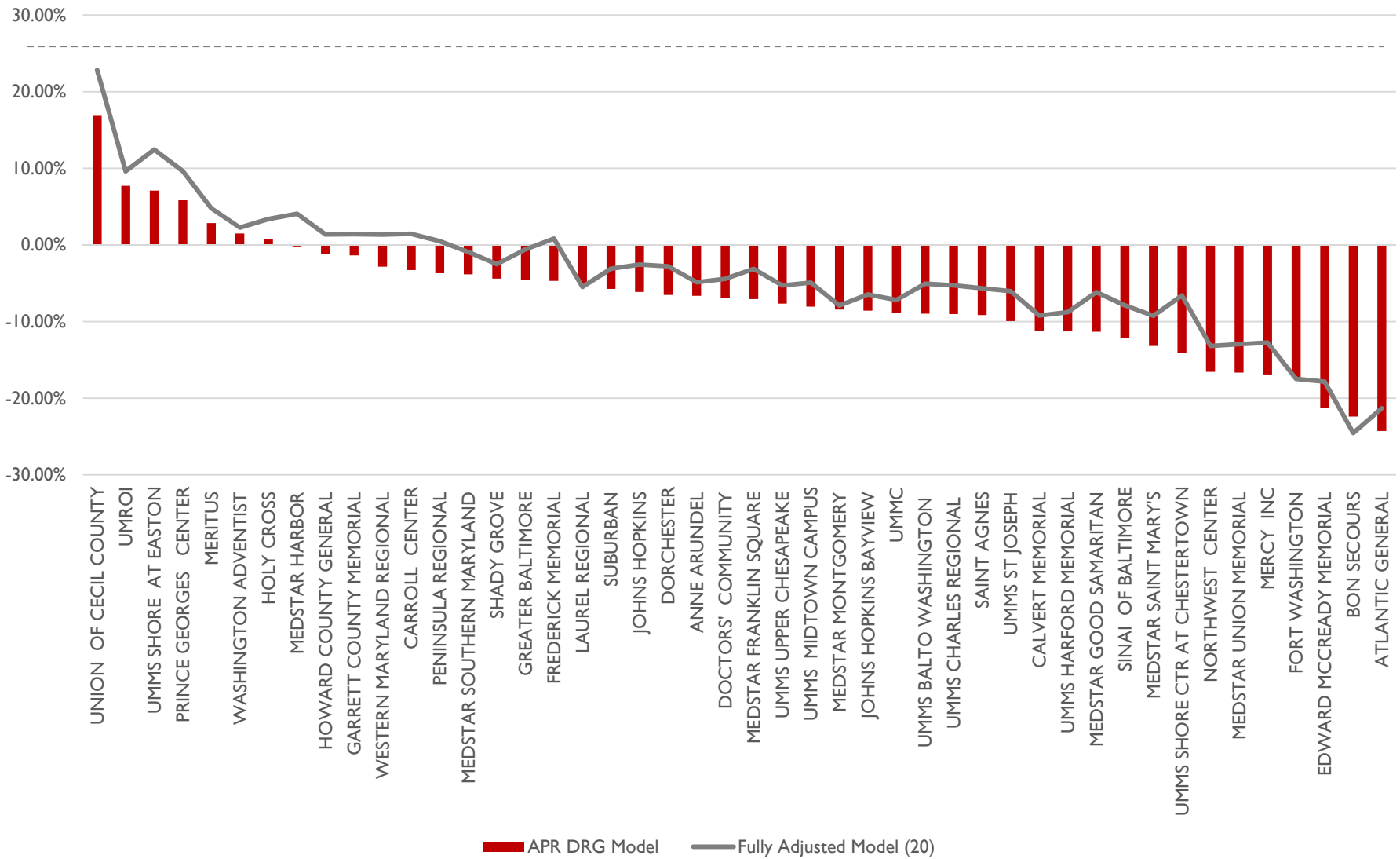


■ APR DRG Model Rates
 — Fully Adjusted Rates (M20)

