# SSAS.

## Creating an Evidence-Based Practice Culture with Business Intelligence

*Effectively implementing business intelligence and performance management software solutions in the healthcare industry*

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# Abstract

Healthcare leaders are challenged to improve care delivery, reduce costs and enhance physician and employee engagement.  Doing so requires the ability to access data from a variety of siloed and disparate systems, and then to get that data into the hands of those closest to the issues. Enhancing the quality of patient care and communication can only occur when true collaboration occurs — and this can only happen when information is shared.

For far too long, healthcare entities have survived using untimely, non-aligned and non-integrated data to drive healthcare decision making. But this can't continue. Today, the stakes are too high to tolerate anything less than an evidence-based — or data-driven — approach to healthcare delivery and executive decision making.

Efforts are underway in healthcare organizations across the country to bring down the information silos that prevent us from seeing the full picture of performance in our hospitals. Only when we have a balanced and complete view of performance — across all perspectives — can we get to the cause and effect relationships and the correlations that exist between the metrics that drive the business.

Proven business intelligence and performance management software solutions are assisting healthcare leaders at Brigham and Women's Hospital, Yale New Haven Health System, Duke University Hospital, and Maine Medical Center, among others, to achieve their organizations' potential as they continue to evolve as environments in which data and evidence drive care delivery.

The impact of such tools on patient safety, quality, physician engagement and employee satisfaction and retention is quantifiable. Applying business intelligence in a healthcare setting is a powerful way to break down political barriers, overcome resistance to change, align strategic priorities and improve communication. Using data is fundamental to facilitating improvements in performance, accountability and collaboration and to creating a culture of evidence-based healthcare delivery.

# Drivers of healthcare quality

The top priority of all healthcare executives is to assure the delivery of high-quality, cost-effective healthcare while attracting and retaining competent and satisfied care providers. Aside from the desire to do the right thing for patients and families, there are several drivers within the healthcare industry that have pushed the quality agenda to greater heights. Since 1999, when the first Institute of Medicine report[1] stated that almost 100,000 Americans die in hospitals each year as a result of medical errors, there has been a heightened awareness at all levels of the issues surrounding healthcare quality and patient risk. Newspaper headlines frequently relate examples of untoward effects experienced by hospital patients, some of which border on egregious errors. Since its inception, the Joint Commission on the Accreditation of Healthcare Organizations has published standards of care and conducted hospital surveys to assure that patient care delivery is safe and of the highest quality. In addition, federal quality initiatives are underway to define quality standards for certain conditions and to enhance data sharing and outcomes reporting at the state and federal levels.

The Leapfrog Group, made up of Fortune 500 companies and other private and public sector health benefits purchasers, has also jumped on the quality bandwagon. The group's efforts will give consumers essential information so that they can make better-informed hospital choices and healthcare decisions. Leapfrog initiatives support the use of computerized provider order entry systems, evidence-based hospital referral and the use of intensivists in critical care units. More than 30 patient safety practices are being evaluated by the Leapfrog Group in more than 1,300 hospitals today to improve physician and provider performance.

Pay-for-performance initiatives are gaining momentum and demonstration projects are being considered to report performance in certain care categories and then to tie clinical performance and outcomes to payment and reimbursement. These initiatives have gotten the attention of physicians, chief financial officers and the payer community and will certainly continue to be drivers of quality discussions and activities.

Each of these drivers has contributed to an enhanced awareness of the consumers of healthcare services — the patients and families served. They are more knowledgeable, better informed and more aware of what to expect in the hospital. Their desire to be an active participant in decision making and informed partners in care are important drivers of the growing quest for quality and for the need to share data and communicate patient outcomes.

