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FEATURE STORY

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turning hospital data into dollars

Healthcare financial executives can use predictive analytics to enhance their ability to capture charges and identify underpayments.

AT A GLANCE

- Predictive analytics is an advanced business intelligence tool that can help healthcare financial executives mine data resulting in high-value, actionable improvements for their revenue cycle.
- Predictive analytic solutions can help hospitals increase revenues and improve their decision-making ability to increase revenue and staff productivity.
- Automation technology can help hospital business offices eliminate manual work on claims, saving time and costly labor while increasing accuracy.

Healthcare organizations are sitting on untapped assets: massive amounts of data. If leveraged with the right business intelligence tools, data can yield millions of dollars in revenue and provide critical decision-making support that can lead to greater staff productivity and enhanced revenues. Although the healthcare industry has lagged behind other industries in adopting business intelligence applications, increasing internal and external financial pressures have created prime conditions for healthcare organizations to begin making greater use of advanced analytics technology, according to a 2008 report by the Aberdeen Group (*Business Intelligence in Healthcare: Have Providers Found a Cure?*).

Business intelligence tools are often categorized as predictive or nonpredictive. Nonpredictive analytics are classified as end-user query analysis and reporting tools that summarize and organize data retrospectively. On the other hand, predictive analytics, or predictive modeling, applies the science of statistics and machine learning to provide smart intelligence that is actionable. The technology uses data mining, or mathematical algorithms, to identify relationships in data to make predictions about specific events, identify anomalies, and importantly, target high-value actions that deliver the greatest and fastest ROI.

A study conducted by IDC comparing predictive and nonpredictive applications found that predictive solutions scored a 56 percent higher ROI (*Predictive Analytics and ROI: Lessons from IDC's Financial Impact Study*, September 2003). The major benefits in predictive analytics were attributable to business process enhancements, according to the study report. Fortune 100 companies have used predictive analytics technology over the past 20 years, especially as demand for higher profits and the need for

Read about five steps to a successful predictive analytics implementation at www.hfma.org/hfm.

supporting quantitative analysis grew. The banking and insurance industries have used predictive analytics for decades to detect fraud, identify overpayments, and set premiums.

Increasingly, healthcare financial executives are recognizing the benefits of advanced analytics for the business office. A poll of CFOs recently conducted by HFMA's CFO Forum found that in this challenging economic environment, the CFOs' primary goal for revenue cycle managers is to employ "innovative approaches to unearthing data and using it to improve collections and denial management." The predictive analytics approach to mining data can help hospital business offices identify missing charges, detect underpaid accounts, automate the resolution of credit balances, estimate costs for patient care, and reduce A/R days with fewer resources.

A key benefit to implementing a predictive solution is that the analytics can be quickly and seamlessly integrated with existing health information systems (HISs). Healthcare financial managers should look for a predictive solution that can be customized to identify the specific nuances and trends for their facilities, implemented and driving results within 60 days. Additionally, a solution that is delivered as Software-as-a-Service (SaaS) reduces the total cost of ownership, increases the speed of implementation, and minimizes IT staff dependencies.

Supporting the Revenue Cycle

Predictive analytics technology offers several advantages over conventional, rules-based technology in supporting the revenue cycle. Because healthcare environments are inherently statistically driven, the ability to model data and forecast threats and opportunities can be crucial for an organization to drive efficient patient flow operations and hospital administration, according to the 2008 Aberdeen report. Using intelligent categorization, predictive analytics can:

> Constantly target the highest value claims or accounts because the automated models are customized to a hospital's specific processes

Predictive analytics models have the ability to analyze data at the claim and transaction level and identify root causes creating processing errors.

> Identify root causes and trends causing missing charges or bad debt to provide executives with strategic intelligence to prevent further revenue leakage or violated contract terms
> Enhance staff productivity and improve nurse auditor efficiency by providing targeted, high-action claims/accounts for review
> Accelerate the resolution of credit accounts and reduce bad debt

Enhancing Revenue Capture

Healthcare organizations often are challenged to allocate the resources and advanced technologies required to aggregate, research, and analyze their data efficiently. Given time and resource limitations, manual audits are limited to a small subset of accounts within departments that have complex billing requirements or known opportunities for improvement.

Many hospitals use rules-based packaged software or built-in billing edits from their HISs to detect coding issues and missing charges. This approach offers some improvements within the charge recovery process, but is limited in its ability to capture the greatest amount of revenue. Rules-based software often identifies only basic edits and is not customized to a hospital's specific nuances so it might not take into account the physician practice patterns, patient mix, and evolving billing and charging processes. Moreover, because a rules-based approach is nonpredictive, it does not offer analysis to support strategic intelligence or a specific call to action.

