FEATURE STORY

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using data analytics to identify revenue at risk

Predictive and comparative analytics have the potential to drive improved value by pinpointing areas where proactive steps can better support optimal revenue cycle performance—as well as the organization's mission.

The trend toward using predictive and comparative analytics to improve value in health care is on the rise, driven by advancements in technology, healthcare reform, regulatory mandates, and the emergence of value-based payment models.

Recently, hospital CIOs surveyed across 12 major health systems identified "creating an information-driven health system using advanced analytics" as

their No. 1 long-term priority (*Health System Chief Information Officers: Juggling Responsibilities, Managing Expectations, Building the Future*, Deloitte Center for Health Solutions, February 2013). Meanwhile, 60 percent of healthcare IT professionals responding to another survey indicated their organizations plan to increase investment in analytics this year to improve their limited ability to handle complex analytics (Miliard, M., "Big Data Driving Analytics Investments," *Healthcare IT News*, Mar. 22, 2013).

The revenue cycle is one area where the power of predictive and comparative analytics has the potential to help healthcare leaders improve margins.

Insight-Driven Margin Improvement

The use of both predictive and comparative analytics is a key differentiator between organizations with strong revenue cycle performance and those that exhibit substantial leakage.

Predictive analytics. In a function rich with patient and financial data, predictive analytics enables revenue cycle leaders to shift away from using retrospective data to make reactive decisions and move toward using real-time data to make prospective predictions that enhance an organization's ability to respond to change. The question with predictive analytics is not a backward-looking "What happened?" but a forward-looking "What's next?" and "What should we do about it?"

Simply put, predictive analytics is a more advanced form of data benchmarking that focuses on the future. Predictive analytics includes components of statistical analysis to predict future trends and behavior patterns by extracting unknown correlations from data. Integration of datasets is critical to enabling the organization's data analytics functions to evolve from a purely historical analysis function to one that encompasses predictive capabilities.

For example, it is standard practice to use key performance indicators (KPIs) to assess revenue cycle performance against industry benchmarks or historical performance. However, healthcare organizations can rely too heavily on traditional KPIs to measure performance—and in doing so, they may neglect to measure performance in process or sub-process areas, such as financial clearance, utilization management and review, denials, and underpayment management. Data related to traditional KPIs may not be enough to provide insight into the root causes of revenue leakage. Measuring both traditional and nontraditional revenue cycle KPIs could help focus leaders' efforts in areas where the potential to improve revenue cycle performance is greatest.

Hospitals and health systems can gain several benefits from using predictive analytics. For example,

THE EVOLVING NATURE OF REVENUE CYCLE ANALYTICS
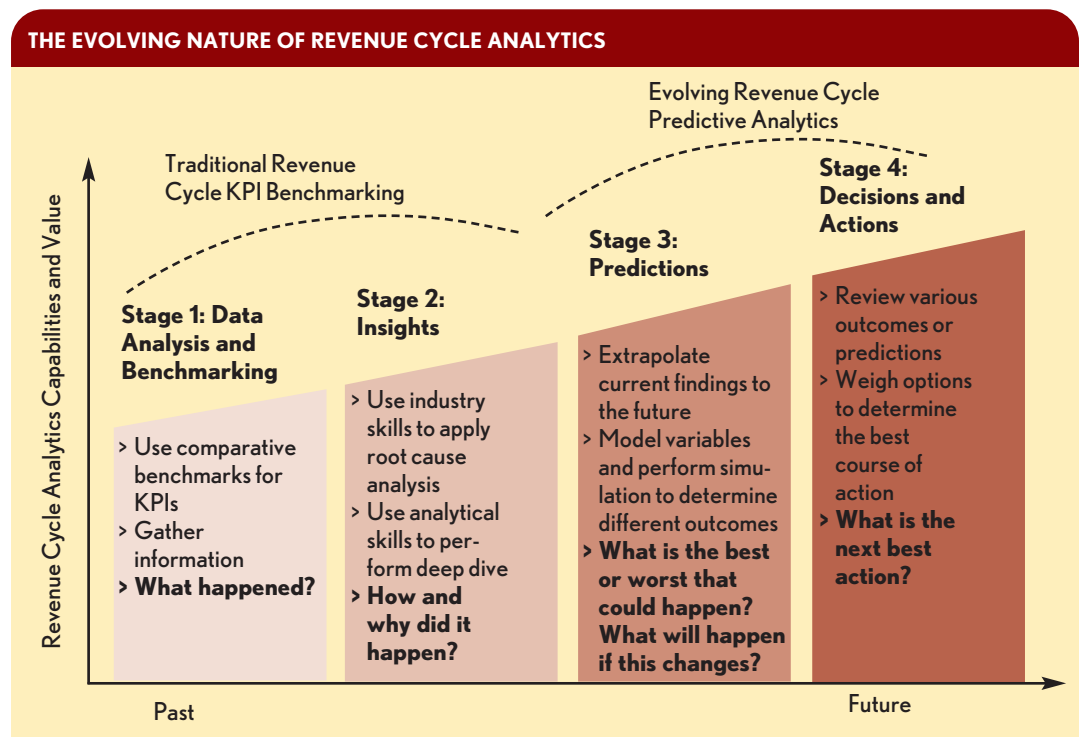
The future of revenue cycle analytics will shift from retrospective insights to prospective predictions and actions to realize value and manage changes.