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[1] <u>To Err is Human:  Building a Safer Health System</u>. Linda T. Kohn, Janet M. Corrigan and Molla S. Donaldson, Editors; Committee on Quality of Health Care in America; Institute of Medicine, The National Academies; (2000).  Washington, DC

## Dimensions of healthcare quality

In order to improve the quality of care delivery and to focus on measuring it effectively, it is important that those involved agree on the definition of healthcare quality. The Institute of Medicine defines healthcare quality as: "The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." In its groundbreaking report *Crossing the Quality Chasm: A New Health System for the 21st Century*[2] (2), the Institute of Medicine further identified the six domains of healthcare quality as being safe, effective, efficient, patient-centered, timely and equitable. Measuring and reporting outcomes in these domains is essential to the achievement of evidence-based healthcare delivery.

# Evidence-based healthcare delivery

In his book *Evidence-Based Medicine: How to Practice and Teach EBM*, author David Sackett defines evidence-based practice as, "The conscientious, explicit and judicious use of current best evidence in making decisions about the care of an individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research."[3] This definition implies that there is a systematic approach to data (evidence) acquisition and utilization and that research-based findings from the literature are applied to practice. In order to achieve truly evidence-based practice, healthcare providers must stay informed of advances in practice by reading the literature, by publishing their own findings and solutions to healthcare delivery problems and queries, and by holding each other accountable to a level of care that is not based on intuition, but on evidence.

This is much easier said than done. Achieving truly evidence-based healthcare delivery requires resources, leadership, focus, accountability and collaboration. Hospital infrastructures must support and facilitate the use of evidence and data to drive decision making, and healthcare leaders must clearly state the expectation that their teams will be data-driven. Hospital leaders who are succeeding on the evidence-based journey have gone beyond the numbers and beyond the jargon. Their management styles incorporate evidence into every facet of communication, resource allocation and performance improvement. Team meetings are routinely run using evidence-based tools and reports to discuss performance and to make decisions, both at the board table and at the frontlines of care delivery. Compensation and bonus structures can be tied to performance once metrics have been decided upon and clearly defined. Collaboration among care disciplines can become more objective and can be strengthened using evidence as the driver for care-related decisions, rather than personal preference or other subjective factors.

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[2] Crossing the Quality Chasm: A New Health System for the 21st Century. Committee on Quality of Health Care in America; Institute of Medicine; National Academy Press. (2001). Washington, DC.
[3] Evidence-Based Medicine: How to Practice and Teach EBM. David L. Sackett, Sharon E. Strauss, W. Scott Richardson, William Rosenberg, R. Brian Haynes. Churchill Livingstone; (2000)

Establishing an evidence-based care delivery model requires a tangible cultural transformation for most organizations. It starts at the top, with executive-level clarity on the purpose of the movement toward a data-driven organization, with executive articulation of the goals and team member expectations, and with executive-level support for the allocation of resources to achieve the goals that have been set. There are human resource requirements to access, manage and report the data, and there may be information technology and infrastructure resources needed to facilitate the extraction, transformation and loading of the data and/or automation to facilitate accessing, analyzing and reporting the data. Once the executive team is on board, they must walk their own talk and become data-driven with team members, including the physicians.

A cascading effect of outcome-based discussions and decision making should be visible throughout the organization, all the way to the point of care. Including patients and families in the process and fully sharing evidence and outcomes with them is evident in fully operational and robust models.

Regardless of the organizational drivers toward an evidence-based culture and the players involved, success is absolutely contingent upon effective data management and strategic alignment across and within the organization.

