Analytics-Driven Healthcare: Improving Care, Compliance and Cost

In the face of skyrocketing costs, the healthcare industry is addressing inefficiencies by improving data sharing and collaboration across the industry value chain and applying analytics to improve operations and patient outcomes.

Executive Summary

Ever-increasing costs highlight the inefficiencies that currently plague each link in the U.S. healthcare industry’s value chain. If deployed properly, advanced analytics can play a significant role in reducing these inefficiencies and providing healthcare organizations with insights to manage their business more proactively and profitably.

For example, analysis of electronic health record (EHR) data can lead to improved clinical outcomes and reduced readmissions, both of which can lower costs and inspire patient loyalty. This will become particularly important this year, when hospital readmissions — which cost Medicare $15 billion in 2012 — will begin to be penalized by the U.S. Centers for Medicare & Medicaid Services (CMS).

Analytics, moreover, can help predict an individual’s future healthcare needs, which can be valuable for both the payer and provider. Healthcare organizations must, therefore, begin to set up internal systems that gather disparate data in one place. This includes both structured and unstructured data; for example, EHR provides structured data of a patient’s history of health conditions and prescriptions, while semi-structured and unstructured data is available in e-mail, social networking sites, doctors’ notes, test results, physicians’ commentaries, etc. The integration of all this data is key, and this calls for greater collaboration among the IT departments of healthcare organizations, care practitioners and claims processing experts.

To fully exploit this abundance of data, healthcare organization must create a culture that places a premium on fact-based planning and decision-making. Evidence-based insights from a variety of sources can be used to provide valuable feedback to physicians.

Furthermore, as data volumes rise, a “pay-per-use” analytics model will help minimize costs for healthcare organizations, large and small.

Rising Healthcare Costs, Regulatory Pressures

Healthcare costs in the U.S. are ballooning. The annual spend in 2012 was estimated at around $3 trillion, or about 20% of the GDP. This expenditure is twice that of any other industrialized country. What’s more, costs will
increase by a projected 4% to 6% in 2013, which is more than the estimated 2.3% rate of inflation. Despite technology and process improvements, it is widely believed that the U.S. healthcare industry remains highly inefficient due to a lack of shared insights, collaboration, incentives for cost control and quality healthcare research. In fact, it is estimated that around $700 billion of the $2.5 trillion spent on healthcare in 2010 in the U.S. represents unnecessary expenditures.

Relief may be on the way. Federal regulations mandating better health outcomes are pressuring the industry to become more efficient. The Patient Protection and Affordable Care Act (PPACA), for example, addresses the twin goals of reducing healthcare costs and improving quality of patient care. It clearly ties reimbursements to the performance of healthcare organizations. A percentage of these reimbursements will take into consideration the efficiency of the healthcare organization, as well as patient satisfaction metrics.

Unnecessary procedures are one cause of the cost spike. According to a survey published by Archives of Internal Medicine, 43% of respondents said many patients are asked to undergo unnecessary tests by physicians.

According to a McKinsey report, effective hospital management strongly correlates with high-quality care. When the quality of hospital management improves by one unit on a scale of 1 (worst) to 5 (best), the report says, the mortality rate for acute myocardial infarction (AMI) decreases by 7%. Moreover, the EBITDA per bed increases by 14%, and the percentage of individuals who would recommend the hospital increases by 0.8%.

Excessive compensation for physicians also contributes to skyrocketing costs. Physician salaries in the U.S. account for 8.6% of total healthcare costs. In absolute dollar terms, U.S. physicians earn more than physicians of other nations, as the average per capita healthcare spend in the U.S. is $2,600 more than the next highest spending country.

Deploying Analytics

In this scenario of runaway healthcare costs — as well as growing regulatory pressure for affordability and improvement in clinical outcomes — analytics has emerged as a silver bullet for the healthcare industry. Analytics can generate insights that lower costs, reduce inefficiencies, identify at-risk populations, predict individuals' future healthcare needs and support physicians' diagnoses. Analytics can enable more efficient use of resources by ensuring that those who need care the most receive it.

In short, analytics can be used to:

- Build multidimensional predictive models.
- Reduce costs.
- Improve outcomes.
- Empower patients.

**Figure 1**

**Source:** "The Promise of Healthcare Analytics," Healthleaders Media, 2012.
Multidimensional Predictive Models
Prior to the signing of the PPACA into law in 2010, payers and providers disagreed on accountability for controlling healthcare costs. Today, both parties agree they must work collaboratively and share accountability for the total cost of care. Therefore, information about patient health is increasingly being combined with nonhealth information and third-party consumer insights to create multidimensional predictive models. These models lead to better stratification that, in turn, leads to higher engagement, improved health and reduced healthcare costs (see Figure 1, previous page).

Reducing Costs
Because healthcare services come with a price, organizations are incentivized to seek volume over value. This model encourages repeat visits to healthcare providers, readmissions and other inefficiencies that increase costs. Analytics can be used to implement a payment method based on performance, where instead of volume, the provider would be paid for value, as determined by outcomes.\(^8\)

This model can be achieved by structuring the payment system so that the payer assumes the “insurance risk”\(^9\) and the provider assumes the “performance risk.”\(^10\) Providers can then use available patient data to deliver better solutions that are focused more on outcomes and value than on volume of patient care.

Additionally, the Health Insurance Portability and Accountability Act’s (HIPAA) privacy rules permit the disclosure of protected health information (PHI) for research without the authorization of the individual.\(^11\) Data-driven models are being used to identify disease risk factors. By using these models to identify at-risk populations, providers can initiate treatment earlier, thus reducing costs. In fact, early diagnoses often lead to treatments that use less expensive medicines or no medicine at all.