Risk Adjustment- All Models Readmission Rates CY 2013



Risk Adjustment- CY 13 to CY 15 % Change in Readmission Rates



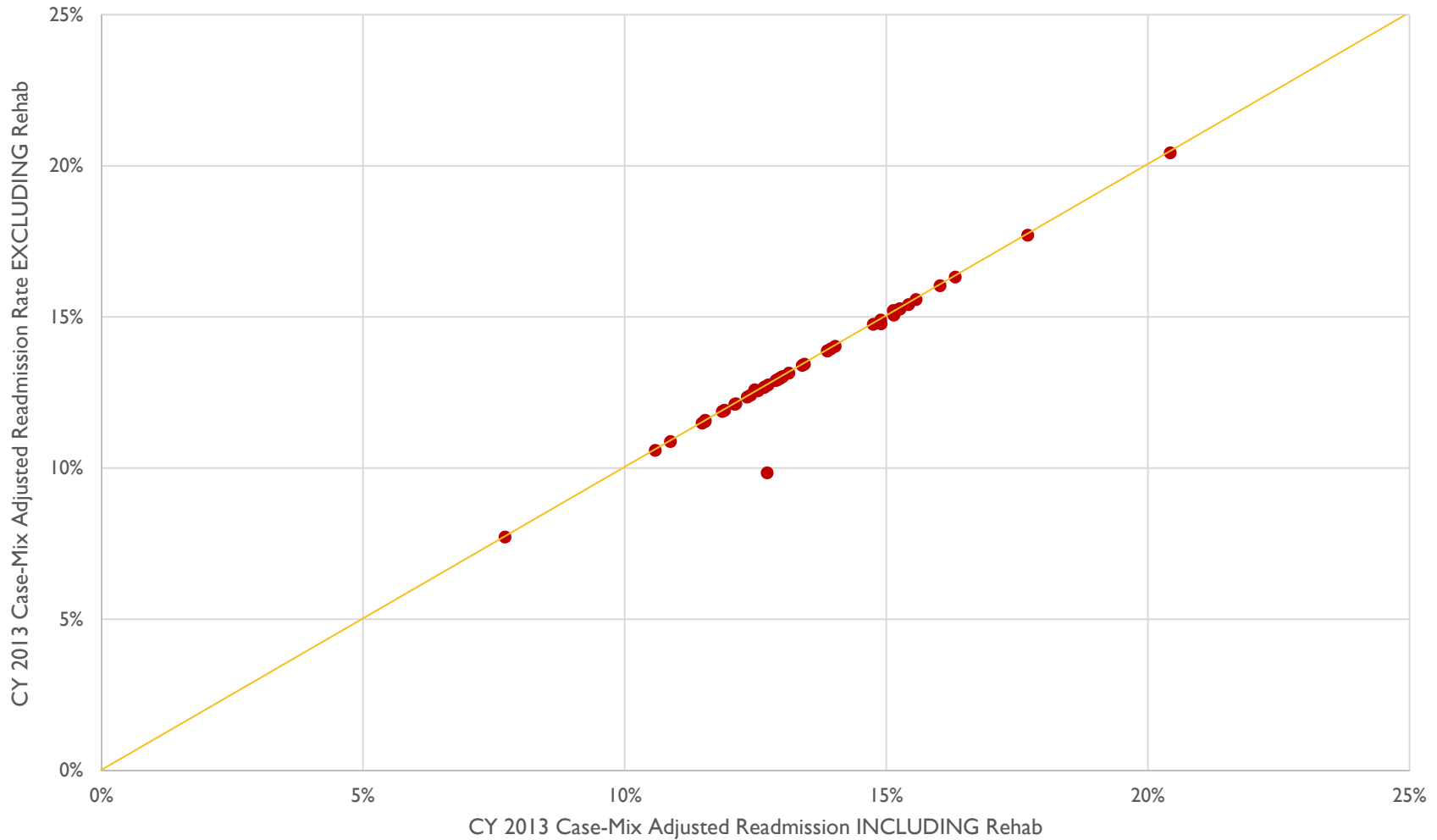
RRIP FY 2017 & FY 2018

MHA and Carefirst Proposals

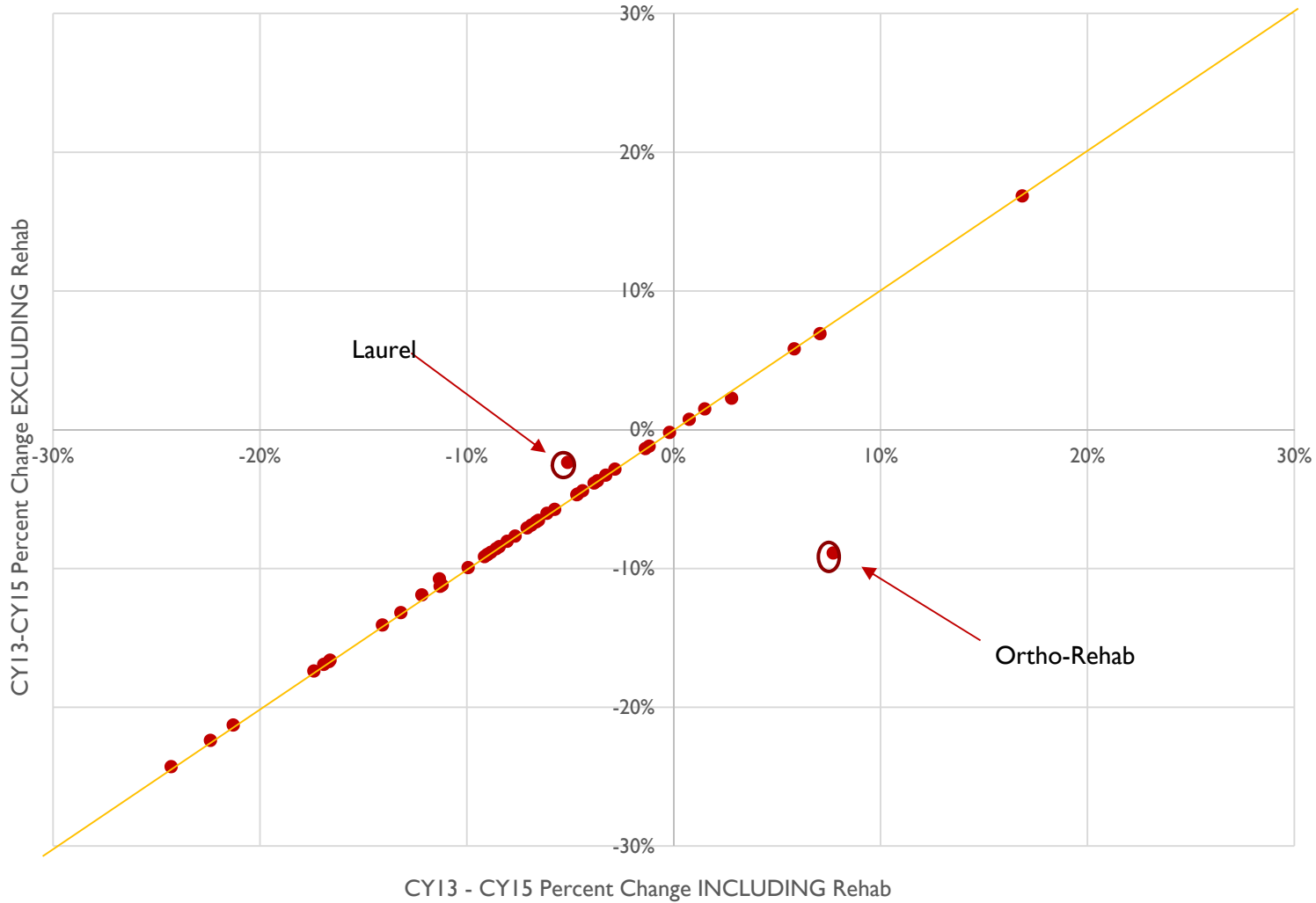
Readmission Measurement

- ▶ Two additional exclusions are considered:
 - ▶ Rehabilitation
 - ▶ Concerns over planned logic
 - ▶ Known ICD-10 impact
 - ▶ Excluded from Medicare CMMI measure
 - ▶ Oncology
 - ▶ Concerns over planned logic
 - ▶ Included in Medicare CMMI measure

