medisolv

Predictive Analytics and Simulation to Maximize Incentive Payments and Eliminate Penalties

Vicky Mahn-DiNicola RN, MS Vice President Clinical Analytics & Research Medisolv, Inc.



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Today's Discussion Points

- 1. How predictive and prescriptive analytics are useful to maximize value-based payments
- 2. How simulation can be used to create the best plan of action
- 3. Impact of distribution of national measure performance on your regulatory penalties and incentive payments
- 4. Things to consider when choosing a vendor for assistance



Analytics: Improving Insight and Business Value



Original Source: Gartner Business Intelligence & Analytics Summit 2013



Predictive and Prescriptive Analytics Definition

Predictive analytics is a data mining practice of extracting information from existing data sets in order to determine patterns and statistical models to predict future outcomes and trends. **Prescriptive analytics** is dedicated to finding the best course of action for a given situation and the impact of considering a solution on a future outcome or trend.

Both may involve "**machine learning**" and "**statistical learning**" techniques to "learn" which variables correlate to trends or outcomes.



How is Machine Learning Used Today?

- National security and law enforcement
- Political campaigning
- Meteorology and weather forecasting
- Netflix and Amazon product recommendation systems
- Targeted marketing by major retailers
- Email spam and junk filters
- Self driving cars







Healthcare Industry's Big Question

 Where can advanced analytic methodologies be applied to accelerate progress in transforming healthcare delivery?

"If we could know X... then we could DO Y"

Medisolv's Big Question

• How can advanced analytics be used to reduce regulatory penalties and increase incentive payments?

Medisolv's Answer

• Predictive and prescriptive analytics to forecast performance so hospitals can be more focused and proactive in their performance improvement



Timeline for Influencing Penalties and Incentive Payments for CMS FY 2022

(Aggregate Timelines Across CMS Hospital Value-based Purchasing, HAC Reduction and Readmission Reduction Programs)





Timeline for Influencing Penalties and Incentive Payments for CMS FY 2023

(Aggregate Timelines Across CMS Hospital Value-based Purchasing, HAC Reduction and Readmission Reduction Programs)





Timeline for Influencing Penalties and Incentive Payments for CMS FY 2024

(Aggregate Timelines Across CMS Hospital Value-based Purchasing, HAC Reduction and Readmission Reduction Programs)





Medisolv Analytics Methodology to Maximize Payments

- Data for computations and estimates for 64 measures is accessed from CMS Hospital Compare Website (data.medicare.gov) for all US Hospitals that participate in one or more of the three hospital regulatory reporting programs during FY 2015-2018
 - ✓ CMS Hospital Value Based Purchasing Program
 - ✓ CMS Hospital Acquired Conditions Reduction Program
 - ✓ CMS Hospital Readmission Reduction Program
- Historical data is extracted from zipped hospital flat tables
- The financial data used to compute the base operating rate and base operating payment are extracted from the IPPS final rule and correction notice data files and tables
- Data is updated and refreshed quarterly
- Future performance scores, performance percentiles and financial gains/losses calculated using machine learning and statistical learning techniques





Most Machine Learning Models are Evaluated Using Regression Analysis



Important to coach clinical stakeholders so they don't confuse correlation with causation!



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Regression Draws the Best Line of Fit Through the Cloud





Evaluating Linear Regression Models

Continuous Variables like LOS, Charges





Evaluating Logistic Regression Models *Binomial variables like mortality or readmissions*



Sleep apnea as Predictor

C-Statistic

The area under the curve explains the probability of your best guess isn't random

- .5 to .6 = random
- .6 to .7 = adequate
- .7 to .8 = good
- .8 to .9 = very good
- .9 <u>></u> excellent



Machine Learning Using Time Series Analysis

 Statistical techniques are used by data scientists to take a large set of historical "training data" to forecast future trends with a high degree of accuracy







Initial predictive models trained on CMS FY 2015-2017 data. Medisolv ran a FY 2018 Forecast through the model and compared to actual results published for FY 2018. High correlation demonstrated between actual and predicted total performance scores.



Two Types of Simulation

"What If" Simulation

What will be the financial impact if I improve my performance in selected measures?



✓ Check ideas you have about areas in which you are currently focused on for improvement or considering as a future improvement priority

✓ Understand the potential financial impact of moving the needle on your performance

✓ Dynamic data display lets you see financial impact for changing performance



Two Types of Simulation

 ✓ Proprietary algorithms provide a "short list" of recommended measures and performance targets (scores and percentiles) that are mathematically the most efficient way to achieve your financial goal

> What is the most efficient way to increase our incentive payments from 12K to 350K?

