Background on Medicare Spend per Beneficiary (MSPB) and Value Based Purchasing (VBP)

At Vizient, our member hospitals were initially confused by the MSPB domain. It doesn't have any individual metrics like the other domains that are aggregated up to the domain score, just a single number. Currently, the MSPB domain is weighted at 25% of the VBP total performance score (TPS), so a low score in MSPB impact VBP penalty dollars significantly.

Common statements and questions heard were :
1. This is a 30-day bundle analysis, like bundled payments, but all I get is a single score, how do I know which types of bundles need to be optimized?
2. To address bullet #1, CMS allows hospitals to download bundle episodes and see detail on every bundle. But, with over 600 fields, how do I make sense of it? One episode has 15+ NPI provider IDs, how do I aggregate the bundles to make sense of it all?
3. I've heard some consultants call MSPB the second readmission penalty program, but our hospital wasn't penalized on readmissions, but we were on MSPB, why?
4. I earned points in MSPB the first year and didn't change anything, but now I'm being penalized, why?
5. We've optimized readmissions for our Heart Failure patients, but our MSPB penalty went up, why?
6. We've reduced our inpatient costs significantly compared to peers, shouldn't our MSPB penalty be zero?

In order to help our member hospitals understand this domain better, we brought in public data and CMS hospital episode data into a database to develop benchmarks and methods to understand this domain at a deeper level than just a single score. When a car has a "check engine" light on, the mechanic has to hook it up to a computer to try to diagnose the issue. This presentation tries to explore the journey we've had with our member hospitals to get beyond the blinking red light, and to find a way to see future bundles that may need optimization.

**Why was the Medicare Spend Per Beneficiary (MSPB) module created?**

Medicare Spend Per Beneficiary (MSPB) module of Value Based Purchasing (VBP) was created to track efficiency of post acute care (PAC) costs. (These are costs to Medicare, which would be reimbursement or spend to providers, not in how cost efficient a hospital or provider might be.) This came about because from 2001 to 2010, the average length of stay and costs for inpatient stays improved by over 62%. Hospitals became more efficient at containing costs during the inpatient stay, yet the cost of 30-day episodes continued to increase :

- From 2001 to 2015, Medicare PAC spending increased on average 5.4 percent per year and doubled to $60.3 billion
- An Institute of Medicine study found that variation in PAC spending explained 73% of the variation in total Medicare spending.
- Hospitals in the same city would have the same standardized spend per MS-DRG during the inpatient stay, but the PAC spend could be over twice as much for patients in the county.

Lessons learned from early bundled payment program initiatives provided a framework to standardize payments for a 30 day bundle and were implemented into the MSPB analysis. The hospital VBP is revenue neutral, so hospitals with poor performance paying the performance bonuses for the higher performing hospitals, in effect.

Calculating the Medicare Spend Per Beneficiary per Episode (Observed Cost)

For each inpatient admission, the payments of that inpatient admission, plus payments incurred 3 days prior and 30 days post discharge are calculated. The payments are standardized, where additional amounts due to geographic area, extra Indirect Medical Education (IME) payments, Disportionate Share (DSH) payments are removed, leaving a Standardized Total Spend Amount per 30 day episode.
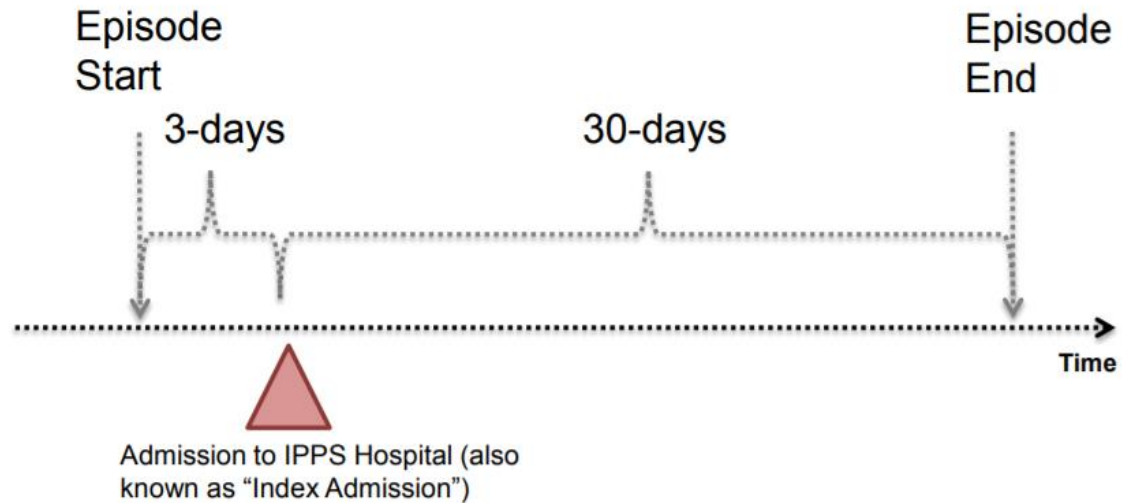
Calculating the Expected Spend per Episode

Patient comorbidities and HCC risk scores along with the case severity from the MS-DRG are used to build an "Expected Spend per Episode" based on each individual MS-DRG. Outliers are flagged at the 0.5 percentile (both high and low cost) to remove abnormal high or low cost episodes and are not used in the MSPB benchmarks or in the individual hospital's score. Then, for each episode an Observed over Expected Rate is built, with a value of 1.1 denoting that the episode was 10% costlier than expected and a value of 0.9 denoting that the episode was 10% lower than expected compared at a national level. All episodes for a given hospital are aggregated and the final MSPB Observed over Expected score is built. A score of 1.0 would denote that the observed cost equaled the expected cost.

The Major Post Acute Care (PAC) Discharge Dispositions and Cost Drivers:

For each inpatient stay, patients are typically sent into 3 main post acute settings : Home or Home Health (HHH), Skilled Nursing Facilities (SNF), and Inpatient Rehab Facility (IRF). These three discharge dispositions account for over 88% of all discharges. Looking at the top 50 DRG average episode costs, the variance in cost to CMS in the post acute setting is quite dramatic, with SNF episodes almost costing twice as much as HHH episodes (these costs averages do not include scenarios where the patient is readmitted back to the acute setting.) Healthier patients tend to be discharged more in the HHH setting, whereas patients with major comorbidities and complications (MCCs) tend to use more costlier PAC settings like SNF and IRF than their healthier peers, but much of this is dependent on the type of recovery/rehab required in the 30 day post discharge period.