Rehab: CY 2013 Base Period Rate

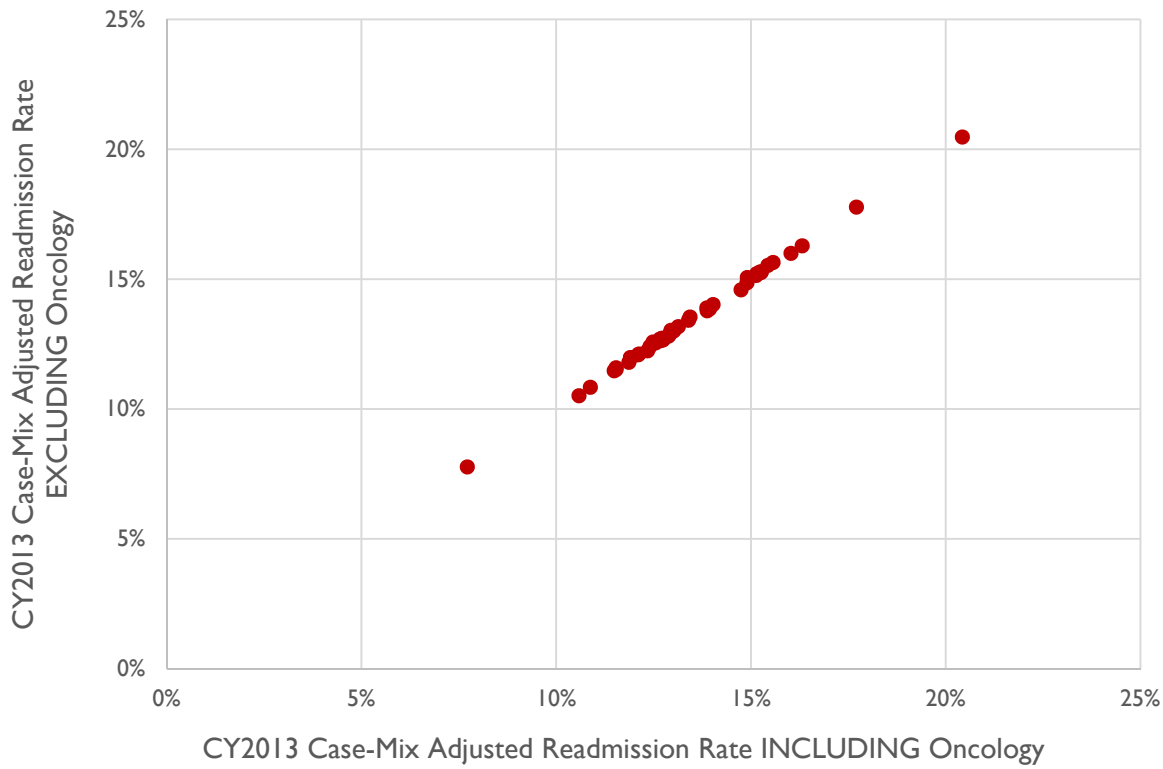


Rehab: CY13-CY15 Change



Oncology: CY2013 Base Period Rates

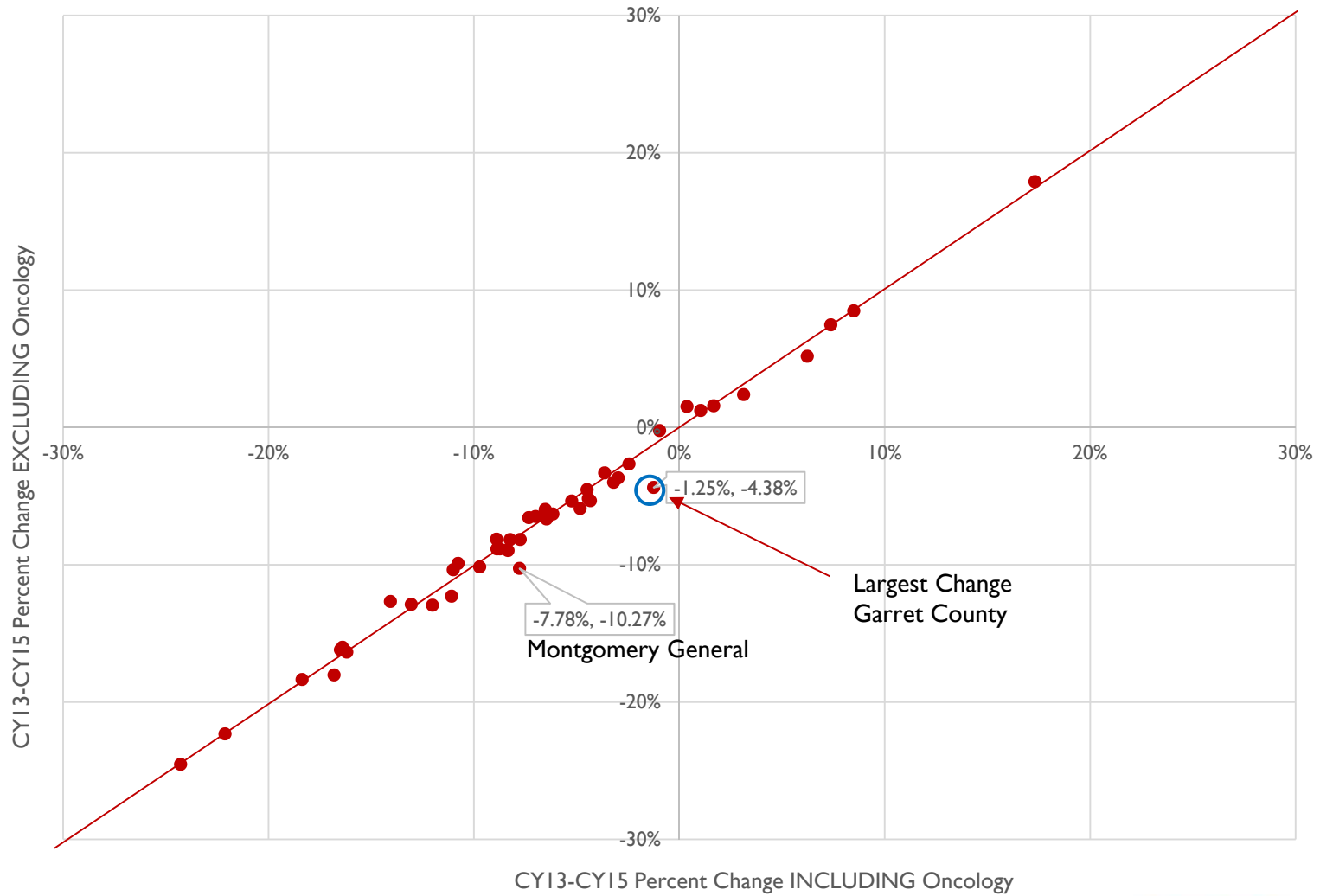
CY 2013	Total Number of Inpatient Discharges	Total Number of Readmissions	Percent Readmissions	Total Number of Expected Readmissions	Readmission Ratio	Risk Adjusted Readmission Rate
Including Oncology	561,903	77904	13.86%	77887.35	1	13.86%
Excluding Oncology	550,240	75312	13.69%	75295.91	1	13.86%
Oncology Discharges	11,663	2592	22.22%	2591.43	1	13.86%



Little/No Impact of Removing Oncology on CY13 Case-mix Adjusted Readmission Rates

Oncology: CY13 – CY15 Change

SC4



FY 2018 Proposed Percent At Risk

	Max Penalty	Max Reward	Statewide
MHAC Below target	-3.0%	0.0%	
MHAC Above Target	-1.0%	1.0%	
RRIP	-2.0%	1.0%	
QBR	-2.0%	1.0%	
Shared Savings		0.00%	-1.84%*
PAU Efficiency Adjustment		0.00%	TBD

Payment Work Group Presentation Slides: Shared Savings Adjustment is -1.1% of Total Revenue. Net proposed increase in shared savings is 0.3% of Total Revenue.

Aggregate At Risk Policy Update Discussion

Maryland surpasses National Medicare Aggregate Revenue at Risk in Quality Payments

Figure 1. Potential Revenue at Risk for Quality-Based Payment Programs, Maryland Compared with the National Medicare Programs, 2014-2017

% of MD All-Payer Inpatient Revenue	FY 2014	FY 2015	FY 2016	FY 2017
MHAC - Complications	2.00%	3.00%	4.00%	3.00%
RRIP - Readmissions			0.50%	2.00%
QBR – Patient Experience, Mortality, Safety	0.50%	0.50%	1.00%	2.00%
Shared Savings	0.41%	0.86%	1.16%	1.16%*
GBR Potentially Avoidable Utilization (PAU)	0.50%	0.86%	1.10%	1.10%*
MD Aggregate Maximum At Risk	3.41%	5.22%	7.76%	9.26%

*Italics are based on RY 2016 results, and subject to change based on RY 2017 policy, which is to be finalized at June 2016 Commission meeting.