predictive analytics can provide organizations with the business intelligence needed to make prospective and proactive business decisions. Its use leverages existing business principles, such as statistical modeling, to enhance budget forecasting capabilities and to develop complex analyses in real time, such as how to best coordinate labor resources in a shared-services delivery model to meet current and predicted demand.

But there are also challenges related to the use of predictive analytics in health care. For example, predictive analytics tools are relatively new, and successfully integrating these tools with other business intelligence software, tools, and applications may prove problematic. Given that revenue cycle data come from multiple sources, the data analytics effort cannot succeed without the ability to combine and mine a variety of data elements, such as electronic remittance files and transaction data. Identifying process outliers also can be challenging from a technology and resources standpoint.

One example of a predictive metric that applies historical revenue cycle performance data to predicting future net revenue and project operational and process risk is revenue at risk (RAR):

$$RAR = \text{net revenue denied} + \text{net revenue underpaid} + \text{uncollected self-pay revenue}$$

RAR is a metric of revenue cycle performance that summarizes potential revenue leakage and/or opportunity. RAR is categorized by three areas that typically drive the majority of revenue leakage in organizations:
> Initial denials
> Underpayments (insurance and patient liability)
> Self-pay collections

RAR provides a valuable summary of revenue cycle performance and can be easily incorporated into organizational financial reporting processes. Through ongoing monitoring of RAR, an organization can better understand the root causes of revenue cycle leakage that ultimately lead to write-offs and bad debt and can develop interventions to enhance performance. Over time, performance monitoring combined with RAR process interventions will lead to improved margins.

Based on industry analysis, risk related to denials and self-pay collections is fairly well known. However, underpayments—specifically underpayments related to patient liability—often are not aggressively monitored or reported. An analysis

