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performance improvement a “left brain meets right brain” approach

Clinical analytics enables hospitals to combine clinical and financial data in developing better strategies for performance improvement.

In 1979, Betty Edwards introduced the world to a new drawing technique in her book *Drawing on the Right Side of the Brain*. The book, which shot to *The New York Times* bestseller list within two weeks and stayed there for more than a year, became popular for its easy-to-learn approach to drawing, which Edwards contends anyone can learn. It’s a matter of bringing out the abilities of the right side—the “creative” side—of the brain, she says.

In addition to teaching millions of people with no apparent talent how to draw, Edwards helped to popularize a new brain theory. To develop her drawing technique, she drew on the words of scientist and neurosurgeon Richard Bergland (*The Fabric of Mind*, New York: Viking Penguin, Inc., 1985, p. 1):

You have two brains: a left and a right. Modern brain scientists now know that your left brain is your verbal and rational brain; it thinks serially and reduces its thoughts to numbers, letters and words ... Your right brain is your nonverbal and intuitive brain; it thinks in patterns, or pictures, composed of ‘whole things,’ and does not comprehend reductions, either numbers, letters, or words.

Not surprisingly, most of us develop a dominant mode of thinking based on what is more comfortable for us, which results in lopsided problem-solving skills.

Before flipping to the table of contents to make sure you’re reading the right publication, consider how these two modes of processing information might apply to the financial and clinical sides of a hospital. Financial analysts focus on cost, budgets, credit rating, revenue, and patient days to determine the bottom line. Clinicians focus on safety, compliance, and outcomes to determine the quality of patient care. Before the advent of pay for performance, there was very little overlap between these two perspectives.

Take, for example, a hospital on the path to quality improvement whose average length of stay for heart failure and shock is running 1.25 days above benchmark. Given that same information, a CFO and a chief nursing officer will typically draw very different conclusions as to why. The CFO will look at patient days, billing delays, claim denials, and deferred admissions and conclude that the organization needs more beds. The CNO will see discharge planning failure,

lack of community services, patient complications, and higher-than-expected severity and conclude that the organization needs more staff. The answer may lie somewhere in the middle, or better yet, may be a matter of optimizing capacity and throughput by properly aligning existing resources. Doing so requires developing a *shared perspective* based on the ability to tie clinical outcomes to financial outcomes, also known as clinical analytics.

Developing a Shared Perspective

Clinical analytics involves the application of business intelligence systems to health care. Global corporations have been competing on such systems since the 1970s, relying on them to mine vast stores of raw data and transform complex relationships into easy-to-use metrics.

The sophisticated mining and reporting power needed to compete in this way requires a vendor-neutral data warehouse that extracts, aggregates, and normalizes data from multiple transactional repositories. Rather than replicating entire systems, the data warehouse extrapolates only data relevant to that organization. Business logic is then applied that enables the organization to

intimately understand its customers' buying habits, for example, and personalize its products and services to maximize profit. Data can be sliced, diced, and presented to stakeholders in the form of web-based scorecards that enable them to drill down into key metrics and quickly draw conclusions.

Clinical analytics requires a similar approach: extracting clinical, financial, and operational data from multiple repositories and loading it into a warehouse optimized for reporting and root cause analytics. Many hospitals overtax the reporting features of their clinical repositories, which are designed to manage *real-time* clinical workflow related to *individual* patients during *episodes* of care, not for reporting beyond ad hoc queries to help clinical supervisors organize care. In contrast, data warehouses are designed to aggregate data *retrospectively* and help the enterprise achieve desired outcomes for *populations* of patients across a *continuum* of care. Embedded clinical knowledge, or healthcare-specific business logic, transforms the normalized data into actionable information.

Five Ways to Compete on Quality

Clinical analytics provides the long-elusive transparency needed to directly link care and cost, thus introducing a tremendous competitive advantage. As a result, organizations can compete on quality in five important ways.

Clinical analytics enables clinical performance to be measured using clinical data. For more than 20 years, we've measured performance using cost accounting, largely because charge codes with Uniform Bill-92 billing codes have been readily available and fairly inexpensive. However, the inadequacy of administrative data to provide insight into the quality and appropriateness of care, including errors of omission or commission, has long been acknowledged. Clinical analytics taps data produced as a byproduct of patient care rather than as a consequence of patient billing. Thousands of data points—on medication administration, lab

results, incision time and so on—are created during the care process and never used again. When combined with other data points and imbued with clinical knowledge, they can provide great insight.