PAC Setting	Avg 30-day episode cost *
HHH	$ 16,784
SNF	$ 31,941
IRF	$ 41,873

* average built for Top 50 DRGs by volume

The other main driver of episode costs are readmissions. Since IRF stays typically take up most of the 30 day post acute window, readmissions are rare, but for HHH and SNF episodes, a readmission adds an average cost of **$10,892** to the episode due to the cost of the extra inpatient stay during the 30 day episode window. So a HHH discharge that is readmitted will have costs almost as equal to a SNF discharge on average. Managing readmissions plays a crucial part in staying out of penalty in the VBP program since just having a readmission rate 3% higher than peers will impact your overall performance on 30 day episodes.

Sample Hospital Distribution of MSPB 30 day episodes:

The variation of Post Acute Care (PAC) discharge disposition costs, makes each individual episode have large Observed over Expected (O/E) values in just one calendar year. 58% of episodes had O/E individual rates lower than 0.75. This hospital received 0 points in the MSPB domain since the observed spend was 1% more than expected (**MSPB=1.01**) Very few episodes (807) were within 5% of the expected spend (0.95 to 1.05)

For this facility, the normal spend for a Home Health care was between $2,200 to $3,500 per HH episode, while a skilled nursing facility (SNF) stay normal spend was between $6,500 to $16,800 per SNF episode. For this facility, a SNF stay can be 3-4 times more costlier than a home health destination.

Sample Hospital in the New England Area:

647	episodes with O/E values >2.0	6%
1,020	episodes with O/E values between 1.5 and 2.0	9%
2,163	episodes with O/E values between 1.05 and 1.50	20%
807	episodes with O/E values between 0.95 and 1.05	7%
2,354	episodes with O/E values between 0.75 and 0.95	21%
4,099	episodes with O/E values <0.75	37%

11,090	Total Medicare Qualified MSPB 30 day episodes

Observed Standardized Spend for Hospital
$ 243,613,755.74

Expected Spend for Hospital
$ 240,796,831.05

Final MSPB Score (Observed over Expected)
1.01

Integrating CMS claims and Value Based Purchasing data sets:

Taking the CMS LDS data and modeling it, we merged the discharge rate for HHH and the readmission rates from LDS data set with the CMS VBP public data for MSPB. In MSPB, a hospital that is a low performer will receive 0 points out of 10, which 1,424 hospitals did because they were below the 50th percentile in Observed over Expected Episode costs.

The differences between the group of hospitals receiving zero points and those earning 10 points correlates to more patients discharged to HHH and lower readmission rates.

The 5 out of 10 group has an average MSPB score of 0.9129, which means their bundles are 8.71% lower than the database median. Earning 5 points of more was attained by 429 hospitals, or 15% of hospitals that qualified for MSPB.

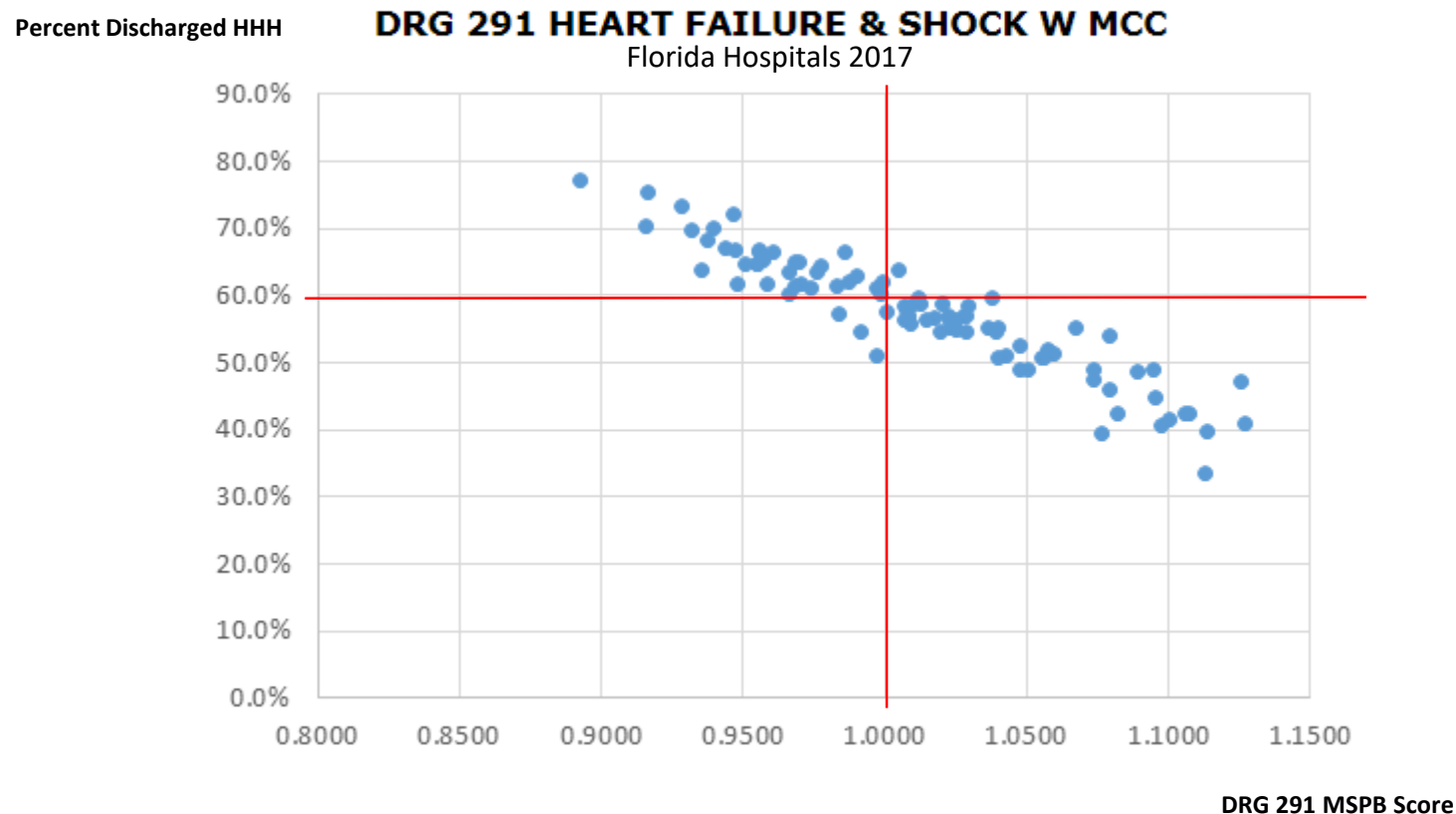| MSPB Point Score	nbr_hosp	% discharged HHH	MSPB Score	stdev MSPB	Readmit Rate
0 out of 10	1,424	71%	1.0415	0.0486	16.3%
1 out of 10	264	72%	0.9792	0.0045	15.6%
2 out of 10	277	73%	0.9626	0.0047	15.0%
3 out of 10	215	72%	0.9463	0.0047	14.8%
4 out of 10	176	72%	0.9305	0.0046	14.1%
5 out of 10	136	73%	0.9129	0.0047	14.3%
6 out of 10	84	73%	0.8979	0.0048	13.9%
7 out of 10	65	75%	0.8811	0.0050	13.4%
8 out of 10	44	76%	0.8646	0.0048	13.6%
9 out of 10	31	78%	0.8491	0.0045	13.5%
10 out of 10	69	79%	0.8074	0.0330	13.0%