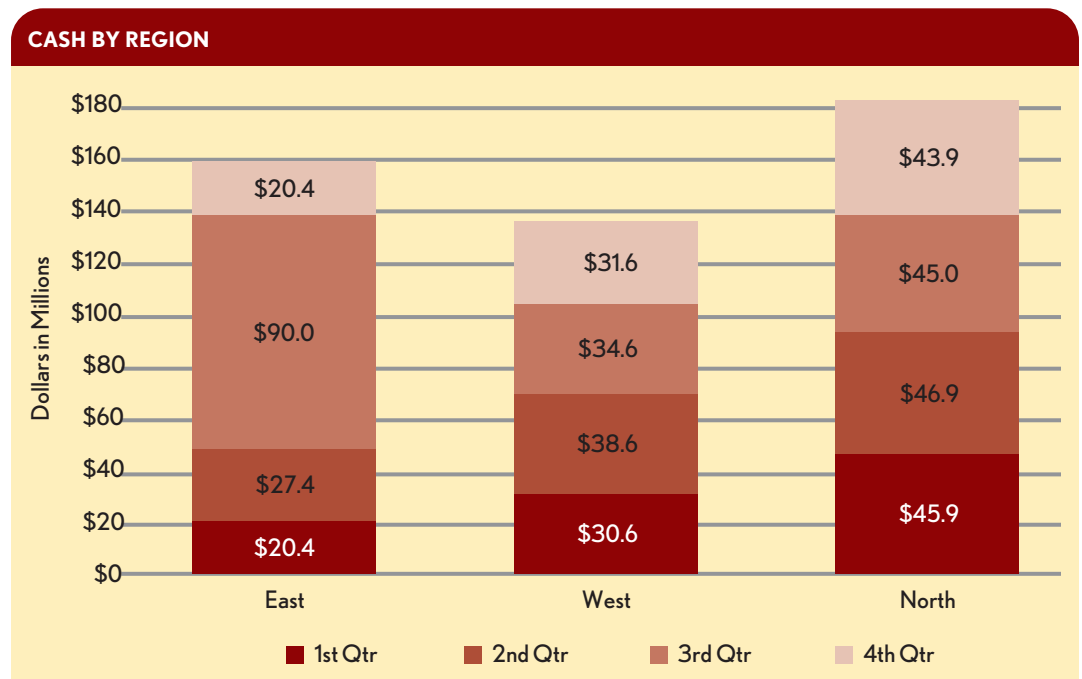**PAYER ACCOUNTS RECEIVABLE (A/R)–% BY FACILITY**
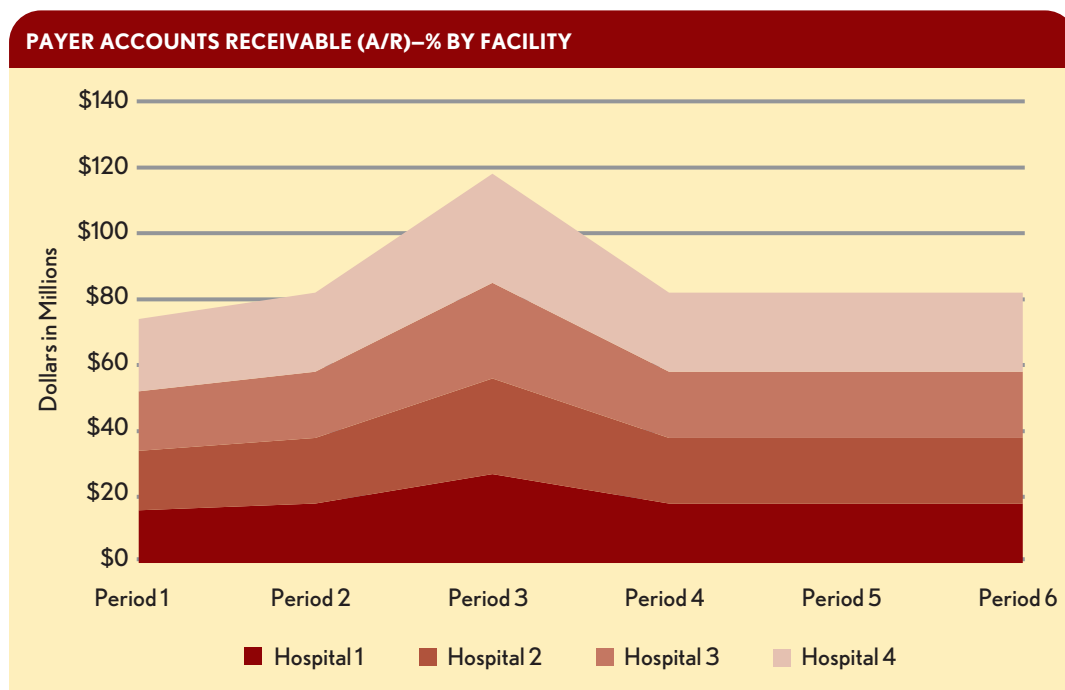
of a sample of payment processes at large health systems found that these organizations failed to capture 10 to 12 percent of expected net revenue, on average, because of ineffective collection of patient liabilities. This represents a substantial loss of revenue.

Comparative analytics. This is the most traditional and common type of analytics used to measure performance in hospitals and health systems. Comparative analytics relies on historical and current analysis and benchmarks to evaluate performance. Such comparisons provide a deep understanding of the organization's past performance. Comparative analytics tools allow for effective peer-to-peer comparisons to understand relative performance. They detail how an organization has performed in the past and can help provide a "same-store" comparison. They also can be used to support the organization's efforts to become more nimble in responding to changes in performance. Examples of comparative analytics focuses include year-over-year volume data, comparison of productivity statistics to national benchmarks, and patient satisfaction scores compared across a peer group.

Using comparative analytics in hospitals and health systems poses challenges, however. Comparative analytics assumes peer comparisons are valid and often ignores variation in patient and payer mix. It also provides little insight as to how an organization may perform in the future, such as in relation to insurance accounts receivable (A/R) aging, denial or underpayment rates, or productivity reporting. It requires continual monitoring to ensure that any changes in tracking methodology for year-over-year comparisons are carefully recorded and considered during analysis. Use of comparative analytics also requires an understanding of the methodology used to create the peer group for benchmarking purposes.