Medicare National				
% of National Medicare Inpatient Revenue	FFY 2014	FFY 2015	FFY 2016	FFY 2017
Hospital Acquired Complications (HAC)		1.00%	1.00%	1.00%
Readmissions	2.00%	3.00%	3.00%	3.00%
VBP	1.25%	1.50%	1.75%	2.00%
Medicare Aggregate Maximum At Risk	3.25%	5.50%	5.75%	6.00%

Cumulative MD-Medicare National Difference	0.16%	-0.12%	1.89%	5.15%
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Maryland vs National Medicare Average Payment Adjustments

% Realized at Risk

Maryland

% All Payer Inpatient Revenue	SFY 2014	SFY 2015	SFY 2016	SFY 2017
MHAC	0.22%	0.11%	0.18%	0.65%
RRIP			0.15%	0.42%
QBR	0.11%	0.14%	0.30%	na
Shared Savings	0.29%	0.64%	0.93%	na
GBR PAU:	0.28%	0.33%	0.39%	na
MD Aggregate Maximum At Risk	0.90%	1.22%	1.95%	

Medicare National

% Medicare Inpatient Revenue	FFY 2014	FFY 2015	FFY2016* Estimated	FFY2017*Esti mated
HAC		0.22%	0.22%	0.22%
Readmits	0.28%	0.52%	0.52%	0.52%
VBP	0.20%	0.24%	0.28%	0.28%
Medicare Aggregate Maximum At Risk	0.47%	0.97%	1.01%	1.01%
Cumulative MD-US Difference	0.43%	0.68%	1.61%	

FY 2017 Year to Date Preliminary Results

	MHAC	RRIP	QBR*	Shared Savings*	PAU*
Total Net Adjustments	\$30,589,652	-\$28,542,210			
Total Penalty	-\$453,064	-\$37,665,606			
Total Reward	\$31,042,716	\$9,123,396			
Potential At Risk (Absolute Value)	4.00%	2.00%			
Maximum Hospital Penalty (% Inpatient Revenue)	-0.25%	-2.00%			
Maximum Hospital Reward (% Inpatient Revenue)	1.00%	1.00%		NA	NA
Average Absolute Level Adjustment (% Inpatient Revenue)	0.42%	0.65%		0.00%	0.00%

Potentially Avoidable Utilization (PAU) Update Considerations

HSCRC

Health Services Cost
Review Commission

National vs. MD: Sepsis & Pneumonia

Data source: HCUP (National) HSCRC (Maryland)		PNEUMONIA			SEPSIS		
		NATIONAL 2013	MD 2013	MD 2015	NATIONAL 2013	MD 2013	MD 2015
CASES	NUMERATOR	882,079	14,550	13,712	1,270,445	25,735	29,137
	DENOMINATOR	35,597,792	664,849	633,989	35,597,792	664,849	633,989
	%	2.5%	2.2%	2.2%	3.6%	3.9%	4.6%

Additional PAU Options: Prometheus Potentially Avoidable Complications (PAC)

- ▶ Percent of adult population (aged 18 – 65 years) identified as having at least one of the following six chronic conditions during a calendar year*:
 - Diabetes Mellitus (DM)
 - Congestive Heart Failure (CHF)
 - Coronary Artery Disease (CAD)
 - Hypertension (HTN),
 - Chronic Obstructive Pulmonary Disease (COPD)
 - Asthma
- ▶ Hospitalization related to the patient’s core chronic condition or any co-morbidity is considered a potentially avoidable complication, unless that hospitalization is considered to be a typical service for a patient with that condition.
- ▶ Additional PACs that can occur during the calendar year include those related to emergency room visits, as well as other professional or ancillary services tied to a potentially avoidable complication.
- ▶ Hospitalizations for major infections (e.g., sepsis), deep vein thrombosis, adverse drug events, and other patient safety-related events are considered PACs.

*In 2010, the Prometheus database reported \$95 billion in “allowed amounts” for claims costs for 4.7 million covered lives. The database was an administrative claims database with medical as well as pharmacy claims. While the overall frequency of PAC hospitalizations is low (for all chronic care conditions, frequency was 6.32% of all PAC occurrences) they amount to over 58% of the PAC medical costs.

Information found at: <http://www.hci3.org/>.