## Data management and strategic alignment

It is no wonder that the healthcare industry has a long way to go to achieve evidence-based care delivery. Even with the best of intentions, healthcare leaders are often hampered in their attempts to become data-driven by the current state of healthcare data. In fact, the data reality in most hospitals today is one of chaos, non-integration, silos, territoriality and turf wars (see Figure 1).
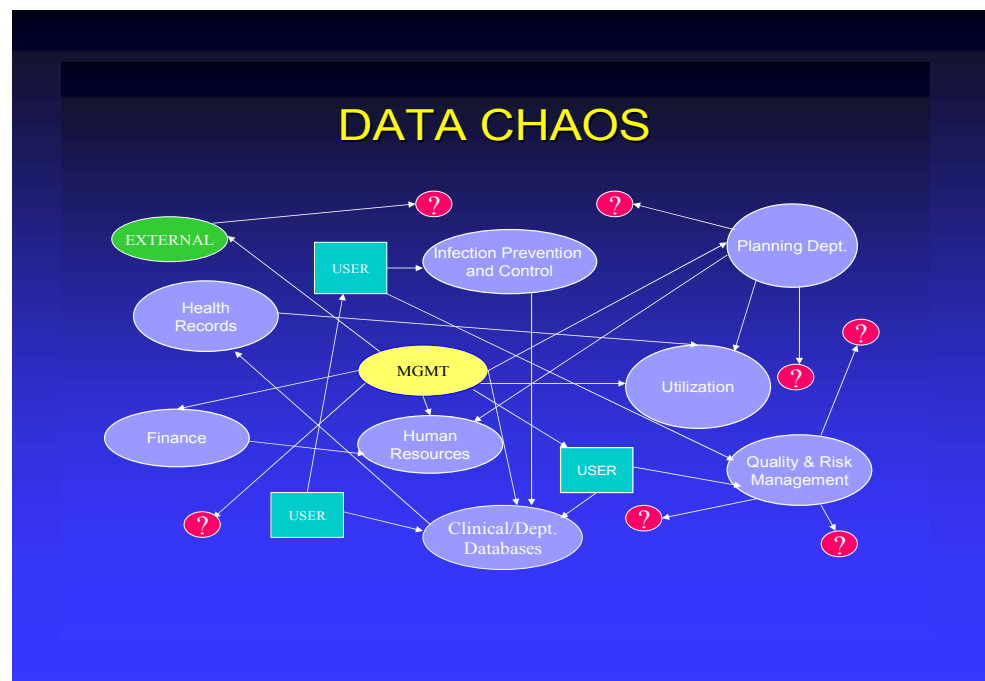


*Figure 1: Data chaos.*

The many disparate data sources in hospitals usually do not "speak" to each other, and each may be owned and managed by different groups that report to different organizational entities. In many cases, just getting to the data is extremely labor-intensive, with no assurance that the data will be accurate or timely once you get to it.

Frontline managers and executives who are trying to solve problems from a variety of perspectives (clinical, financial, employee, patient) often are unable to fit these puzzle pieces together in order to understand what is driving performance — let alone how to improve it. When resources such as analysts or management engineers are in place, too often their time is spent just getting to the data and generating paper or electronic reports. They have little time left to truly analyze results and to understand the correlations and potential cause-and-effect relationships between the metrics.

Effective data management is the foundation for communicating strategy and for achieving strategic alignment throughout the organization. This requires "putting the pieces together" (see Figure 2) to encompass clinical and operational, financial, human resource, satisfaction, planning, governance and supplier data.
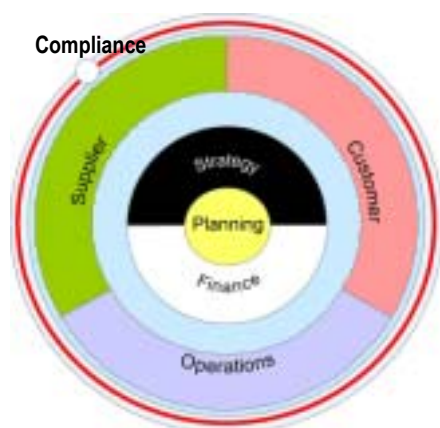


*Figure 2: Putting the pieces together.*

Defining the strategic agenda and then determining measures of success takes time and commitment, but it is ultimately at the heart of performance improvement efforts. Strategic priorities in hospitals often encompass the clinical/operational/safety domain, the employer-of-choice domain, the provider-of-choice domain and the financial domain. Achieving those priorities requires that the strategy is executed and that outcomes are measured. Strategy, execution and results form the three legs of the performance stool, and failure in any one area will cause the stool to topple over.

