The New World of Healthcare Analytics
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We live in a data-driven world, where streams of numbers, text, images and voice data are collected through numerous sources. Analytics can transform this data into meaningful alerts, decision support and process improvements, which all have the potential to dramatically impact the success of a healthcare organization.

When analytics are applied effectively, healthcare organizations can better coordinate decisions, extract and present key clinical information and respond to an evolving situation in real time. They can better utilize their resources, save more lives, contain costs, improve their services and performance levels and even reduce their environmental impact.

Understanding the trends

Using analytics, healthcare companies can go beyond analyzing the significance of their historical data. They can explore ‘what-if’ scenarios without causing inconvenience or driving up costs. They can test what might happen if certain situations occurred, without actually performing physical experiments or simply relying on a trial-and-error approach. Analytics can be the key to successfully managing your organization.

To be able to perform effective analytics, a minimum set of requirements must be fulfilled. The first is the manner in which data is used. Although capturing data has become fairly well established, being able to exploit it requires more expertise. This expertise is embodied in the analytics tools that connect to the data. These tools will vary depending on the data, the processes in place and the desired output. While some of these tools are becoming mainstream, making the best use of them for healthcare is difficult. They need to be sufficiently targeted to the specialized domains, up to date with the latest practices and standards, and furthermore they must support collaborative decision making.

Xerox and ACS, A Xerox Company have been applying analytics tools for more than a decade. We are uniquely positioned to deliver the quality analytics services that today’s healthcare companies need. ACS, by the very nature of our BPO and analytics business—collects, manipulates and applies structured and unstructured data from multiple sources. We’re also an integrator, skilled at bringing together the right technology and creating self-service tools to give our clients visibility into their processes and governance. Add Xerox global R&D in text mining, visualization and machine learning to the data and the result is a powerful, unique combination. Machine learning enables systems to automatically recognize complex patterns from data and develop the models used in predictive analytics. Text mining analyzes and extracts information from unstructured data. Unstructured data represent the biggest knowledge resource in many organizations but also the most challenging to process. Visualization enables fast perceptual processing of your analytics results to make intelligent decisions based on them. In some processes, sophisticated decision engines are able to completely automate some of the work.

These technologies, data and integration resources combine to deliver leadership and focused analytics services that give our healthcare clients the kind of insight that changes the way they do business—improving processes, anticipating needs and setting the stage for a more competitive future. Over many years, we have applied analytics to solve some specific challenges in the healthcare industry and have developed an accompanying suite of tools to help us do so.
Creating healthier hospitals

Running a hospital has never been an easy proposition. Today, the burdens are greater than ever. Hospital management must keep pace with changing regulatory and reporting requirements, keep up with technological change, improve efficiency and cut costs—all while finding a way to improve the quality of patient care.

While many hospitals have long tracked data, others are still in the process of adopting medical record systems and the rapid change in healthcare reform and the many different specialties in healthcare analytics make their use more complicated for even the advanced hospital. Administrators can at best identify what happened, but there was no clear way to see what is happening now and even less to identify what is likely going to happen. As a result, hospitals couldn’t use the data they had to optimize patient care while the affected patient was still on site.

These hospitals needed a way to follow each patient from admission through discharge, collect data in real time, measure performance and compliance and send alerts to the appropriate people when an event strayed from the norm. To be effective, these analytic tools have to connect to all the various departments within the hospital and create a relationship among them.

One of the most successful of these solutions is the Midas+ family, a suite of proprietary ACS software that applies statistical process controls to the challenge.

Basically, statistical process controls are statistical methodologies used to monitor a process to ensure it produces the maximum amount of product with minimum waste. When a human being enters a hospital, he or she goes through a specific, controlled process as well. That patient is admitted, assigned a bed, tested, treated and ultimately discharged. With ACS’ Midas+ Care Management solution, an event that is out of the ordinary during a patient’s care and treatment, alerts the appropriate hospital personnel so the event can be reviewed, the root cause identified and the process altered so that the event doesn’t happen again.

Let’s look at patient falls as a simple example. In hospital A, if the fall rate increases to a pre-defined number, Midas+ triggers an alert. The appropriate personnel can drill down to the data source to identify why so many falls occurred in a particular wing or during a specific period of time. They can look at details surrounding the patients who fell, their ages and other factors that could contribute to the variance. Perhaps there was a skeleton nursing staff on duty during the impacted time period, so patients tried to go from their beds to the bathroom without assistance and fell as a result. Perhaps the new janitorial service cleaned the rooms at an earlier time, and patients were falling on wet floors.

Using Midas+, hospital staff can identify issues, analyze causes and make the appropriate changes. Just as important, after making the change, they can monitor the go-forward data to ensure the changes made actually had a positive impact. It’s a closed-loop reporting and management platform that drives continuous improvement.