The exhibits below and on page 103 illustrate the incremental value of combined clinical and financial data. Suppose you want to determine the impact of perioperative care on the cost of a total hip replacement. Relying on financial data alone, you could determine whether the patient was charged for an anti-infective and a glucose test on the day of the surgery—information useful only from a cost perspective. Clinical data alone will allow you to determine, through time stamps, whether the prophylactic anti-infective and glucose test were administered according to evidence-based guidelines and how long the surgery lasted. This information is somewhat more useful. Only by combining financial and clinical data and applying embedded clinical knowledge, however, can we get at what we really want to know. Using clinical analyt-

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ics, we can determine the degree to which procedure duration and noncompliance with guidelines impact readmissions, total cost of care, percentage of postoperative infections, and other important measures, such as complications by payer and patient satisfaction.

Clinical analytics supports a metric-driven culture.

A key characteristic of high-performing organizations is the ability of every employee to articulate the meaning of quality in their organization and the impact they have on quality. Via scorecards, the quality imperative can be communicated deep within the organization using a common

language. These scorecards establish an early warning system for clinical and financial variances, enabling stakeholders to head off errors and drive process improvement.

A good scorecard focuses attention on only the most meaningful metrics for that stakeholder. Physicians and other clinicians must be able to see a clear connection to their daily practice. A nurse manager, for example, would be interested in metrics related to barcode medication administration compliance on her unit that provide ongoing feedback regarding whether care is improving as a result of barcode scanning (e.g., whether her nurses are responding appropriately to alerts). Metrics are meaningless as ends in themselves; their value is in helping stakeholders know where to drive process changes that will ultimately be reflected in higher scores.

Creating a metric-driven culture also requires data integrity. Besides being expensive and time-consuming to collect,

manual data provide only a snapshot in time for a sample of the population. Manual data are generally gathered to meet specific reporting requirements or answer specific questions. Should a new requirement arise or the data gathered beg a new question, it's back to the charts. In contrast, clinical analytics has a rapid refresh rate because data are regularly feeding the warehouse. This enables ongoing trend analysis for an entire population. It can also eliminate objections about sample size when a given clinician's performance is questioned. As new questions arise, the data can always be re-mined.

Finally, scorecards should enable users to

quickly identify variances and drill down to determine the cause with little or no analytical training. Returning to what we know about left brain/right brain thinking, it's important to let users customize views of their data to accommodate how they process information. Visually oriented right brainers may respond to radar charts that look like ink splats to number-crunching left brainers, who live and die by spreadsheets.

month collecting data for the Joint Commission on Accreditation of Healthcare Organizations' core measures for acute myocardial infarction, heart failure, and pneumonia, and another 23 hours a month analyzing the data, with total associated costs of up to \$100,000 a year (Anderson, Kristine M., and Sinclair, Susan, "Easing the Burden of Quality Measures Reports," *Hospitals and Health Networks*, Aug. 15, 2006).

ized short-term mortality rates. How do we explain the other 94 percent of variation? The researchers concluded that "multiple measures that reflect a variety of processes and also outcomes, such as risk-standardized mortality rates, are needed to more fully characterize hospital performance" (Bradley, Elizabeth, et al., "Hospital Quality for Acute Myocardial Infarction: Correlation Among Process Measures and Relationship with Short-Term Mortality," *JAMA*, July 5, 2006, pp. 72-78).

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Clinical analytics can be used to manage regulatory initiatives. If you don't manage regulatory initiatives, they end up managing you. Yet few hospitals know how much time and money they spend collecting and analyzing data. In one study, a sample of providers spent between 50 hours and 90 hours a

Adding insult to injury, a recent study published in *JAMA* concluded that the publicly reported AMI process measures for both JCAHO and the Centers for Medicare and Medicaid Services capture a scant 6 percent of the variation in hospitals' risk-standard-

Beyond required reporting, how do you explain care variations for your most costly populations—and eliminate them while improving overall quality? A recent study found that the likelihood of adverse events from anesthesia varies with the time of surgery, with procedures scheduled at 9 a.m. having the lowest rate of anesthesia-related events such as pain and postoperative nausea and vomiting. Adverse events were slightly more likely to occur at 7 a.m. than at 9 a.m., and pain management events were four times more likely to occur