Communication, alignment, measurement, monitoring, collaboration and feedback are the spokes of the performance wheel, and each requires clarity of vision to create an effective data and performance management system in hospitals (see Figure 3).
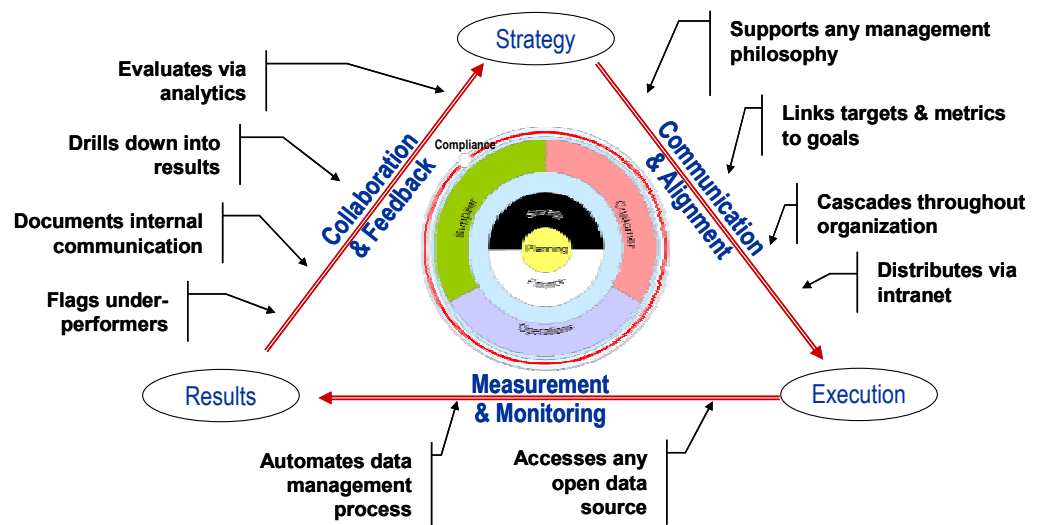
# SAS Enterprise Performance Management



*Figure 3: SAS Enterprise Performance Management*

Once strategic priorities are established, they must be communicated throughout the organization to the point of service. In most hospitals, the cascade of information flow and the hierarchical drilldown of information might take the path from health system, to individual hospitals within the system, to individual departments or business units within each hospital, to the unit and possibly employee/physician level. The data becomes more and more granular as strategy is translated into actual care practices, pathways, interventions, protocols and services. When done well, this framework enables each individual to understand his/her contribution to the achievement of the overarching goals of the organization. This facilitates engagement of employees, physicians and managers in problem identification and resolution as they become armed with the information needed to make better decisions. Mastering the steps of data acquisition and organization yields knowledge generation. Knowledge-based decision making is the basis for performance improvement and focusing on outcomes makes it possible to sustain improvements in the services provided to patients.

# Performance management in healthcare

There are several performance management frameworks that are being used effectively in hospitals across the country. When all is said and done, it doesn't matter which framework is chosen. What matters is that the framework "fits" with your organizational culture and that hospital leaders really invest time and resources into assuring that the framework is understood, accepted and utilized. A key focus must be on integrating all of the data in order to turn it into useful information that can drive decision making, actions and best practices. Establishing a "single version of the truth" is the only way to maximize improvement efforts and to quiet the naysayers. Once there is confidence in the data, then it can be used to populate and operationalize the performance management framework.

The Balanced Scorecard methodology is yielding positive results for hospital leaders and has worked well in conjunction with the Six Sigma method. Achieving a "balanced" view of performance, inclusive of the internal business process (clinical/operational), financial, employee and customer perspectives has yielded stronger results than the traditional hospital approach that focused heavily on financial performance only. The Baldrige National Quality Award can also be used as a model for organizing the hospital leadership's focus on performance and outcomes. The Baldrige criteria also assist healthcare leaders in taking a broad view of performance, incorporating leadership, strategic planning, patients, measurement and analysis, employees, processes and organizational performance results into the assessment of quality.