2,785

HHH=Home or Home Health Discharge status

Hospital Variation in Post Acute Care Setting – Examining 30 day bundles based on the MS-DRG

Reviewed 95 hospitals from Florida for MSPB episodes for DRG 291, Heart Failure & Shock w MCC. The X axis shows the MSPB score for the hospital for this DRG and the Y-axis shows the percent of patient discharged to Home or Home Health (HHH.) The national average that were discharged to HHH was 59.6% for this DRG.

As hospitals send less patients to HHH (below the 59.6% national average), typically to higher cost venues like skilled nursing facilities (SNF) or inpatient rehab facilities (IRF), very few end up with a MSPB score below 1.0. In Florida, no hospital that sent less than 50% of patients to HHH, had a MSPB score below 1.0.

Each MS-DRG has different national distribution rates for HHH, SNF, IRF and readmissions. We calculated benchmarks for these using the CMS LDS dataset. For example, with DRG 291, the national IRF rate is 2.8%, while DRG 470 (Hip/Knee Implants) has a national IRF rate of 7.2%. So, a MS-DRG may have the same inpatient case mix index, but the PAC resource costs could be over 42% higher.

Percent Discharged HHH

DRG 291 HEART FAILURE & SHOCK W MCC
Florida Hospitals 2017

DRG 291 MSPB Score

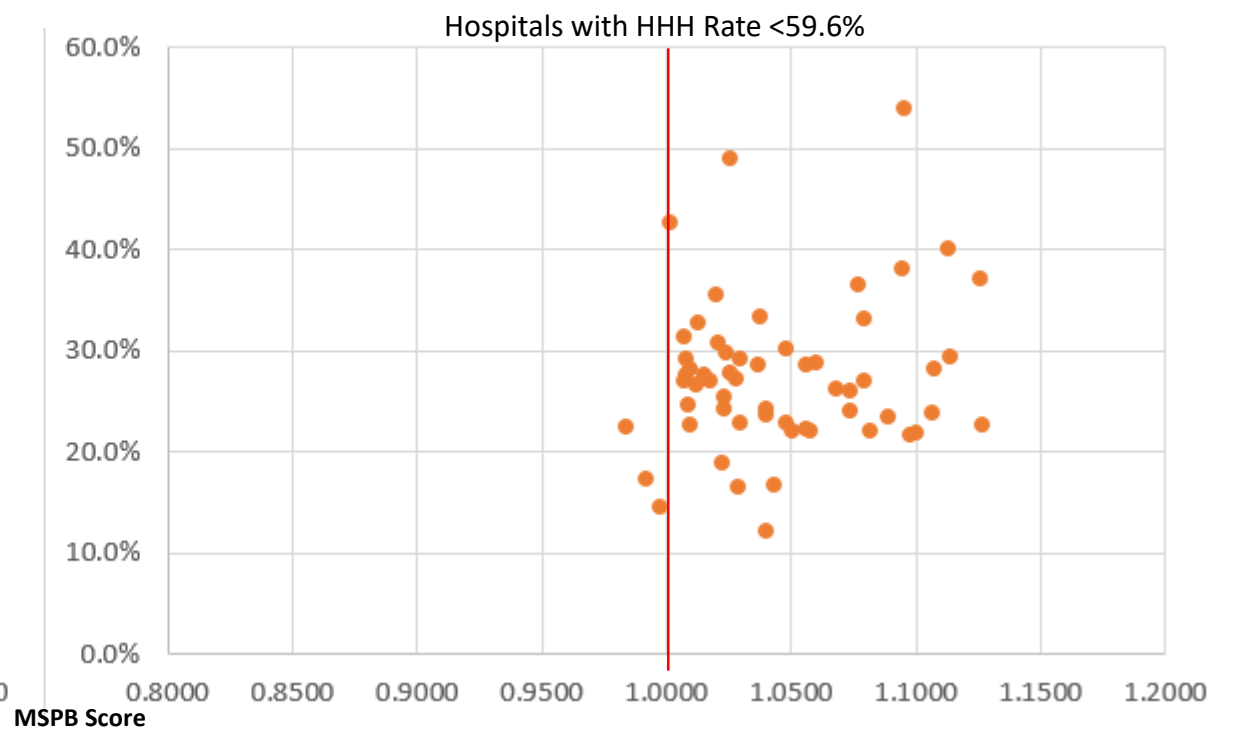# Hospital Variation in Post Acute Care Setting – Readmissions

Same 95 hospitals with Florida, but the Y-Axis is Readmission Rate and X-Axis is MSPB Score. The left chart show hospitals who had a HHH Rate above the national benchmark of 59.6% and the right chart has hospitals that sent less than 59.6% of patients to HHH. The redline denotes a MSPB Score of 1.0 (Observed Spend=Expected Spend.) You could almost merge these two charts into one graph very easily because only 4 hospitals break the line in each group.

The national readmission average for DRG 291 is 24.9%. Interesting to note is with the low HHH group on the right, 3 of the 4 hospitals that had MSPB score lower than 1.0 had readmission rates below 24.9%, showing the strength of this factor even among hospitals that use more expensive PAC settings.