PERIOPERATIVE ANALYSIS USING FINANCIAL DATA

Charge Code/Cost	+	UB Px Code	=	Financial Result
525678 Rocephin 1GM		81.51 Total hip		Cost and volume of anti-infective
743210 Glucose Test		replacement		and lab test on day of surgery

PERIOPERATIVE ANALYSIS USING CLINICAL DATA

Medication Administration Data	+	Surgery IS	=	Clinical Result
Rocephin 1GM 10:04		Left hip replacement Incision time 10:45 Close time 12:55		> Prophylactic anti-infective administered > 30 minutes before incision
Lab Results				> Glucose > 150 mg/dl
Glucose, fasting 175 mg/dl 06:00				> Procedure duration > 90 minutes

at 4 p.m. than at 9 a.m. (Wright, M.C., et al., "Time of Day Effects on the Incidence of Anesthetic Adverse Events," *Quality and Safety in Health Care*, August 2006, pp. 258-263). Interesting aggregate data for the sample population, but what is the experience in *your* ORs, and can you affect it?

In addition to meeting today's reporting requirements, providers must be able to evaluate the impact of future measures that will address more diagnosis and procedure codes and cut across more clinical areas. CMS has promised to phase in a new diagnosis-related group weighting system that accounts for patient severity. Unless a second diagnosis is present on admission, you may be paid less for complications such as hospital-acquired infections.

CMS is also looking seriously at cardiac and musculoskeletal complications. To prepare for the change, Baptist Healthcare System, based in Louisville, Ky., used clinical analytics to determine the potential impact. Vice president and CFO Carl Herde predicts more than a \$7 million reduction in CMS reimbursement, with traditional procedural

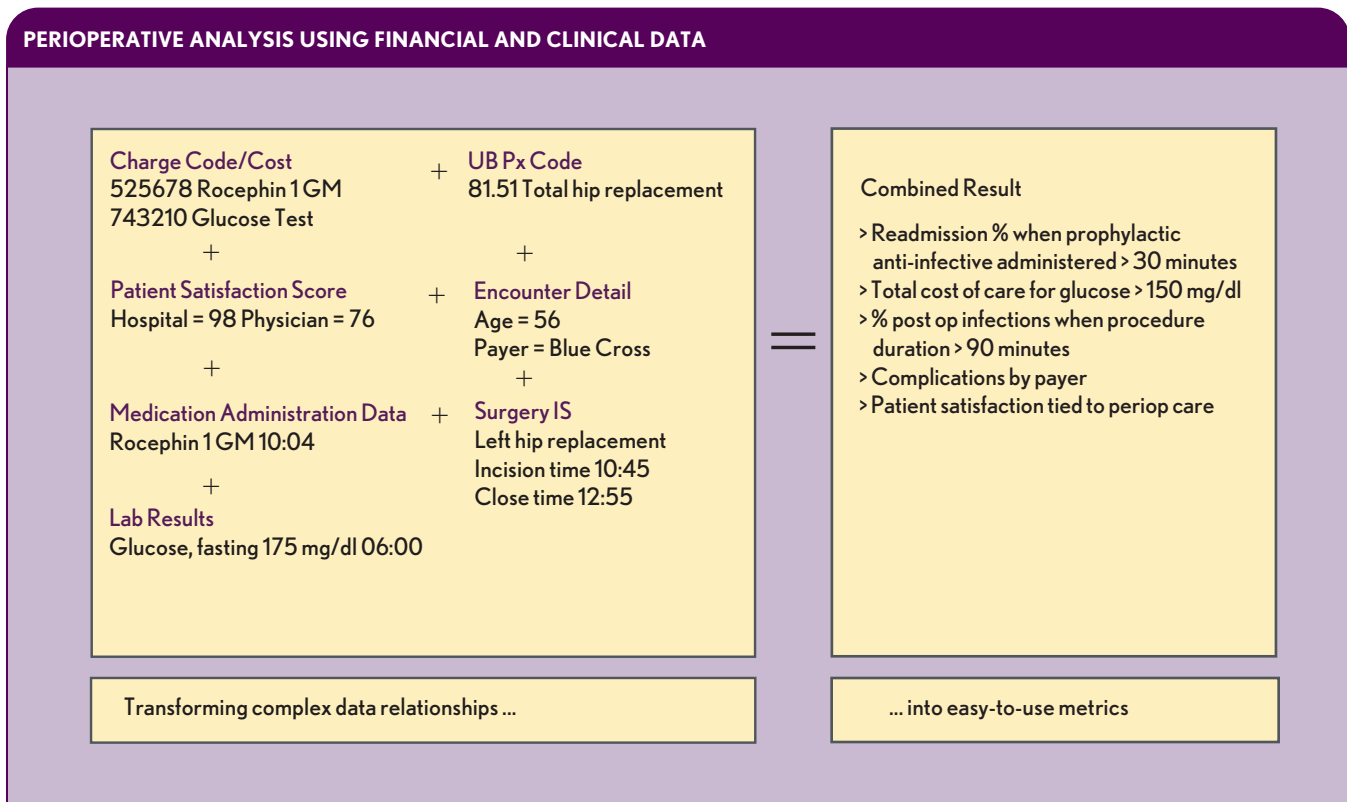
profit leaders in cardiology and orthopedics bearing the brunt of the rebasing impact. Can you predict the potential impact on your organization based on your surgery volume and complications?