"How To" Simulation

- What performance do I need to achieve a desired financial target?
- Which measures will give me the most "lift" towards my desired financial goals?



Medisolv How To Simulation to Maximize Performance

Each measure (for each hospital and for each quarter) is evaluated for:

- **Net gain** = financial gain achieved with each measure score "leap" (0-10)
- Effort = Change in performance/range in performance across US
- **Efficiency** = Net gain/effort

In other words....we do a comparison of the effort it takes to leapfrog past other US Hospitals to the level of financial gain you will receive for that leap relative to your performance with other measures and the performance of all other hospitals





Which of these measures should you focus on?



- USA General Hospital is a 275-bed hospital with 40M of annual Medicare revenue.
- In the Hospital VBP Program they had a maximum potential incentive payment of 495K.
- Medisolv estimated that they would net \$12,960k incentive payment for FY 2022.
- They want to aim for 495K in payments.

Which measurement improvement strategy is the most efficient?





More Insight if You Know the Percentile Leap





Best Insight if You Understand the Distribution

Financial gains depend on distribution of performance for all US Hospitals and where your hospital is in the distribution



Vendors must evaluate the distribution on both known and forecasted results!



Communication with Doctors

Small financial gain for big improvement Efficiency Score = 3.79





Impact of getting to zero CLABSI

Moderate financial gain for big improvement Efficiency score = 5.74





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Medicare Spending per Beneficiary

Large financial gain for small improvement Efficiency score = 54.41





Medisolv Value Maximizer Dashboard

medisolv Analytics		Medisolv General Hospital ඎ 온				
Home Analytics Tools Audit Logs Learned CCN						
Facility: Medisolv General Medical Center CMS Payment Year:	FY 2023 (Forecasted Results)					
All Programs Total: - <mark>\$2,086,454.23</mark>		Projections based on Medisolv Analytics Forecast as of September 28, 2020				
Hospital Value-Based Purchasing Program	Hospital Acquired Conditions Reduction Program	Hospital Readmissions Reduction Program				
\$1,173,818.77	-\$2,178,173.32	-\$1,082,099.68				
-5000k -3000k -1000k 1000k 3000k 5000k	-3000k -2500k -2000k -1500k -1000k -500k 0k	-7000k -6000k -5000k -4000k -3000k -2000k -1000k 0k				
Domains	Categories	Cohorts				
Clinical Outcomes \$1,605,425.49	CMS Patient Safety Indicator (PSI 90) \$0.00	Acute MI -\$135,576.98				
Efficiency and Cost Reduction -\$704,156.35	NHSN Healthcare Associated Infections (HAI) -\$2,178,173.32	Heart Failure \$0.00				
Person and Community Engagement \$1,105,016.09	Measures	Pneumonia -\$3,602.33				
<u>Safety</u> -\$832,466.46	NET GAIN/LOSS -\$2,178,173.32	<u>COPD</u> -\$35,441.96				
NET GAIN/LOSS \$1,173,818.77		Total Joint -\$907,478.41				
		<u>CABG</u> \$0.00				
		NET GAIN/LOSS -\$1,082,099.68				
HVBPP O	HACRP 1	HRRP (



Medisolv Summary Report

medisolv • Analytics		Medisolv General Hospital ඎ 옴
Home Analytics Tools - Audit Logs Learned C	CN	
Facility: Medisolv General Medical Center CM	5 Payment Year: FY 2023 (Forecasted Results)	Return to All Programs Dashboard
All Programs Total: - <mark>\$2,086,454.23</mark>		Program: HOSPITAL VALUE-BASED PURCHASING PROGRAM
Summary Domain Detail	Domain Time Trend Simulator	
3000k 1000k -1000k -1000k	Maximum Potential Inc \$9,398,496 Maximum Potential Loss	Projections based on Medisolv Analytics Forecast as of September 28, 2020 \$1,173,818.77 5.33 \$4 356 300 00
	Gain	\$1,173,818.77 Domains
-3000k	Missed Potential Opportunity	\$8,224,677.56 Clinical Outcomes \$1,605,425.49 Efficiency and Cost Reduction -\$704,156.35 Person and Community Engagement \$1,105,016.09 Safety -\$832,466.46 NET GAIN/LOSS \$1,173,818.77
HVBPP		Summary Analysis 🕄