DRG 291 HEART FAILURE & SHOCK W MCC
Florida Hospitals 2017
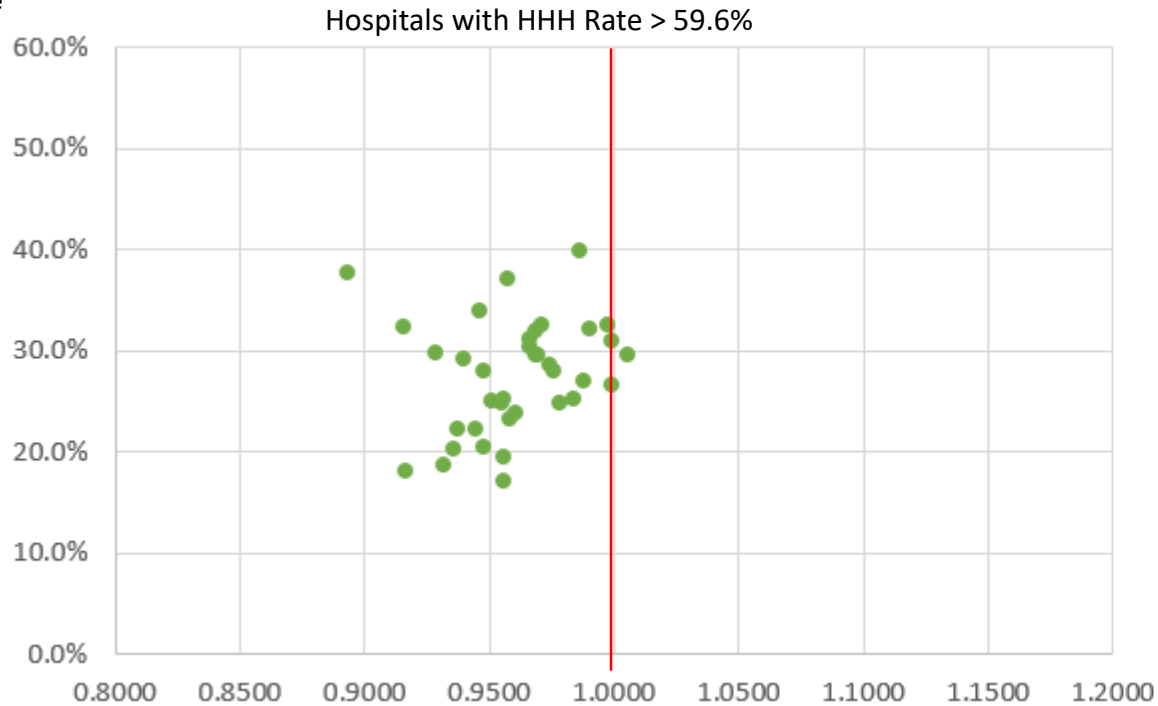
Hospital Variation in Post Acute Care Setting – Low Performers

Same DRG 291, but this table shows hospitals with the highest MSPB scores along with other variables and their respective benchmarks. The national benchmark for IRF rate is 2.8% and SNF benchmark is 21.5%, all 27 of these low performers used *significantly more of these resources*.

DRG MSPB Score	HCO Readmit	BM Readmit	HCO HHH	BM HHH	HCO IRF	BM IRF	HCO SNF	BM SNF
1.13	22.7%	24.9%	40.9%	59.6%	9.1%	2.8%	25.0%	21.5%
1.13	37.2%	24.9%	46.9%	59.6%	14.2%	2.8%	18.6%	21.5%
1.11	29.3%	24.9%	39.7%	59.6%	1.7%	2.8%	36.2%	21.5%
1.11	40.0%	24.9%	33.3%	59.6%	3.3%	2.8%	33.3%	21.5%
1.11	28.3%	24.9%	42.4%	59.6%	4.3%	2.8%	29.3%	21.5%
1.11	23.8%	24.9%	42.3%	59.6%	3.6%	2.8%	32.1%	21.5%
1.10	21.8%	24.9%	41.5%	59.6%	4.1%	2.8%	30.6%	21.5%
1.10	21.6%	24.9%	40.5%	59.6%	5.4%	2.8%	24.3%	21.5%
1.10	53.9%	24.9%	44.7%	59.6%	6.6%	2.8%	25.0%	21.5%
1.09	38.0%	24.9%	48.9%	59.6%	10.9%	2.8%	18.5%	21.5%
1.09	23.4%	24.9%	48.4%	59.6%	3.1%	2.8%	34.4%	21.5%
1.08	22.0%	24.9%	42.4%	59.6%	1.7%	2.8%	31.4%	21.5%
1.08	27.0%	24.9%	45.9%	59.6%	2.7%	2.8%	29.7%	21.5%
1.08	33.0%	24.9%	53.9%	59.6%	15.7%	2.8%	12.2%	21.5%
1.08	36.5%	24.9%	39.4%	59.6%	2.9%	2.8%	22.1%	21.5%
1.07	23.9%	24.9%	47.3%	59.6%	3.1%	2.8%	29.9%	21.5%
1.07	26.1%	24.9%	48.7%	59.6%	3.5%	2.8%	31.3%	21.5%
1.07	26.2%	24.9%	55.1%	59.6%	11.2%	2.8%	16.5%	21.5%
1.06	28.7%	24.9%	51.3%	59.6%	6.1%	2.8%	21.7%	21.5%
1.06	22.0%	24.9%	51.7%	59.6%	4.8%	2.8%	26.3%	21.5%
1.06	22.3%	24.9%	50.5%	59.6%	1.0%	2.8%	32.0%	21.5%
1.06	28.6%	24.9%	50.7%	59.6%	1.8%	2.8%	29.1%	21.5%
1.05	22.0%	24.9%	48.9%	59.6%	1.3%	2.8%	28.7%	21.5%
1.05	22.8%	24.9%	48.8%	59.6%	4.1%	2.8%	22.8%	21.5%
1.05	30.2%	24.9%	52.5%	59.6%	5.0%	2.8%	23.0%	21.5%
1.04	16.7%	24.9%	50.8%	59.6%	3.2%	2.8%	24.6%	21.5%
1.04	24.3%	24.9%	54.9%	59.6%	5.8%	2.8%	22.0%	21.5%

Orange color denotes performance below benchmark

Hospital Variation in Post Acute Care Setting – High Performers

Same DRG 291, but this table shows hospitals with the lowest MSPB score along with other variables and their respective benchmarks. None of these top performers used more SNF resources. Some IRF rates were higher than national benchmark, but only one was twice the IRF benchmark and for that one hospitals, the SNF rate was only 2.6% (national benchmark=21.5%) and readmission rate was only 18.2%