Clinical analytics enables you to document the value of your IT investment. Calculating a hard-dollar return on investment for health IT remains elusive. One positive consequence of the current focus on quality and safety is a broader definition of ROI. In addition to net present value, organizations must now consider how the investment will affect quality indicators as well as physician, patient, and staff satisfaction. As early as 1998, the Adverse Drug Events Prevention Study Group used financial variables (cost reductions, length of stay, revenue enhancements, risk avoidance) as well as clinical and organizational variables (improved outcomes, decline in mortality, fewer medical errors, improved stakeholder satisfaction) to calculate the ROI for computerized provider order entry. The system cost of \$1.9 million plus \$500,000 in annual maintenance fees was estimated to be offset by a net savings of \$5 million to \$10

million per year (Bates, D.W., et al., "Effect of Computerized Order Entry and a Team Intervention on Prevention of Serious Medication Errors," *JAMA*, Oct. 21, 1998, pp. 1311-1316).

You can use clinical analytics to tap this and more information from your own latent data stores.

Clinical analytics provides a basis for redefining your business strategy. Another key characteristic of high-performing organizations is accountability for quality at the CEO and board level. These individuals are actively involved in building scorecards that reflect the culture they are trying to shape, and they take responsibility for each element. Boards of high-performing organizations spend much more time on quality issues than boards of typical hospitals, often opening their meetings with scorecard reviews. Ideally, the board-level scorecard is the rudder that keeps your organization steered in the direction charted by the strategic plan. Managing to metrics requires you to strictly define your goals and be disciplined in your daily operations.



Hospitals frequently engage consulting firms to gather and analyze the data necessary to address a particular issue, like ER overcrowding. When the consultants leave, so does that level of attention and insight. To properly manage your business, you must be able to measure the impact of every decision you make regarding stents, beds, IT—every aspect of care. Clinical analytics lets you decide and execute on the right strategy based on solid information, not best guesses. “The best hospitals not only collect data on outcomes and cost, but also pull apart the numbers on surgeries, tests and other procedures to identify each step in the process where less-than-optimal medicine is practiced,” states a Commonwealth Fund report (Meyer, Jack

A., et al., “Hospital Quality: Ingredients for Success—Overview and Lessons Learned,” The Commonwealth Fund, July 2004).

A New Role: Chief Performance Officer

In 1983, the prospective payment system rocked our world. Hospitals grappled with how to optimize payment and minimize risk. Overnight, the role of DRG coordinator emerged. As public and private pay-for-performance programs move beyond pilot phases, CMS introduces DRG reweighting, and the Bush administration calls for transparency in price and quality for consumers, we may see another new role emerge: the chief performance officer. Working closely with the CEO and board, this person would

be charged with managing the nerve center between the two halves of the organization’s brain.

Achieving Left Brain and Right Brain Harmony

The unprecedented ability to directly link everything that happened to the patient to the total bill—and to determine whether the services delivered achieved the desired outcome: keeping the patient out of the hospital—is enough to turn the most left-brained analysts into quality champions, if not artists. Clinical analytics is an important strategy to consider in closing the gap between clinical quality and financial outcomes. ●

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