Medisolv Value Maximizer Domain Detail

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Analytics Tools Audit Logs Learned CCN										
isolv General Medical Center	CMS Payment Year: FY 2	2023 (Forecasted Results)				\rangle	Retu	rn to All Programs Dashboard		
ams Total: - <mark>\$2,086,454.23</mark>						/		Program: HO	SPITAL VALUE-BASED PURCHA	ASING PROGRAM
ummary Domain Detail Domain Tim	ne Trend	Simulator								
								Projections l	based on Medisolv Analytics Fo	precast as of Septem
ical Outcomes 🕄										\$1,605,42
ciency and Cost Reduction 🔂										-\$704 15
con and Community Engagement										¢1 105 01
										\$1,105,0
ety 🗢										****
										-\$832,46
Measure Name		Financial Impact	<u>Baseline</u> <u>Score</u>	Performance Score	Performance Percentile	<u>Achievement</u> <u>Points</u>	Improvement Points	<u>Total</u> <u>Performance</u> <u>Score</u>	<u>Days Remaining</u> <u>to Impact</u> <u>Performance</u>	-\$832,46 <u>Total</u> <u>Performanc</u> <u>Days</u>
Measure Name Catheter-Associated Urinary Tract Infections (CAUTI)		Financial Impact	Baseline Score 1.12	Performance Score 0.94	Performance Percentile 73.53	Achievement Points 0	Improvement Points	<u>Total</u> <u>Performance</u> <u>Score</u> 1	Days Remaining to Impact Performance 388	-\$832,46
Measure Name Catheter-Associated Urinary Tract Infections (CAUTI) ④ Central Line-Associated Bloodstream Infections (CLABSI)	6	Financial Impact -\$117,359.39 -\$181,514.44	Baseline Score 1.12 0.78	Performance Score 0.94 1.04	Performance Percentile 73.53 80.57	Achievement Points 0	Improvement Points 1 0	Total Performance Score 1 0	Days Remaining to Impact Performance 388 388	-\$832,46 Performanc Days 364 364
<u>Measure Name</u> Catheter-Associated Urinary Tract Infections (CAUTI) ① Central Line-Associated Bloodstream Infections (CLABSI) ① Clostridium difficile Infection (CDI) ①	Methicillin-resistant S	Financial Impact -\$117,359.39 -\$181,514.44 itaphylococcus aureus (MRS	Baseline Score 1.12 0.78	Performance Score 0.94 1.04	Performance Percentile 73.53 80.57 95.34	Achievement Points 0 0	Improvement Points 1 0 0	Total Performance Score 1 0 0	Days Remaining to Impact Performance 388 388 388	-\$832,46 <u>Performanc</u> Days 364 364 364
Measure Name Catheter-Associated Urinary Tract Infections (CAUTI) Central Line-Associated Bloodstream Infections (CLABSI) Clostridium difficile Infection (CDI) Methicillin-resistant Staphylococcus aureus (MRSA)	Methicillin-resistant S Base line period: Disc Performance Period: Achievement Threshe Benchmark: 00000	Financial Impact -\$117,359.39 -\$181,514.44 taphylococcus aureus (MRS charges January 1, 2019 to D Discharges January 1, 2021 olicharges January 1, 2021 olicharges January 1, 2021	Baseline Score 1.12 0.78 (A) vecember 31, 2019 to December 31, 20	Performance Score 0.94 1.04	Performance Percentile 73.53 80.57 95.34 52.56	Achievement Points 0 0 0 0	Improvement Points 1 0 0 0	Total Performance Score 1 0 0 0	Days Remaining to Impact Performance 388 388 388 388 388 388 388 388	-\$832,46 Performanc Days 364 364 364 364
Measure Name Catheter-Associated Urinary Tract Infections (CAUTI) ① Central Line-Associated Bloodstream Infections (CLABSI) ① Clostridium difficile Infection (CDI) ① Methicillin-resistant Staphylococcus aureus (MRSA) ① Patient Safety and Adverse Events Composite ①	Methicillin-resistant S Base line period: Disc Performance Period: Achievement Threshe Benchmark: 0.0000 The PSI-90 Composite	Financial Impact -\$117,359.39 -\$181,514.44 :taphylococcus aureus (MRS charges January 1, 2019 to D Discharges January 1, 2021 old: 0.7270 e measure is reported as an o	Baseline Score 1.12 0.78 (A) to December 31, 2019 to December 31, 2019 to December 31, 2019	Performance Score 0.94 1.04 21 ratio by CMS	Performance Percentile 73.53 80.57 95.34 52.56 60.85	Achievement Points 0 0 0 0 0 0	Improvement Points 1 0 0 0 0	Total Performance Score 1 0 0 0 0 0 0 0 0	Days Remaining to Impact Performance 388 388 388 388 388 388 388 388 388	-\$832,46 <u>Performanc</u> <u>Days</u> 364 364 364 364 730
Measure Name Catheter-Associated Urinary Tract Infections (CAUTI) Central Line-Associated Bloodstream Infections (CLABSI) Clostridium difficile Infection (CDI) Methicillin-resistant Staphylococcus aureus (MRSA) Patient Safety and Adverse Events Composite Surgical Site Infection (SSI): Abdominal Hysterectomy	Methicillin-resistant S Base line period: Disc Performance Period: Achievement Threshe Benchmark: 0.0000 The PSI-90 Composite	Financial Impact -\$117,359.39 -\$181,514.44 taphylococcus aureus (MRS charges January 1, 2019 to D Discharges January 1, 2021 old: 0.7270 e measure is reported as an of \$735.63	Baseline Score 1.12 0.78 (A) to December 31, 2019 to December 31, 2019 to December 31, 2019 to December 31, 2019	Performance Score 0.94 1.04 21 ratio by CMS 0.69	Performance Percentile 73.53 80.57 95.34 52.56 60.85 49.74	Achievement Points 0 0 0 0 0 0 0 1	Improvement Points 1 0 0 0 0 0 0	Total Performance Score 1 0 0 0 0 0 1 1	Days Remaining to Impact Performance 388	-\$832,46 Performance Days 364 364 364 364 364 364 364