Midas+ Live is a clinical surveillance tool using Evidence-Based Medical Research that works with a hospital’s electronic medical record systems. Surveillance the entire patient population at all times, it alerts caregivers not only when changes in a patient’s condition are observable, but also when any of the patients is likely to develop a critical condition within a given time horizon. For example, a combination of increased temperature, low blood pressure and other vital signs combined with various lab and radiology results may indicate the likelihood of developing a critical heart condition within the next 24 hours. Midas+ Live is a cloud-based solution that actively monitors patient data in real time, makes it accessible to hospital staff in easy to read form from any Internet browser and sends out alerts when needed using secure communication. In one analysis it has been shown that Midas+ Live would have been able to indicate 82% of pressure ulcers at least 24 hours before patients were diagnosed with this condition.

With Midas+ Live, you can identify emerging complications in real time, enable clinicians to return to care, and move to concurrent Core Measure and CQM compliance. Midas+ Live features e-measures, core measures, and 22 patient complications.
Xerox research in Europe is simultaneously collaborating with several hospitals to combine its text-mining technology with medical rules and knowledge representation to apply it to the unstructured information in patient records. It will be used to identify and attack the root causes of hospital-acquired infections (HAI) and to quickly alert medical staff to any risk, mitigating the problem and lowering the overall cost of a hospital stay.

**Controlling the cost of care through behavioral change**

The burden of rising healthcare costs affects more than healthcare providers. Both government and private-provider health insurance programs are also under budgetary pressure.

Traditionally, insurance analytics focused on transactional data, like prior approval statistics or a study of claims paid. Today, we’re seeing that focus turn more proactive—identifying how individuals are utilizing medical services, uncovering areas of waste and segmenting individuals whose health could benefit from behavioral change. By evaluating the who, what and why, employers and health plans can more accurately determine the drivers of the rising cost of healthcare and proactively implement programs to counter the impact.

For example, emergency rooms have become a very expensive substitute for primary care physicians. By identifying who is using the emergency room for non-emergency situations and why, providers can take steps to counter the problem. In some cases, people may need help finding doctors or making appointments. In other cases, the individual’s doctor may be located an hour’s drive away, whereas the emergency room is closer. By using Midas+ analytical tools to gain a clear picture of the real issues, providers can set up care management programs to influence that behavior and provide a single point of care for the patient—a physician well positioned to oversee the global wellness of that patient and recommend specialists as needed.

Data mining and predictive models are also used to show how behavioral change can positively affect healthcare costs for those suffering from chronic conditions, like diabetes or heart disease. Programs that encourage exercise, dietary changes, lifestyle changes—as well as regular testing—improve longevity and wellness, while driving down the overall cost of care. Decision support tools for physicians support treatment adherence programs at the intersection of doctors and patients.

But perhaps one of the newest and potentially most significant applications of analytics is around behavioral health issues, including substance abuse and mental health conditions. In many cases, these conditions can account for as much as 50 percent of total program spend. The greater availability of data and analysis tools enables experts to examine patterns among those with behavioral health concerns, and more clearly study the relationship between chronic conditions and behavioral health issues.

There is evidence that a significant number of people with behavioral health problems also have some sort of chronic condition. Although still in the discovery phase, analytic tools are now used to try to determine the reasons behind this crossover. By determining which condition is the driver, healthcare providers can use the knowledge gained to develop more effective outreach programs.

At the same time, these models can be used to predict the impact of these programs before they are put into place.

**Making healthcare plans understandable**

While plan providers work to drive down costs, insured individuals work to understand the complex world of insurance. Although healthcare reform in the United States brings new choices to people, it also makes them responsible for choosing the insurance plan and deductible that fits their family’s needs. For those who aren’t well versed in the language of insurance, this could be a daunting task.

ACS has already applied algorithms to this challenge, creating a plan section tool that enables individuals to determine eligibility, perform a side-by-side comparison of health plan options and gain a clear understanding of the costs and patient care impact of each plan. The tool uses a statistical model based on
comparative demographic and claim data to model a person’s situation, which users can then modify to simulate different future uses of healthcare. From this, users get a concrete, apples-to-apples comparison of their choices—and the capability to re-evaluate costs and coverage if they change deductible amounts and other variables. This same type of interactive analytical tool has other applications in the new health insurance exchanges.

The Final Analysis

Quite clearly, advanced analytics are changing the face of healthcare, bringing real-time, actionable information to decision-makers. With the rise in available data and the continued proliferation of computing power, that trend shows no sign of slowing down.

Although many experts have emerged in the field of analytics, the combination of Xerox and ACS brings together world-class research, a unique set of expertise, a broad set of tools and proven success.

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