The exhibit on page 3 compares payer performance across facilities in a multihospital system. The spike in A/R in period three occurred at all facilities, potentially indicating a payer remittance problem. The exhibit below illustrates cash performance for the same payers across regions in a health system. In particular, the exhibit shows that cash collections during the third quarter were substantially stronger for facilities in the eastern region than for facilities in other locations.

CASH BY REGION

	East	West	North
4th Qtr	$20.4	$31.6	$43.9
3rd Qtr	$90.0	$34.6	$45.0
2nd Qtr	$27.4	$38.6	$46.9
1st Qtr	$20.4	$30.6	$45.9

Dollars in Millions

■ 1st Qtr   ■ 2nd Qtr   ■ 3rd Qtr   ■ 4th Qtr

Combining Predictive and Root Cause Analytics

Data analytics tools can be effectively used to gain additional insight into revenue cycle margin opportunities.
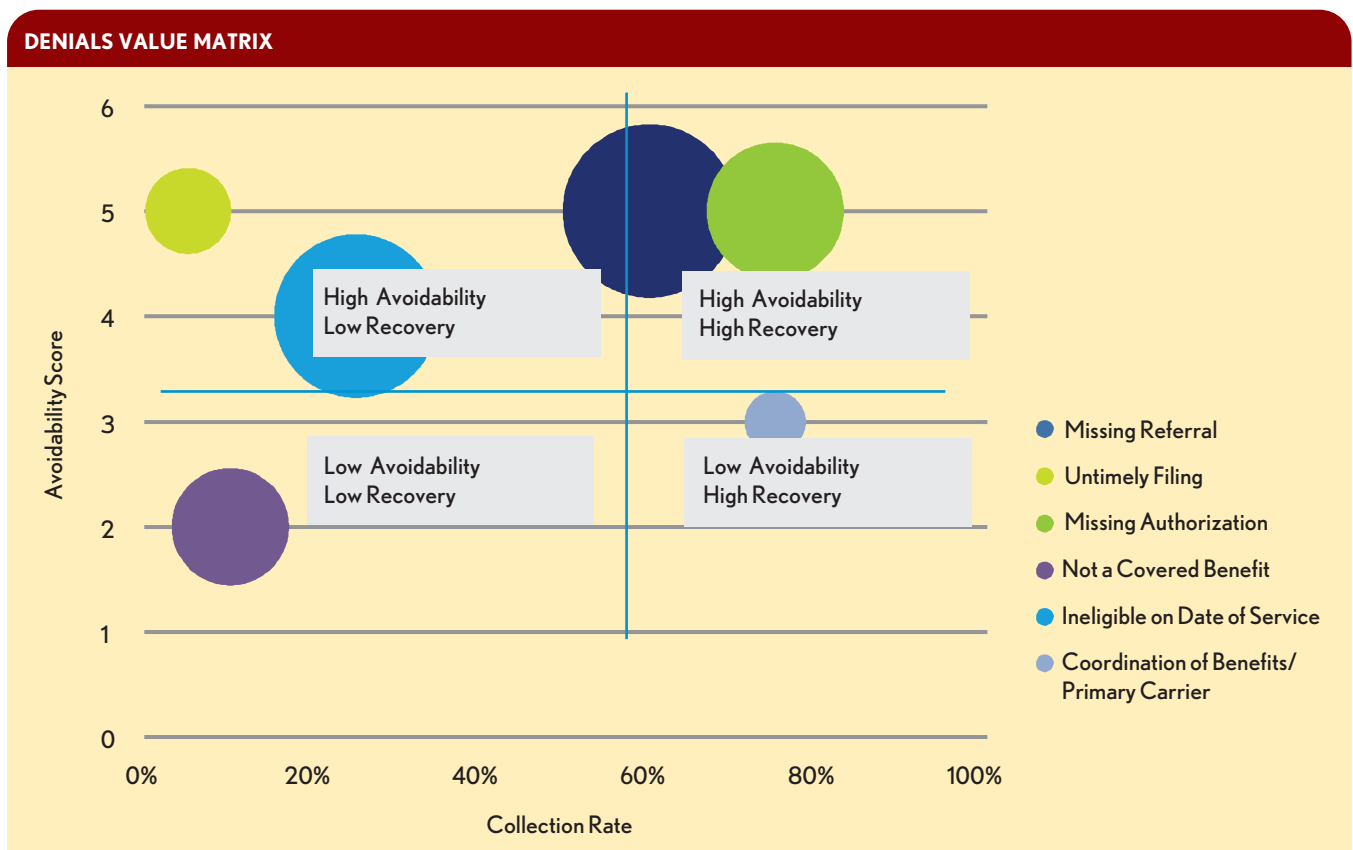
For example, the denials value matrix in the exhibit below segments denials across several criteria to provide a better understanding of both value and prioritization. First, the historical collection rate across various reasons for denial is measured to ascertain how a combination of revenue cycle activities has historically affected payment. Assuming no other variations or changes, the historical collection rate is applied across denial reasons using an analytical tool that archives detailed performance data and runs financial analytical modeling. Hospitals and health systems can move toward a scenario-based predictive approach by using past performance as a predictor of future outcomes and manipulating assumptions to better forecast risk.