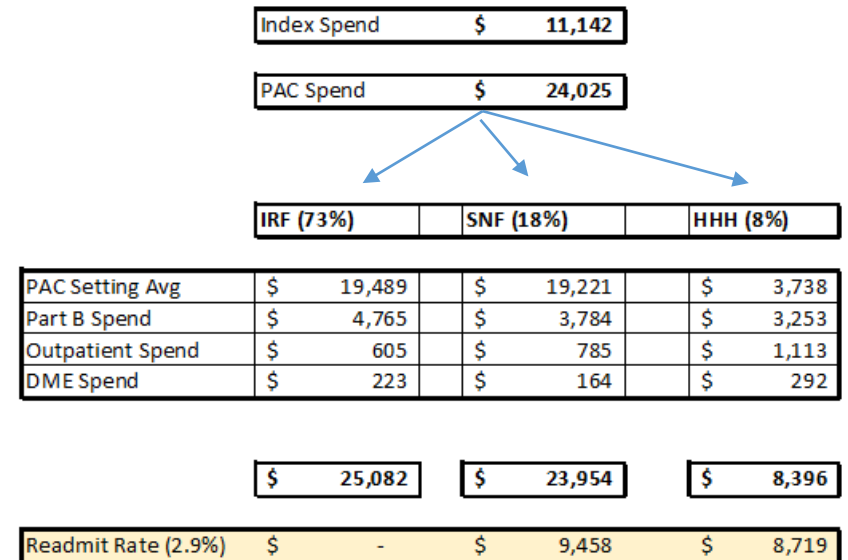| DRG MSPB Score	HCO Readmit	BM Readmit	HCO HHH	BM HHH	HCO IRF	BM IRF	HCO SNF	BM SNF
0.97	32.5%	24.9%	61.7%	59.6%	1.2%	2.8%	18.9%	21.5%
0.97	29.5%	24.9%	64.8%	59.6%	3.3%	2.8%	17.2%	21.5%
0.97	31.9%	24.9%	61.3%	59.6%	0.8%	2.8%	18.5%	21.5%
0.97	29.5%	24.9%	64.7%	59.6%	1.7%	2.8%	17.3%	21.5%
0.97	31.3%	24.9%	60.0%	59.6%	3.8%	2.8%	6.3%	21.5%
0.97	30.4%	24.9%	63.4%	59.6%	0.9%	2.8%	17.9%	21.5%
0.96	23.8%	24.9%	66.4%	59.6%	2.6%	2.8%	17.0%	21.5%
0.96	23.2%	24.9%	61.6%	59.6%	2.0%	2.8%	11.1%	21.5%
0.96	37.1%	24.9%	65.0%	59.6%	4.9%	2.8%	8.4%	21.5%
0.96	25.2%	24.9%	66.2%	59.6%	0.9%	2.8%	19.6%	21.5%
0.96	19.4%	24.9%	66.7%	59.6%	1.4%	2.8%	18.1%	21.5%
0.96	17.1%	24.9%	64.6%	59.6%	1.2%	2.8%	14.6%	21.5%
0.96	24.7%	24.9%	64.5%	59.6%	1.1%	2.8%	16.1%	21.5%
0.95	25.0%	24.9%	64.6%	59.6%	2.1%	2.8%	14.6%	21.5%
0.95	20.5%	24.9%	61.5%	59.6%	2.6%	2.8%	7.7%	21.5%
0.95	28.0%	24.9%	66.7%	59.6%	0.8%	2.8%	15.9%	21.5%
0.95	33.9%	24.9%	72.1%	59.6%	4.7%	2.8%	12.4%	21.5%
0.94	22.3%	24.9%	66.9%	59.6%	0.8%	2.8%	15.7%	21.5%
0.94	29.2%	24.9%	69.9%	59.6%	0.9%	2.8%	18.6%	21.5%
0.94	22.3%	24.9%	68.0%	59.6%	1.8%	2.8%	12.9%	21.5%
0.94	20.3%	24.9%	63.8%	59.6%	2.9%	2.8%	2.9%	21.5%
0.93	18.8%	24.9%	69.6%	59.6%	0.9%	2.8%	14.3%	21.5%
0.93	29.7%	24.9%	73.2%	59.6%	2.9%	2.8%	13.8%	21.5%
0.92	18.2%	24.9%	75.3%	59.6%	6.5%	2.8%	2.6%	21.5%
0.92	32.4%	24.9%	70.3%	59.6%	2.0%	2.8%	10.1%	21.5%
0.89	37.7%	24.9%	77.0%	59.6%	3.3%	2.8%	4.9%	21.5%

Orange color denotes performance below benchmark

Top 30 DRGs by volume and 30 day Bundle Spend

The table below breaks down 30 day spend during index inpatient admission and cost in post acute care (PAC.) The Index spend is determined by the MS-DRG and its relative weight. A PACIndex variable was built based on PAC Spend divided by $5,000. Some DRG bundles require less PAC resources (like DRG 192-COPD) and have a PACIndex of 0.98 and others, require considerable more in the PAC setting (DRG 481-Hip/Femur Procedures not major joint), with a PACIndex of 4.80, requiring more than twice the index admission spend.

DRG	Index Spend	PAC Spend	30d Bundle Spend	PAC Share	PACIndex	Natl Share
470	$ 12,081	$ 10,407	$ 22,487	46%	2.08	6.7%
871	$ 10,563	$ 13,737	$ 24,300	57%	2.75	3.2%
392	$ 4,276	$ 5,781	$ 10,057	57%	1.16	2.3%
292	$ 5,637	$ 9,334	$ 14,970	62%	1.87	1.9%
690	$ 4,380	$ 9,445	$ 13,824	68%	1.89	1.9%
378	$ 5,753	$ 6,835	$ 12,589	54%	1.37	1.8%
194	$ 5,595	$ 7,987	$ 13,582	59%	1.60	1.7%
291	$ 8,490	$ 12,554	$ 21,044	60%	2.51	1.6%
683	$ 5,500	$ 10,138	$ 15,638	65%	2.03	1.6%
603	$ 4,792	$ 7,382	$ 12,174	61%	1.48	1.6%
872	$ 6,083	$ 8,905	$ 14,989	59%	1.78	1.5%
190	$ 6,699	$ 8,225	$ 14,924	55%	1.65	1.5%
191	$ 5,303	$ 7,132	$ 12,435	57%	1.43	1.4%
193	$ 8,237	$ 11,245	$ 19,481	58%	2.25	1.3%
65	$ 6,077	$ 18,210	$ 24,287	75%	3.64	1.3%
247	$ 12,177	$ 4,966	$ 17,144	29%	0.99	1.2%
641	$ 3,987	$ 8,545	$ 12,532	68%	1.71	1.2%
310	$ 3,160	$ 4,409	$ 7,569	58%	0.88	1.1%
885	$ 5,961	$ 6,271	$ 12,232	51%	1.25	1.1%
481	$ 11,142	$ 24,025	$ 35,167	68%	4.80	1.1%
312	$ 4,176	$ 7,846	$ 12,022	65%	1.57	1.1%
309	$ 4,528	$ 7,710	$ 12,238	63%	1.54	1.1%
287	$ 6,349	$ 7,082	$ 13,431	53%	1.42	1.0%
460	$ 23,822	$ 11,569	$ 35,392	33%	2.31	1.0%
189	$ 7,144	$ 9,961	$ 17,105	58%	1.99	1.0%
682	$ 8,679	$ 14,362	$ 23,041	62%	2.87	0.9%
689	$ 6,292	$ 12,970	$ 19,262	67%	2.59	0.9%
69	$ 4,031	$ 6,788	$ 10,819	63%	1.36	0.8%
192	$ 4,134	$ 4,877	$ 9,011	54%	0.98	0.8%
812	$ 4,656	$ 7,307	$ 11,963	61%	1.46	0.7%