Predictive models for missing charges can detect new trends and anomalies to flag missing charges

and proactively prevent charge capture leakage. Mining data from the HIS, clinical services provided, payer contracts, and the chargemaster, customized models will automatically group and identify claims that are coding outliers based on proven statistics, leading to improved collection rates and diminished lost revenue. Specifically, models compare a current claim with historical patterns and thresholds for equivalent scenarios based on physician, diagnosis-related groups (DRGs), procedures, diagnosis codes, present charge codes, and other visit-related data.

With predictive modeling, hospitals can automate the analysis of patient accounts to ensure that necessary codes and charges have been submitted. Predictive analytics leverages data already captured in the HIS to identify coding outliers relative to patterns of similar historical accounts. As a result, nurse auditor productivity improves because auditors can perform highly targeted reviews of medical records on accounts that have been prescreened for coding anomalies.

Additionally, models can analyze data at the claim and transaction level and identify root causes creating processing errors, which provides executives with the information to determine how to prevent further leakage in the charge recovery process.

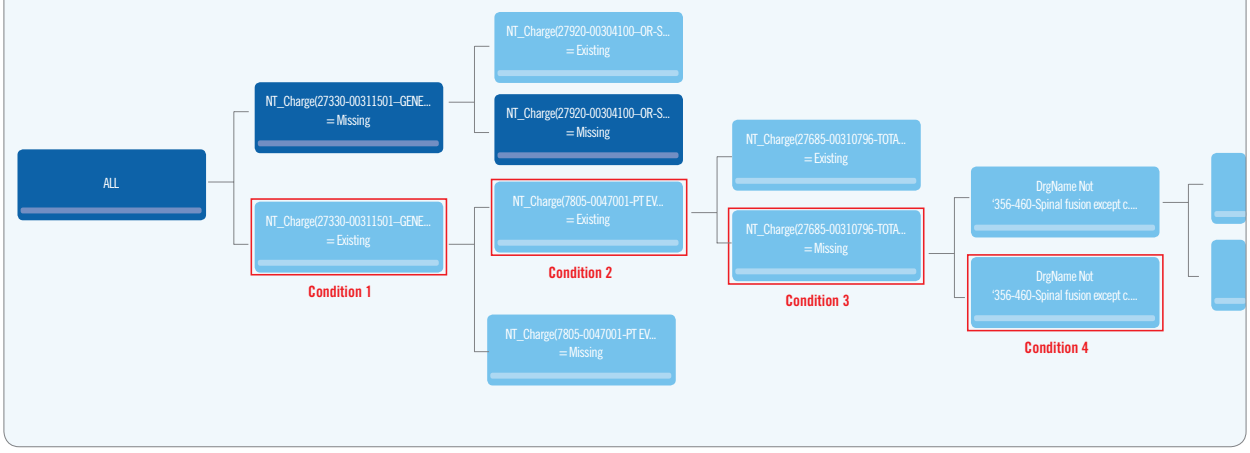
For example, a large, multicenter health system applied a customized predictive analytics model to assist with missing charges. Within 30 days of installing the model, the predictive application identified more than 1 percent of the system's annual net revenue in missing charges, in this case $1.5 million. The predictive model automatically reviewed all the attributes from 12 months of clinical, financial, and patient data collected by the hospital and analyzed the accounts to determine what a properly charged claim looks like for a given procedure. Claims that were not correlated were flagged as outliers or anomalies and ranked by probability (or likelihood) that the charge is missing. Each claim was given a score that indicates the strength or confidence of the prediction.

The predictive analytics model analyzed historical claim patterns to detect 18 accounts missing a charge for an implantable joint device with a probability of 93.6 percent for total revenue of $215,000.

EXAMPLE OF USING PREDICTIVE ANALYTICS TO DETECT MISSING CHARGES FOR IMPLANTABLE JOINT DEVICE

CHARGE 00052995 'ORTHOPEDIC IMPLANT' (HCPCS = C1776)/NO. OF ACCTS: 18 /HISTORICAL OPPORTUNITY : $215,000 GROSS

No.	Transaction Description	Value	Probability of Missing Charge
1	IF Charge 00311501 'GENERAL/SPINAL/EPIDURAL SUPPLY'	Is Present	13.5%
2	IF Charge 00047001 'PT EVALUATION INITIAL' (CPT = 97001)	Is Present	32.5%
3	IF Charge 00310796 'TOTAL KNEE PROSTHESIS'	Is NOT Present	39.5%
4	IF DRG 460 'Spinal fusion except cervical w/o MC'	Is Present	93.6%



The exhibit on page III demonstrates the scale and comprehensiveness of predictive analytics. The model detected, with greater than 90 percent probability, 18 accounts as missing a charge for an implantable joint device. In this example, the model analyzed all similar procedures for the previous 12 months and identified, with a 93.6 percent probability, accounts that, if the four conditions were performed in conjunction, should have the artificial joint charge on the bill. To ensure accuracy, the 18 accounts flagged with the missing charge were validated against the medical record.