Educating team members on the selected framework is essential to successful implementation. Often, a multidisciplinary approach to performance management is used in healthcare,and could include champions who are clinicians, financial analysts, information technologists, decision support personnel and Six Sigma green and black belts. Educating diverse team members together starts to break down turf barriers and to create an "us" environment instead of sustaining the "us and them" scenario that is so common in hospitals. Kicking off a performance management initiative is a great way to build teams, to validate organizational priorities and to collaborate on defining metrics that will be used to assess performance. As diverse teams start to understand and appreciate the role that each member plays, an individual's use of the data, his or her relationship to the data and what needs are and are not being met, consensus can be built and teams can be strengthened. Bringing such diverse team members to the performance management meetings may be a first in your organization. Capitalize on that and use these efforts to continue your evidence-based journey while simultaneously building bridges across departments and roles. It is only through this degree of level setting and collaboration that the organizational business intelligence goals can be achieved.

## Achieving business intelligence goals

The only way to eat the performance management elephant is one bite at a time. For many healthcare leaders, it is a yeoman's task merely to access the data from the many disparate sources across the organization.

Static reporting and manual data manipulation may be the norm, but for most, that cannot facilitate the level of problem solving and decision making that is required in hospitals today. Many organizational leaders choose to automate the extraction, transformation and loading processes to then enable data mining, online analytical processing, advanced analytics, forecasting and predictive modeling to be utilized. This is when the next level of performance management is achieved — true business intelligence (see Figure 4).

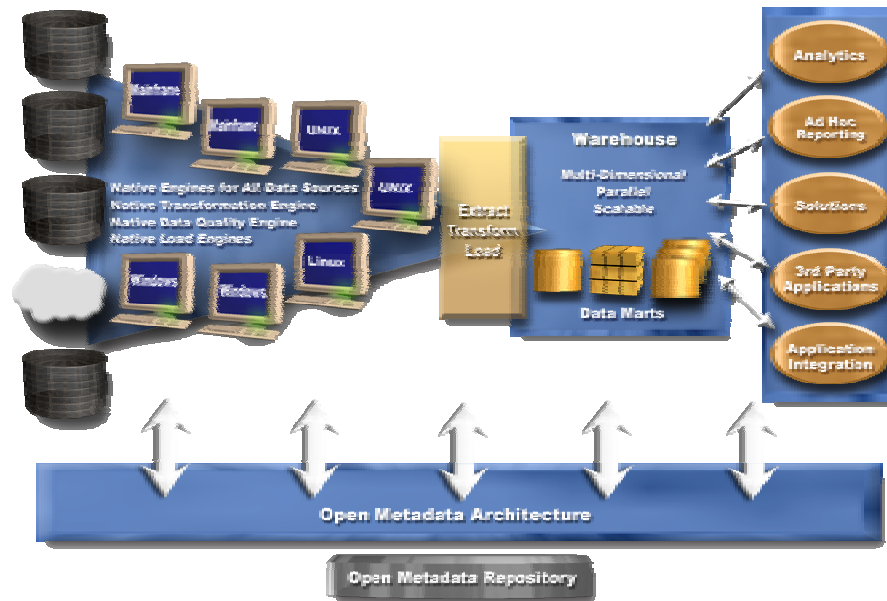# SAS Intelligence Architecture for Healthcare



*Figure 4: SAS Intelligence Architecture for healthcare.*

Achieving business intelligence in hospitals enables leaders to understand the correlations among the metrics they have chosen and delineates cause-and-effect relationships among metrics. Questions such as, "How low can we take length of stay before we see an increase in patient recidivism?" and "How can I tweak the skill mix in the ICU before I see an increase in patient falls and medication errors?" can be answered. It is this level of intelligence that will achieve the strategic goals of high-quality and cost-effective care. The ability to predict and forecast referral patterns and to apply analytics to provider profiling and disease management programs would add significant intelligence to the decision making of health system executives. Moving from static reporting to dynamic data querying and outcomes management is what is needed today, and there is no more time to waste. The stakes are higher than they've ever been.