HVBPP

Domain Detail 🚯



Medisolv Value Maximizer Domain Time Trend Analysis

mediso	medisolv • ^{Analytics} Medisolv General Hospital ඎ 온											
Home Analytics Tools Audit Logs Learned CCN												
Facility: M	Facility: Medisolv General Medical Center CMS Payment Year: FY 2023 (Forecasted Results)											
All Prog	All Programs Total: -\$2,086,454.23									OGRAM		
	Summary	y Domain Detail	Domain Time Trend	Simulator								
		Unfavorable Trend		Favorable Trend	Domain: S	afety	Data Typ	e: Performance Period	Percentile			
5	0.00				Perform	nance Period Percentile						
Y 202	20.00			Fave		Measure Name	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>
ntile - F				Performance for Surgical Site Infec shows an upward tre and compares more favorably than r	ction (SSI): Colon end many U.S. hospitals	(Composite)	78.89					^
Perce	40.00					Elective Delivery Prior to 39 Completed Weeks Gestation	60.68	69.69	57.55			
Period	60.00	•		Unfavc		Methicillin-resistant Staphylococcus aureus (MRSA)	48.82	36.06	49.12	54.97	52.92	52.56
Jance				rrable Per		Patient Safety and Adverse Events Composite						60.85
Perform	80.00			formance		Surgical Site Infection (SSI): Abdominal Hysterectomy	61.78	73.06	34.46	31.17	40.62	49.74
	100.00	-0.70	-0.20 0.30	0 0.80		Surgical Site Infection (SSI): Colon	76.23	66.06	72.47	66.30	55.90	45.44
			Trend									
HV	BPF)									Doma	ain Time Trend 🕄