Next, the impact on revenue for each reason for denial is assessed, as represented by the size of the bubble in the exhibit below.

The last step is to categorize the denials according to the avoidability of the root cause issue or the ability to avoid the denial through process intervention. The final result is a matrix with four quadrants, each representing distinct attributes and required remediation actions. Organizations can use these data to help define specific strategies for remediation, such as prevention tactics, tighter collaboration with clinical teams, and ways to adjust denials resolution prioritization.

Case Study: Data Analytics in Action

Organization X is a 1,700-bed health system with eight locations in the Southeast. In May 2013, Organization X began an initiative to assess financial opportunities across its revenue cycle. An example of the types of analytics—both

DENIALS VALUE MATRIX

High Avoidability
Low Recovery

High Avoidability
High Recovery

Low Avoidability
Low Recovery

Low Avoidability
High Recovery

Avoidability Score

Collection Rate

- Missing Referral
- Untimely Filing
- Missing Authorization
- Not a Covered Benefit
- Ineligible on Date of Service
- Coordination of Benefits/ Primary Carrier

comparative and predictive—that were used in this evaluation, as well as areas of financial opportunity that were identified, is shown in the exhibit below.

By analyzing the reasons for denials of claims over a six-month period several primary areas of revenue at risk for Organization X were immediately identified, such as self pay, underpayments, and denials. Using the data, Organization X developed several denials management prevention tactics based on this initial analysis, such as expanding patient access functions, aligning to top denial reasons, and implementing a formal patient discharge process for patient access services staff to encourage collections.

But a deeper dive into the data through analytical modeling, which can predict outcomes based on historical patterns, revealed revenue leakage occurring in previously undetected areas that, over time, would have a much greater impact on the organization than losses in the areas initially uncovered.

Emergency department (ED). The highest-frequency denials from the ED related to issues with authorizations, eligibility, and coordination of benefits—and the rate of denials associated with such issues was predicted to increase over time. Based on the predictive analysis, three key corrective actions were identified:

> Include indicators on the patient board to identify those patients who have been clinically triaged and are ready for full registration.
> Expand the scope of the eligibility verification tool to include all available insurances.
> Create mobile registration stations—"workstations on wheels"—that registrars could use to perform full bedside registrations, including eligibility verification and point-of-service cash collections.

These action steps are targeted to be completed within three months, and benefits are expected to be fully realized within six months of implementation.

Outpatient surgery. The highest-volume preventable denial for outpatient surgeries was missing/invalid authorization, with the root cause for a majority of these denials identified to be a gap in the procedure code table within the scheduling module. Organization X corrected the gap by loading the most recent table of procedure codes and ICD-9 codes into the surgery scheduling system and testing the system to detect any potential glitches and make the appropriate corrections.

USING PREDICTIVE AND COMPARATIVE ANALYTICS TO IDENTIFY FINANCIAL OPPORTUNITY		
Analysis	Organization X's initial denial rate is 7.7 percent compared with peer denial rates of 4 to 6 percent. Top-percentile root causes related to issues with authorizations, eligibility, and coordination of benefits occurring predominantly at two of the organization's eight facility locations.	A revenue-at-risk (RAR) analysis forecasts that 3 percent of Organization X's annual net revenue is at risk of being uncollectible. The primary categories of risk are denials, underpayments, and self-pay collections. Underpayments constitute 50 to 75 percent of RAR, with previously unrecognized opportunity in patient liability (balance after insurance).
Action	Redesign front-end registration processes for eligibility and authorizations with a focus on ED, surgeries, and outpatient recurring services.	Focus patient access resources on preservice verification and eligibility, and optimize technology, where applicable. Implement policy changes to encourage patient flow process of patient registration/financial counseling prior to discharge.
Targeted Benefit	Annual net revenue optimization of 0.3 percent, or $6.7 million.	Annual avoidance of 2.6 percent, or $57.2 million in future net revenue leakage.