Detecting Underpayments

Predictive analytics also can help detect underpaid claims. Leveraging predictive analytics, hospitals can automate the process of sifting through all the historical billing, account, and clinical data to identify and flag underpaid claims, detect payment variances, automate batch appeals, and improve administration of contracts.

For example, an 800-bed health system was able to uncover payment anomalies by statistically analyzing what the appropriate payment should be for each individual claim. The model automated the analysis of two years worth of historical data and identified $20 million in contract violations that occurred before the predictive contract management technology was employed. Since implementation, the predictive model has flagged an additional $2 million per month in new underpaid claims. (The engagement with the hospital was on contingency with an ROI of 845 percent.) Further, because the model identified the root cause of the violated contract term, the managed care staff was able to review claims and submit appeals 25 to 50 percent faster than it did using a nonpredictive tool. As productivity increased, staff members were reallocated to other areas in the business office.

Automating Credit Resolution

Credit balance management is often achieved through a manual process involving significant

Predictive analytics found that a patient's secondary payer had overpaid its liability, leaving a credit balance of $554.17.

EXAMPLE OF USING PREDICTIVE ANALYTICS TO IDENTIFY ROOT CAUSE OF INCORRECT ACCOUNT PROCESSING

ACCOUNT INFORMATION

Account #	Total Charges	Total Adjustments	Total Payments	Total Insurance Payments	Balance	Insurance 1	Insurance 2
0012*****2	$913.00	($659.03)	($808.14)	($808.14)	($554.17)	Medicare	Aetna

CLAIM INFORMATION

Account #	Claim #	Claim Amount	COB	Paid Amount	Contractual Adjustment	Insurance
0012*****2	005****8	$913.00	1	($114.26)	($659.03)	Medicare
0012*****2	005****1	$139.71	2	($693.88)	$0.00	Aetna

TRANSACTION INFORMATION

Account #	Transaction Date	Transaction Description	Transaction Amount	Deductible Amount	Insurance
0012*****2	9/19/2008	Medicare Payment	($114.26)	**$139.71**	Medicare
0012*****2	9/19/2008	Medicare Adjustment	($659.03)	$0.00	Medicare
0012*****2	6/23/2009	Aetna Payment	**($693.88)**	$0.00	Aetna

The benefits of predictive analytics can be twofold: identifying revenue opportunity and increasing staff efficiency to recover the revenue.

research to identify root causes of incorrect account processing. Organizations often allocate additional staff to resolve their credit balance accounts, many of which result in an outflow of funds, rather than use those resources on teams focused on generating or collecting additional revenue for the hospital. Nonpredictive tools do not allow organizations to analyze and process accounts in batch without manual involvement.

Although rules-based technology may allow hospitals to maintain a reasonable level of credit balances at the cost of growing credit management teams, they lack the strategic intelligence available by using predictive analytics to implement automation and account categorization.

Predictive models for credit management are built leveraging various data points and groupings from the hospital's information system, such as payment and adjustment transactions, expected payment, and claim detail, which will be present on accounts based on the claims being submitted to payers and account processing history. The deployed models can aggregate all of the available data on an account and immediately identify the root cause of the credit balance. As a result, the identified issues can, based on hospital preference, either be automated to initiate the refund or assigned to categorized work drivers, which will batch all accounts with this same set of characteristics.

The exhibit on page **IV** highlights the predictive model's capabilities for identifying root causes within historical account data. This example demonstrates the ability to identify secondary payers overpaying their liability, in this case secondary paying as primary. On this account, Medicare is the primary insurance and Aetna is secondary. In the transactions, the first line shows the Medicare payment of $114.26 and an allocation of $139.71 to deductible. Because the patient had a secondary insurance, the remaining balance of 139.71 was billed to Aetna. However, the hospital overprocessed the claim by paying $693.88. As a result, the account became a credit balance of $554.17, the difference between Aetna's payment and its actual liability.

By leveraging an intelligent categorization engine, credit management teams can accelerate the resolution of credit accounts when review is necessary through the direction and focus on the root cause of the error rather than researching and manually calculating payment and adjustment discrepancies.

A Tool that Benefits the Bottom Line

With the right technology, hospitals can mine the considerable amount of data that they have to make sure they receive all of the payments that are due to them and maximize staff productivity. A business intelligence tool that uses predictive analytics can help hospitals improve their bottom line, which is especially important in today's challenging economy. ●

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