DRG 481 – HIP/FEMUR procedures not major joint
PAC Options & Detail Spend
High PACIndex since national HHH rate is only 8%, majority of patients need IRF or SNF resources.

Index Spend	$ 11,142

PAC Spend	$ 24,025

IRF (73%)	SNF (18%)	HHH (8%)

	IRF (73%)	SNF (18%)	HHH (8%)
PAC Setting Avg	$ 19,489	$ 19,221	$ 3,738
Part B Spend	$ 4,765	$ 3,784	$ 3,253
Outpatient Spend	$ 605	$ 785	$ 1,113
DME Spend	$ 223	$ 164	$ 292

	$ 25,082	$ 23,954	$ 8,396

Readmit Rate (2.9%)	$ -	$ 9,458	$ 8,719

All spend is standardized spend, where geographic, IME and DSH payments are removed and normalized

Impact of VBP Program Initiatives over time
The initial Hospital VBP program targeted Patient Experience, Quality, Mortality, Readmissions and MSPB. From 2012 to 2016, the impacts of these performance improvement initiatives, makes the benchmark a moving target. For example, DRG 470 (Major Lower Joint Replacement) had readmission rate reduced from 14.6% to 9.2%. Also, more cases moved from SNF and IRF PAC setting to HHH and with more cases discharged to Home/Home Health, the costs of the 30 day bundle was reduced by $2,826 between 2012 and 2016.

As Home Health networks are leveraged more and optimized, this PAC setting has grown across all DRG families. Hospitals without awareness of national trends, could find themselves moving from no penalty for MSPB to penalty, because the national benchmarks have changed the PAC costs considerably.

DRG	Cases	ReadmitRate	2016 HHH Perc	SNF Perc	IRF Perc	Cases	ReadmitRate	2012 HHH Perc	SNF Perc	IRF Perc	Cost Per Case	Cost
470	525,345	9.2%	66.6%	25.3%	7.2%	447,932	14.6%	51.8%	34.5%	12.2%	$ 27,802	$(2,826)
057	125,792	14.6%	55.1%	28.6%	2.5%	67,889	19.9%	37.2%	38.7%	3.9%	$ 26,608	$(2,545)
560	64,343	11.1%	70.8%	20.4%	1.2%	7,127	25.5%	45.2%	35.0%	5.7%	$ 25,988	$(4,070)
483	58,894	5.9%	83.5%	13.0%	2.6%	14,857	10.5%	66.3%	26.8%	5.3%	$ 25,249	$(2,952)
981	43,444	30.0%	45.3%	26.0%	6.0%	24,711	33.5%	39.2%	31.4%	7.2%	$ 31,214	$(1,151)
949	43,379	14.7%	69.9%	15.5%	1.1%	3,846	22.7%	43.3%	31.5%	6.5%	$ 25,919	$(4,260)
092	40,569	19.1%	64.1%	21.5%	3.4%	20,864	21.9%	56.6%	28.2%	5.2%	$ 24,102	$(1,428)
372	32,836	23.4%	70.8%	20.3%	2.7%	38,555	27.2%	63.3%	26.3%	2.5%	$ 23,074	$(1,034)
561	32,728	8.8%	77.0%	16.1%	1.2%	4,321	23.7%	58.0%	25.9%	5.3%	$ 23,854	$(3,086)
056	32,288	18.1%	42.9%	31.2%	3.4%	13,404	23.1%	28.1%	40.8%	5.5%	$ 28,326	$(2,229)
091	31,962	22.5%	57.4%	20.4%	3.1%	12,132	26.2%	43.3%	28.6%	6.1%	$ 25,935	$(2,075)
071	22,568	19.9%	52.5%	29.9%	3.5%	16,849	22.6%	44.5%	35.7%	4.0%	$ 25,546	$(1,198)
559	21,837	17.4%	53.7%	25.3%	2.1%	4,458	27.3%	29.8%	36.8%	6.8%	$ 27,874	$(3,554)
467	20,266	18.6%	48.7%	38.5%	10.8%	23,744	22.2%	43.7%	40.1%	14.0%	$ 31,210	$(1,101)

MSPB and Social Determinants of Health (SDOH)

Using CMS cost reports, CMS calculates a Disportionate Share Rate (DSH Rate). This looks at admissions from standard Medicare, Medicaid, Commercial and determines the percent of admissions from Medicaid or those in Medicare under 65 years of age, with high cost conditions, like End Stage Renal Disease. On inpatient discharges, CMS pays hospitals with higher DSH rates extra payments since these patients tend to have higher needs during the inpatient stay due to socio-economic factors. We will use this as a proxy index for social determinants of health (SDOH).

The graph below shows the wide variance of the DSH Rate among all hospitals in the country, not just the ones qualifying for MSPB calculation. Numerous studies have shown that patients from lower income groups tend to have many chronic conditions at earlier ages and more comorbidities, making their costs much higher.

Each day, about 12,000 people turn 65 years of age and enter the Medicare system. For some hospitals, the majority of these will be coming from the Medicaid ranks into the Medicare payer group.