Updated PAU Trends

	Total Inpatient & Observation (23+) Admissions		Total Inpatient & Observation (23+) ECMADs		Total Hospital Charge	Annual % Change
		Annual % Change		Annual % Change		
A-NON-PAU						
2013	572,295		587,271		\$13,467,040,131	
2014	564,895	-1.29%	580,609	-1.13%	\$13,738,159,369	2.01%
2015	553,171	-2.08%	576,631	-0.69%	\$14,134,272,138	2.88%
B-PAU						
2013	155,676		146,293		\$1,890,262,296	
2014	151,146	-2.91%	142,464	-2.62%	\$1,887,939,813	-0.12%
2015	148,627	-1.67%	141,989	-0.33%	\$1,924,732,496	1.95%
B1-Readmission						
2013	90,921		94,989		\$1,279,024,631	
2014	87,595	-3.66%	91,827	-3.33%	\$1,268,184,463	-0.85%
2015	84,303	-3.76%	90,212	-1.76%	\$1,275,755,564	0.60%
B2-PQI						
2013	64,755		51,305		\$611,237,665	
2014	63,551	-1.86%	50,637	-1.30%	\$619,755,350	1.39%
2015	64,324	1.22%	51,777	2.25%	\$648,976,932	4.72%
% PAU						
2013	21.38%		19.94%		12.31%	
2014	21.11%	-1.29%	19.70%	-1.20%	12.08%	-1.84%
2015	21.18%	0.33%	19.76%	0.28%	11.99%	-0.80%

ICD-10 Conversion Analysis

- ▶ Diagnosis coding affects the quality and efficiency measures used by HSCRC in its hospital quality initiatives; codes determine the assignment of APR-DRGs, EAPGs, and PPCs.
- ▶ Impact on rehab APR DRGs has been identified
- ▶ HSCRC is working with Mathematica to assess extent of ICD-10 conversion impacts
- ▶ Maryland ICD-9 and ICD-10 coded records data obtained from different time periods (just prior to and after the conversion) requires analysis to isolate the impact of coding changes from random fluctuations:
 - ▶ Comparison of the distribution of severity levels separately for each APR-DRG from before and after the transition
 - ▶ Examination of the distributions of claims with PPC flags based on ICD-9 and ICD-10 coding
 - ▶ Frequencies of EAPGs in the pre and post transition periods will be studied, statistical differences at the EAPG level identified, and diagnosis coding patterns examined
- ▶ HSCRC/MPR will also collaborate with 3M to investigate ICD-10 actual/potential PPC impacts (hospital industry meeting with 3M and HSCRC on May 6, 2016)
- ▶ Literature scan for analyses describing ICD-10's impact on APR-DRG, EAPG, PPC, or related systems
- ▶ The results of our preliminary analyses (completed April 2016) will inform the broader analysis decisions
- ▶ Data from October 2012 through September 2015 compared with data from October 2015 through March 2016 for the broader analysis, with results forthcoming late 2016

GBR Infrastructure Report – Template Update for FY16

Purpose of Reports

- ▶ “The purpose of this report is to inform the HSCRC and other stakeholders, including the Center for Medicaid and Medicare Services (CMS), on the amounts and types of investments that all acute hospitals in Maryland are making over time to improve population health. The report will also advise HSCRC, stakeholders, and CMS on the effectiveness of these investments in furthering the goals of the All-Payer Model. The reports will be available for any interested stakeholder.”
- ▶ Therefore, please include all expenses for the current fiscal year associated with population health investments that began no earlier than FY 2014.
 - ▶ List of excluded expenses remains the same.

GBR Infrastructure Dollars

- ▶ GBR Infrastructure provides monies for investments for patients with the goals of improving care and improving health while also reducing avoidable utilization.
- ▶ Intent of these monies is to accelerate the development of care coordination.
 - ▶ Focus on investments that can reduce PAU in short term.
- ▶ Partner with existing local/community health resources or links with statewide infrastructure (Community Providers, LHICs, CRISP, etc.)
- ▶ Present and track viable outcomes/metrics to evaluate effectiveness of investments.

Background

- ▶ **Areas of focus for FY16 reports:**
 - ▶ Clarification on what expenses to report
 - ▶ Improved categorization
 - ▶ Process and outcome measures
 - ▶ Staffing for Care Transitions and Care Management

Process and Outcome Metrics

- ▶ **Process metrics per each investment.**
 - ▶ At the request of the Commission.
 - ▶ How hospital is evaluating the efficacy of individual investment.
- ▶ **Outcome metrics per each investment.**
 - ▶ Instead of reiterating quality outcomes in each investment, please note if investment will influence particular quality outcome.
- ▶ **Outcome metrics at the conclusion of the report.**
 - ▶ Broader discussion of progress toward quality outcomes.

Report Template and Submission Process

- ▶ HSCRC will publish final Reporting Template with accompanying memo and instructions by the end of April.
- ▶ FY 2016 report will be due from all hospitals 90 days after the end the State fiscal year
- ▶ Questions can be directed to Andi Zumbrum