# Measuring ROI when implementing business intelligence solutions

As healthcare leaders continue to struggle with shrinking margins, decreasing capital funds and multiple demands on limited resources, they are challenged more and more to articulate the return on investment of their information technology spending. That is not as easy as it sounds. How do you measure the return on building an information infrastructure that supports decision making at the point of care, that enhances communication and collaboration, and that facilitates the creation of an evidence-based practice environment? In the majority of successful business intelligence implementations, healthcare leaders experience the positive outcome of consolidated reporting and decreasing the labor intensiveness of data management and reporting. Certainly the labor savings can be quantified in real dollars. In other cases, annual hardware and software expenses can be decreased, again through consolidation of systems and data sources.

Probably the best return, however, comes from utilization of the data to change practice patterns and to enhance clinical decision making and communication. Applying business intelligence to understand the correlation among metrics such as length of stay, cost per case and RN staffing is a way to derive the best clinical practices that are also the most cost-effective. As mentioned earlier, understanding how low length of stay can be driven before patient recidivism increases is a critical piece of information for both clinicians and administrators to have in-hand. Understanding the cause-and-effect relationships between demographic metrics, clinical diagnoses and outcomes is essential if optimal patient care is to be achieved at the lowest possible cost.

Using business intelligence to drive clinical and administrative decision making is an ideal way to decrease the variation in healthcare delivery and, in doing so, to decrease costs, decrease errors, facilitate patient throughput and enhance patient and employee satisfaction. When targets are met or exceeded in each of these domains, there is absolutely a positive impact on the bottom line. That impact can be quantified and used as you justify the return on your business intelligence investment. ROI can be increased using business intelligence for performance management to drive productivity gains and cost savings.

# Leading the way

A number of healthcare organizations are leading the way using business intelligence to create environments of care in which evidence is used to guide practice. Some, such as the Brigham and Women's Hospital (BWH) in Boston, are approaching this work through their clinical and operational business units, such as nursing services and surgical services. At BWH, scorecards are populated with metrics in four domains: Patients and Community, Quality and Efficiency of Care, Employee Development and Clinical Innovation, and Financial Health. Tremendous work has been done to educate executives, mid-level managers and physicians on the scorecarding framework and on the metrics and their definitions. Management meetings are now driven by discussions on performance, quality improvement and strategies to achieve and exceed the targets that have been agreed upon. Individual surgeons and Nurse Leaders are now able to call up their own performance and to see how they compare with their peers (see Figure 5).
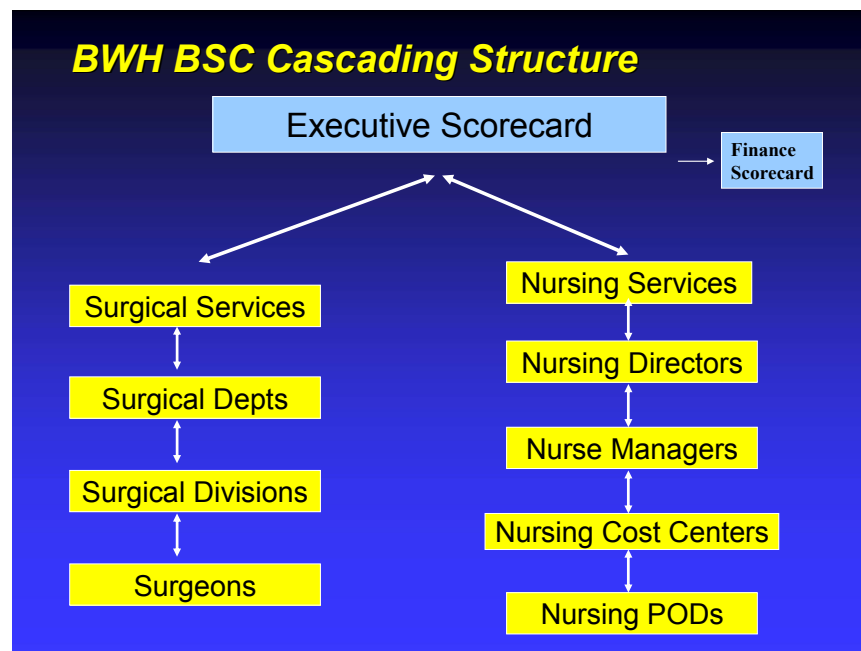


*Figure 5: BWH performance management cascade.*

This facilitates achievement of best practices and standardization of care as appropriate. Using business intelligence has given those at BWH a better way to communicate and a common songsheet from which to sing.