Hospital Disportionate Share Rates for 2017
(all hospitals)
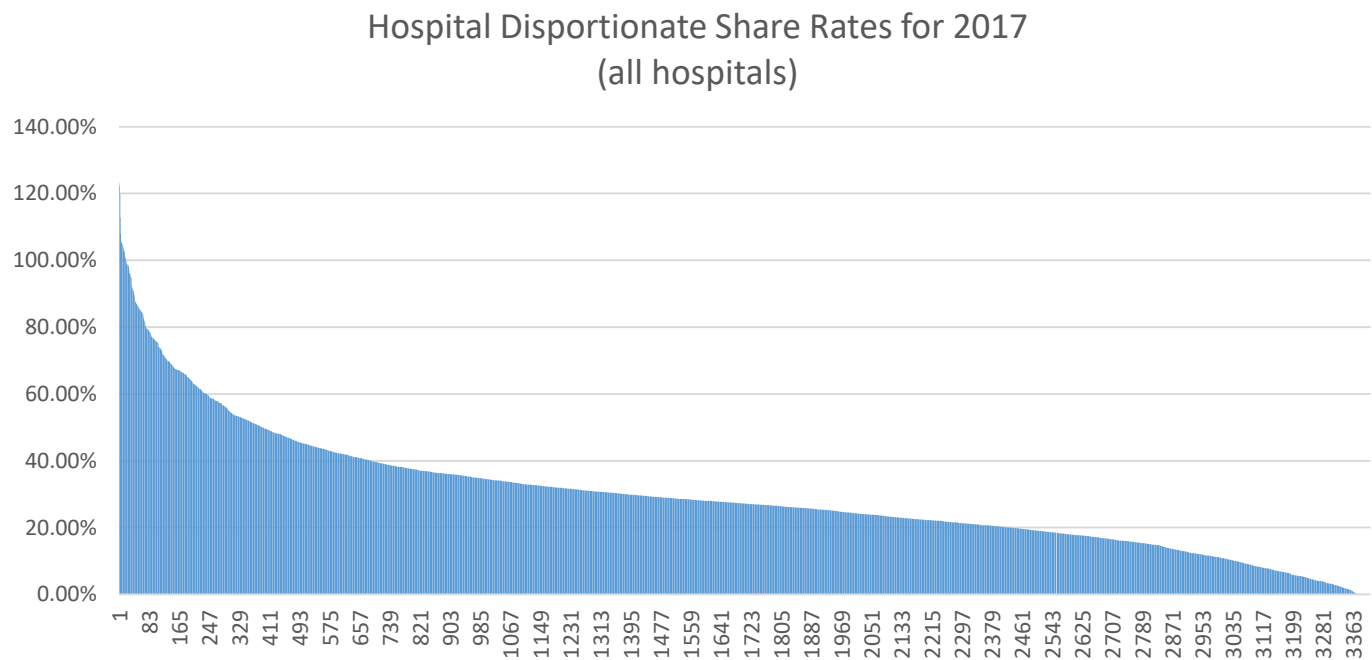
Social Determinants of Health (SDOH) and Facilities treating higher percentages of lower income patients.

Hospitals were put into bands based on DSH percentage ranges and the average MSPB scores were calculated, along with the number of facilities that achieved top performer status (scoring 5 or more points on MSPB Domain.) If the SDOH weren't a factor, the distribution among the groups should be the same or near 15.8%, *yet the hospitals that treat the fewest percent of low income patients had 26% more facilities designated top performer than expected* and the lowest MSPB score average. Group 4, which has hospitals with an average of 62.5% of patients from low income status, had 13% less top performers than expected.

Even though the MSPB bundle logic is extremely fair and has very good outlier removals, hospitals serving more disportionately lower income patients have much more challenges to become a top performer due this SDOH local factor.   Since Value Based Purchasing (VBP) is revenue neutral, the top performers will receive a performance incentive bonus derived from the lower performer hospital penalty dollars.

DSH Group	Nsize	avg perf	std perf	avg complex rate	avg dsh rate	avg score	# hosp w/5+pts	>=5pts share	pt5 OE
1. DSH<15%	369	0.9794	0.0836	5.0%	9.6%	2.50	75	20.3%	1.29
2. DSH btw 15-30	1,232	0.9849	0.0642	5.1%	23.2%	1.99	187	15.2%	0.96
3. DSH btw 30-45	769	0.9883	0.0668	6.1%	35.9%	1.94	120	15.6%	0.99
4. DSH >45%	415	1.0065	0.0872	9.3%	62.5%	1.71	57	13.7%	0.87

| | 2,785 | 0.9883 | | | | | 439 | 15.8% | |

Complex Group	Nsize	avg perf	std perf	avg complex rate	avg dsh rate	avg score	# hosp w/5+pts	>=5pts share	pt5 OE
1. Complex Pts <4%	755	0.9456	0.0634	2.9%	25.9%	3.43	237	31.4%	1.99
2. Complex pts btw 4-7%	1,280	0.9897	0.0610	5.4%	27.6%	1.72	153	12.0%	0.76
3. Complex pts >7%	750	1.0290	0.0731	10.1%	41.6%	1.05	49	6.5%	0.41

| | 2,785 | 0.9883 | | | | | 439 | 15.8% | |

Social Determinants of Health (SDOH) and managing complex (high-use) patients

Complex patients can be defined as patients with at least 5 inpatient admissions per year, or 56 or more days of inpatient service. While only representing **3.9%** of all beneficiaries that had an inpatient admission, they represent **16.7%** of all inpatient spend. Comparing hospitals in the MSPB program, the variation of the percent of complex patients ranges from **2.7%** at the 10 percentile and **9.9%** at the 90th percentile. The correlation between complex patient rate and DSH rate is 0.4387, not insignificant, so many hospitals that have higher than normal low income patients will tend to have higher rates of complex patients.

Management of high-use complex patients has been well researched and studied, but the key takeaway from MSPB perspective is in how hospitals and primary care providers coordinate to ***help prevent patients migrating into Complex patient status.*** A 5 year review of complex patient rates by hospital show that each year, the rate for most hospitals increases. Complex patients have inpatients admissions almost every 45 days, almost insuring an extra $10,852 dollars to the episode cost for these patients. Their non-acute service spend is typically 82% higher than non-complex patients.