Today, Organization X's preregistration team has access to the precise CPT codes needed to obtain authorizations, rather than the description of services previously provided. Organization X will continually monitor performance to validate that the CPT code for the service ordered at the point of scheduling is the same as the CPT code of the service performed. The health system realized benefits from the improvements within the first month of implementation, and it is expecting to achieve full benefits within the first six months.

Recurring treatment. An examination of denials for a recurring-treatment series revealed that such denials were primarily due to missing/invalid authorizations. Organization X identified two root causes:

> Limited preregistration support for the high volume of services, particularly for initial authorizations
> Problems with the authorization renewal tracking system

Organization X created a new unit in its preregistration department to specifically track recurring treatment accounts and arranged for enhancements to the tool that tracks authorization renewals for recurring services. Organization X will begin to feel the impact of these changes within three months. Organization X monitors performance of both the new unit and the tool and shares performance reports with preregistration leaders and staff during weekly status meetings. The health system expeditiously addresses barriers and interdependencies that are identified during the meetings, with a focus on eliminating the issues that led to such denials.

Action Steps for a Data Analytics Approach

Not all data are created equal—and neither are management reports. Turning raw data into usable and understandable information is not easy. The path to effectively using comparative and predictive analytics in the revenue cycle begins with four steps.

Step 1: Standardize. Standardization of data is the process of ensuring all data being compared are in the same measure or are normalized across the same

parameters (i.e., "apples to apples"), such as gross vs. net revenue. This process is especially important if data are being extracted from various information systems, such as billing, accounting, or contract management systems, across multiple platforms.

Step 2: Integrate and define the data. Revenue cycle data sets typically are categorized according to traditional revenue cycle operational areas, such as patient access, middle revenue cycle, and patient financial services. During this step, organizations should determine the type of analysis they want to generate (e.g., predictive; comparative) and identify the sources of data across the revenue cycle continuum that will support such an analysis. This effort is where historic performance deviates from the revenue cycle of the future: Leading organizations strive to manage their performance according to multiple dimensions and criteria.

Step 3: Prioritize. Prioritizing revenue cycle goals is one of the most important steps in protecting revenue at risk. Data from advanced analytics can help focus resource efforts on high-value work, such as enhancing work queue logic and prioritization. Organizations should consider prioritizing improvement initiatives according to multiple factors, including value (both qualitative and quantitative), speed of benefit realization, and entity data attributes such as facility/location, department, procedure, attending physician, or payer/plan. It is critical to determine the factors and dimensions that will provide the most insight for revenue cycle leaders to act upon.

Step 4: Optimize. Using lessons learned from implementation, the enterprise should begin optimizing new functionality. This activity should include revising reports, including what is being measured, how often, and how data are being utilized to drive improvement.

Success Factors

Successful optimization of a data analytics approach depends, in large part, on the following key factors.

Inclusive leaders. Senior administrators should engage physicians and work with business unit owners to gain ground-level insights.

Communication and learning. Because the use of predictive analytics in the hospital revenue cycle involves a paradigm shift, reorienting healthcare revenue cycle executives on how to derive insights from and lead their teams in root cause analysis to proactively manage revenue cycle issues will be critically important to realizing value from such initiatives.

Embedded analytics. At this stage, the organization should be realizing full benefits from augmented analytics, with all four types of analytics being used throughout the organization in appropriate settings and venues.

Transparency. Clinicians, business unit owners, and staff should know how analytics are used, and a positive performance culture should be fostered to support accurate data reporting and to successfully address items brought to light through data analysis.

Real-time monitoring. Diligently tracking performance markers will enable revenue cycle leaders to manage exceptions and focus on problems with the assurance that adequate controls for monitoring financial performance are in place.

Incorporation of staff feedback. Continual monitoring and feedback related to analytics requirements and processes are vitally important and will position the organization both to maintain gains

developed through augmented analytics and to continually improve its metrics and modeling capabilities.

A Strategic Approach to Revenue Cycle Improvement

The revenue cycle has become an increasingly strategic function in healthcare organizations as leaders determine how to enhance market position, improve margins, and protect revenue at risk. Predictive and comparative data analytics have the potential not only to provide retrospective insight into revenue cycle performance, but also to identify opportunities to optimize performance in the future. ●

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