Medisolv Follows the Math to Find the Most Efficient Path

CMS Pay	ment Year: FY 2023 (Forecasted Results)	▼							\rangle	Return to All Pro	grams Dashboard		
All Programs Total: - <mark>\$2,086,454.23</mark> Summary Domain Detail Domain Time Trend	Simulator								/		Program: HOSPITAL VALUE-BASED PURCH		
Select Simulation Type Set Financial Goal Set Performance Goal											Projections based on Medisolv Analytic	rs Forecast as of September 28, 20	
Choose desired financial goal and click Run Simulation Original \$1,173,818.77 \$3,804,135.14	Performance Points Clinical Out1 Efficiency a1 Person and	Safety	, 2							Domains Clinical Outcomes		\$1,862,025.76 (\$1,605,425.49)	
(Catheter-Associated Urinary Tract Infections (CAUTI)	Unfav	vorable Trend	1	1 1	1 6	1 7	avorable	Trend	Efficiency and Cost Reduction Person and Community Engagement Safety		\$1,220,482.11 (-\$704,156.35) \$1,105,004.26 (\$1,105,016.09) -\$383,376.99 (-\$832,466.46)	
Run Simulation	Central Line-Associated Bloodstream Infections (CLA Clostridium difficile Infection (CDI)		2	1 3		6	1 7	1 1 8 9	9 10		\$3,804,135.14 simulated net gain/loss		
Save Load Reset	Methicillin-resistant Staphylococcus aureus (MRSA) Patient Safety and Adverse Events Composite		2	3	4 5	6	, 1 7	° 1 8	9 10 9 10				
	Surgical Site Infection (SSI): Abdominal Hysterectomy		2	3	4 5 1 1 4 5	6	7 1 7	8 1 8	9 10 1 1 9 10				



Medisolv Follows the Math to Find the Most Efficient Path

medisolv Analytics				Mediso	olv General Hospital ඎ 음
Home Analytics Tools • Audit Logs Learned CCN					
Facility: Medisolv General Medical Center	IS Payment Year: FY 2023 (Forecasted Results)		\rangle	Return to All Programs Dashboard	
All Programs Total: -\$2,086,454.23			/	Program: HOSPITAL ACQUIRED CON	NDITIONS REDUCTION PROGRAM
Summary Category Detail Category Time Tr	end Simulator				
Select Simulation Type Set Financial Goal Set Performance Goal				Projections based on Medisolv A	nalytics Forecast as of September 28, 2020
Choose desired financial goal and click Run Simulation.	Observed, Expected, and Simulated Complications			Categories	
Original Simulated -\$2,178,173.32 \$0.00	CMS PSI 90 NHSN HAI Measures 🥹			CMS Patient Safety Indicator (PSI 90)	\$0.00 (\$0.00)
Full Penalty Penalty Penalty		Favorable Trend	Unfavorable Trend	NHSN Healthcare Associated Infections (HAI) Measures	\$0.00 (-\$2,178,173.32)
	Catheter-Associated Urinary Tract Infections (CA				
2178k -1678k -1178k -678k -178k	Clostridium difficile Infection (CDI)			\$0.00 SIMULATED NET GAIN/LO	220
Run Simulation	Central Line-Associated Bloodstream Infections	0 50 100 150 200			
Saved Simulations	— Methicillin-resistant Staphylococcus aureus (MR		0 70 80 90 100		
Save Load Reset	Surgical Site Infection (SSI) - Colon and Hystere				
L					
HACRP					Simulator 🕄



Analytics Vendor Evaluation Check List for Value Payment Forecasting and Simulation

- □ Includes all measures in all three CMS programs
- □ Trends evaluated for all US Hospitals (not just vendor's clients)
- □ Forecasts available through CMS FY 2023 (2024 available in April)
- Distributions of both actual results and forecasts evaluated
- Performance can be displayed as scores, percentiles, rates (including excess readmissions)
- Data refreshed quarterly
- □ Simulation available for client selected measures
- Optimization targets and recommendations provided
- Recommended targets can by adjusted by user
- □ Targets and recommendations can be saved for later review
- □ Supports multi-facility analysis
- No software installation or complex implementation to view forecasts
- □ Accessed via the Web on PC or mobile technology
- Drill down on value payment measures to encounter and prov
- □ Transparent vendor methodology
- □ High correlations demonstrated





For More Information

- Please contact us for a full tour of the Medisolv Value Maximizer
- Contact Information
 - vdinicola@medisolv.com
 - 520-990-0876
 - For more information about Medisolv Solutions see https://medisolv.com/solutions/
 - Or call us at 1-800-MEDISOLV or email us at
 - info@medisolv.com



WHEN YOU RETURN

Our next presentation will be in the main workshop room.

Click the link found in your calendar invitation to return to the main session.

YOU ARE HERE 🌺 = 1:00-1:10: Break



1:10-2:00: The 2021 "Voluntary" Electronic Measures

Join this session by clicking the main workshop link found in your calendar invitation or confirmation email.

 A review of the specifications and steps for implementing the Hybrid Hospital-Wide 30-Day Readmission measure and the Safe Use of Opioids - Concurrent Prescribing eCQM.