Other organizations, such as the Yale New Haven Health System (YNHHS), have driven business intelligence efforts from the top down, aligning their strategic priorities and direction all the way to the point of care. This work was part of an overarching effort to create a supportive performance management infrastructure, including the creation of an Institute of Excellence to support performance improvement and Six Sigma efforts.

Essential to the success of the performance management goals was the creation of an information technology infrastructure and plan to support this three hospital system. Now, executives, managers and physicians can access and view data from multiple disparate data sources in one place, at one time. They are using online analytic processing (OLAP) technology to create multidimensional views of metrics in order to solve clinical problems and to answer operational questions. Using business intelligence to support Six Sigma projects will enable YNHHS to achieve the next level of performance excellence.

These are just a few examples of business intelligence at work in complex healthcare delivery systems. Whether urban, rural, academic or community-based, healthcare leaders can optimize care, profitability and overall performance by using business intelligence and information technology to support and enhance their efforts.

# Get it right… Or else!

What is at stake if healthcare leaders do not succeed in performance management initiatives and do not apply business intelligence to healthcare? First and foremost, patient outcomes and patient satisfaction are at risk. Quality and safety can only be achieved when outcomes are measured, when variation is eliminated and when multidisciplinary teams sing from the same songsheet. Tools exist to assist healthcare providers in better manaing data in order to generate information and knowledge. Use them.

Employees, managers, physicians and executives have a stake in all of this as well. Those who choose to serve patients do so with the most noble of intentions, not the least of which is to "do no harm." No one likes to make an error, especially one that results in loss of limb or life. Enhancing healthcare providers' ability to deliver safe, quality care with adequate resources, support, tools and compensation will go a long way to attracting and retaining competent healthcare providers in this industry that is fraught with shortages of essential personnel.

The image of the hospital/health system within the community/region/nation is at stake if quality is not assured and positive patient outcomes and satisfaction are not achieved. Word spreads quickly when bad things happen to patients, and that is not publicity that any organization wants. Hospitals are often the largest employers in a given community. Employees want to be proud of where they work and of the contributions they make to the health and well-being of their community members and neighbors. Performance management is a tangible way to drive outcomes and satisfaction that benefit patients, families and providers.

All of these factors have the potential to either improve or deplete the financial margin of the organization. Errors, variation, turnover, vacancies and litigation are all very expensive, and they erode the bottom line, depleting resources needed for facility upgrades, capital equipment and employee salaries and benefits. Enhancing quality will always be best for the bottom line. Healthcare executives need to make appropriate investments in technology solutions, human resources and organizational infrastructure to support evidence-based practice and data management.

## Where to begin?

Most organizational leaders are somewhere on the performance management and evidence-based continuum, but many are not as far along as they would like to be. It is important to maintain momentum and to continue to learn and to improve. One mantra may be to "measure, measure, measure." Focus on the metrics that drive your business, and that will tell you when you've achieved your goals. Communicate and collaborate and, if in doubt, communicate some more. Share information broadly and deeply, including those closest to the patients. Use all communication vehicles available to you, including electronic mail, posters, town meetings, etc. Be flexible, but stick to your plan. If you alter the plan and the metrics too frequently, you will never know what's working or what's causing the effect you are observing. Celebrate successes, but don't forget to also celebrate attempts that are made. Reward team members that meet or exceed the targets that have been set, and hold all team members accountable to performing to the standards. Finally, step up to the plate and **lead** your organization. Walk the walk of performance measurement, and hold yourself accountable to the same standards that you've set for your team.

Publish your results, present them at regional and national meetings, and receive the recognition that you deserve for succeeding in this very challenging arena. Arm yourself and your team with the tools necessary for success, and remember that technology is your friend!

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