DSH Group	Nsize	avg perf	std perf	avg complex rate	avg dsh rate	avg score	# hosp w/5+pts	>=5pts share	pt5 OE
1. DSH<15%	369	0.9794	0.0836	5.0%	9.6%	2.50	75	20.3%	1.29
2. DSH btw 15-30	1,232	0.9849	0.0642	5.1%	23.2%	1.99	187	15.2%	0.96
3. DSH btw 30-45	769	0.9883	0.0668	6.1%	35.9%	1.94	120	15.6%	0.99
4. DSH >45%	415	1.0065	0.0872	9.3%	62.5%	1.71	57	13.7%	0.87

| | 2,785 | 0.9883 | | | | | 439 | 15.8% | |

Complex Group	Nsize	avg perf	std perf	avg complex rate	avg dsh rate	avg score	# hosp w/5+pts	>=5pts share	pt5 OE
1. Complex Pts <4%	755	0.9456	0.0634	2.9%	25.9%	3.43	237	31.4%	1.99
2. Complex pts btw 4-7%	1,280	0.9897	0.0610	5.4%	27.6%	1.72	153	12.0%	0.76
3. Complex pts >7%	750	1.0290	0.0731	10.1%	41.6%	1.05	49	6.5%	0.41

| | 2,785 | 0.9883 | | | | | 439 | 15.8% | |

Role of Primary Care Providers in reducing Complex Patient Rates

Table below takes groups of hospitals based on share of complex patients and MSPB scoring. Then, looked at average number of PCP visits per complex patient and per non-complex patient. All groups had high # of PCP visits for complex patients. Interesting note was on non-complex patients, much lower number of PCP visits overall, but the hospitals that have much lower shares of complex patients (<4%) also **have much higher than normal number of visits for the non-complex patients**. This increased visits also correlated to other insights found:

1. Coding of Wellness Visits and Welcome to Medicare visits was higher in the [Complex Pts<4%] group, 38% of patients compared to 14%
2. A cluster of preventive care procedures showed the [Complex Pts<4%] group having 26% of patients compare to 7%. Preventive services require diligence and time commitments from both provider and patient, difficult to manage without a strong relationship.
3. Readmission rate of [Complex Pts<4%] group was 16.8% compared to 29.3%
4. Observed over Expected ED Visit rate for non-complex patients was 0.82 for the [Complex Pts<4%] group, while it was 1.16 for the other groups.
5. Observed over Expected ED Visit rate for complex patients was 0.98 for the [Complex Pts<4%] group, while it was 1.01 for the other groups
6. From Accountable Care Organization (ACO) attribution data, these PCPs with lower complex/high need patients, had 11.2% lower patients to provider ratios for Medicare patients. Being able to serve less patients per provider, allows more direct patient care visits for all patients, helping them to reduce complex patient rates.

Complex Group	Performance Group	Nsize	Avg # PCP Visits per complex patient	Avg # PCP Visits per non-complex patient
1. Complex Pts <4%	1. MSPB Score=0	150	7.7	1.7
1. Complex Pts <4%	2. MSPB Score 1 thru 4	368	7.8	2.2
1. Complex Pts <4%	3. MSPB Score>=5	237	8.2	2.6
2. Complex pts btw 4-7%	1. MSPB Score=0	559	7.9	1.4
2. Complex pts btw 4-7%	2. MSPB Score 1 thru 4	568	7.5	1.6
2. Complex pts btw 4-7%	3. MSPB Score>=5	153	7.9	1.6
3. Complex pts >7%	1. MSPB Score=0	452	7.9	1.4
3. Complex pts >7%	2. MSPB Score 1 thru 4	249	7.7	1.9
3. Complex pts >7%	3. MSPB Score>=5	49	8.3	2.0

2,785

Summary of Findings :

- **DRG and DRG Family is necessary for performance optimization :** Episodes should be analyzed at MS-DRG or at least at DRG Family level. Benchmarks of the 3 main post acute venues help build awareness of what hospitals are doing at the national level and using these metrics to help guide performance goals. Simply checking the overall MSPB score is below 1 isn't enough in the long run.

- **Readmission management should focus on top 50 DRGs, not just HRRP admissions :** DRG bundles that have significantly higher number of readmissions than national average should be used to create specific targets for improvement, rather than trying to boil the readmission ocean.

- **Complex Patients :** The share of patients that are complex/high use will impact MSPB score over time. Keeping this rate below 4% could double a hospital's chances of avoiding penalty and achieving top performer status.

- **Social Determinants of Health (SDOH)** : While the MSPB bundle logic includes many HCC risk scores and adjustments, hospitals in areas that serve disportionately lower income patients will be challenged with this domain to attain high performance. Those that have achieved high performance use home health services at a much higher rate than their peers and keep their complex patient rates below 7%.

Endnotes and Takeaways:

- Using DRG family based bundle benchmarks, awareness of national trends in discharge disposition needs to calibrated every 1-2 years. A simple discharge disposition analysis by MS-DRG that can be done at the hospital level and then compared to national benchmarks can help identify current or future risks based on trends.
- Hospital Systems that have much higher than normal complex patients based on this publicly available data need to build awareness around this instead of just adopting a "My patients are sicker" attitude that is commonplace. The PCPs in their network might be overstressed and need additional resources to help reduce this in the long-run. The use of Physician Extenders (Nurse Practitioners and Physician Assistants) to help migrate from transactional care to relationship-based care is a option to explore. Many ACOs have non-traditional physician extenders (coaches) specialized in certain chronic conditions as resources in a capitated market.
- Readmissions should be reviewed at the MS-DRG level, not just for the few targeted admissions in the current HRRP program. Perhaps the skilled nursing facilities (SNF) in your area readmit or send patients to the ED at much higher rates than other providers in your market for patients within certain DRG families.
- Home Health service provider networks are key to post acute care optimization. Many readmissions can be prevented when the initial home health visit isn't delayed. If you are underutilizing home health for certain DRG families, those few cases couldn't be key.
- Considerable variation between SNF and Home Health stays and days of service at a national level. Building awareness around what is working and what needs attention is key.
- More research needs to be done in the realm of social determinants of health (SDOH) in the post acute settings. Some hospitals are high performers despite the constraints they deal with on a day-to-day basis. Learnings could be found by looking at the top performers in this markets and what other infrastructure entities they rely on would be a good start.
- There were 14 hospitals that had very high percentages of complex patients that reduced their complex patient share over a 5 year period. More case studies on what these hospitals and providers did during these transition periods could be insightful.
- Coding rates on CMS Part B preventive services should be reviewed and benchmarked. Many of these visits are free of cost to patients and help with patient engagement in their health.
- Improvement collaboratives with our hospitals around MSPB have saved over $24 million in episode bundle spend just by reducing SNF length of stay. Taking time to review benchmarks and problem solve with other facilities helps create best practices.
- If a DRG Family's 30-day bundles are still higher than 1.0 and the HHH, SNF, IRF and readmission rates are within acceptable ranges, then possible over-treatment of services of Part B providers and Home Health providers should be reviewed. In most cases, these costs are out of control, but since their average cost is typically very small in comparison to other higher cost levers, these cases won't kick-out as an outlier and be removed by CMS's MSPB bundle logic. 97% of episode outliers come from high costs during inpatient and IRF stays.