Fraud committed by healthcare provider personnel is another cause of growing costs. Such fraud can take the form of duplicate scripts or filling multiple prescriptions for the same drug. These activities increase revenue for the provider and unintentionally create incentives for employees to commit fraud. For example, employees can substitute generic drugs for brand names, short-count pills and fill prescriptions without a refill and then overbill Medicaid.

Such fraud can be reduced by using rule-based algorithms.\(^12\) For instance, on the payer side of the healthcare equation, a business rule might ask for closer inspection of a claim when it exceeds a benchmark dollar amount. Similarly, an alarm could be triggered if multiple medical procedure codes are used instead of a single code or if a claimant submits an unusually high number of claims.

Lack of access to healthcare also contributes to industry inefficiency, as the need for services is sometimes greater than the healthcare resources available. The decision to provide a service should be driven by the relative merit of the patient’s need. Surplus resources can then be made available to those who really need them. Analytical models can be built on the basis of demographic characteristics to inform this decision-making process, thus increasing access to healthcare to those most in need.\(^13\)

Improving Outcomes
The healthcare industry across the globe is moving from volume to value. As such, clinical outcomes are more important than ever. Healthcare industry-related data is increasing at a rate of 35% per year due to increased use of EHR capabilities and other forms of unstructured data generated by social Web site and mobile device usage. Advanced analytics can help organizations more effectively mine this data to improve health outcomes.\(^14\) Additionally, an evidence-based approach to collecting and analyzing information from various sources can be employed – including practitioner research papers, technical reports, clinical trial studies, expert views, patient characteristics, etc. – to enable appropriate intervention for the physician at the point of care.

Minimizing Readmissions
Nearly one in five Medicare patients in the U.S. is readmitted within 30 days of hospitalization.\(^15\) Healthcare providers are increasingly using
advanced analytics to improve after-treatment care by gaining insights into treatment trends and causes for readmission and designing interventions. A leading U.S. healthcare provider has reduced readmissions by 22% through the use of analytics.\(^6\)

Beginning in 2013, CMS will begin penalizing providers for readmissions beyond a stated cut-off for some conditions.\(^7\) Total penalties for 2013 are estimated to reach $280 million.\(^8\) Hospitals that fail to show readmission rate improvements will be penalized up to 2% of Medicare reimbursements in 2014 and 3% in 2015.\(^9\) Moreover, more chronic conditions will be included on the readmission penalty list in the future, including cardiac bypass surgery and chronic obstructive pulmonary disease. Analytics can be used on the EHR data of patients with chronic conditions, as well as other discharge procedures, to identify the target population and enhance patient monitoring with appropriate post-discharge plans that reduce readmissions.

It is, therefore, imperative for healthcare organizations to prepare and understand their readmission metrics, calculate their readmission rates by condition and physical performance and compare outcomes with benchmark rates. This is a highly data-intensive analytical process that will benefit healthcare providers by reducing penalties or, better yet, avoiding them. Providers can also use patients’ demographic data to conduct a risk assessment, identify at-risk patients and prioritize their treatment.

Preventive Care

Historically, healthcare has been considered a local service, and comparing it with related geographic markets was considered unnecessary. It was not price sensitive or driven by market needs, so operational analysis was considered a waste of resources. Even if it were important, healthcare institutions either lacked appropriate technology or were saddled with outdated IT systems that in many cases did not offer data analysis capabilities.

However, in an increasingly competitive world, where reimbursements are declining and proof of better care is required to improve clinical outcomes, organizations need to analyze all the data they can get their hands on. Stratifying the population, identifying patients at risk, analyzing gaps in care and elevating pre-care planning are among the use cases in which advanced analytics can drive thoughtful and effective preventive care strategies.

Educating patients about their health conditions and taking precautionary measures will also help healthcare providers establish preventive care initiatives. Effectively disseminating information through patients’ preferred channels is vital to encouraging them to access requisite information about their conditions and share preventive measures. With increasing use of smartphones, mobile applications can be used to educate patients and for outreach. These applications can help access physician guidelines and share health information, such as sugar levels and blood pressure levels. The key here is providing accessibility to portals through smartphones.

Health information wellness calculators should also be accessible on-the-go.\(^{10}\) These wellness calculators can help determine average walking speed, stride length, calories burned by activity, resting metabolism and also body fat percentage (see sidebar, next page). Once these details are obtained, an individual can decide whether it’s necessary to contact a physician. Moreover, this unstructured data is ripe for predictive analysis that can help improve patient outcomes and lead to better management of the healthcare ecosystem.

Significant data is available on the payer side, as well. Predicting patients’ future healthcare needs would greatly benefit at-risk patients. For one leading payer, 4% of customers account for 50% of its cost. If the insurer could identify and engage that small customer segment to better manage their health, it could improve not only cost control but its healthcare outcomes, as well.

Empowering Patients

Consumers can and should become more responsible for their own health if they are provided with more relevant and timely data-driven insights. They can, for instance, select the best provider in their vicinity by examining a report card on various institutions. Customer relationship
management and marketing techniques used in retail can also be emulated to understand appropriate communication channels for patients to disseminate the right message at the right time. For instance, a monitoring system is available that monitors a medication prescribed for diabetes patients at prescribed intervals and sends text messages or makes phone calls as a therapeutic reminder.

Data Standardization, Integration and Collaboration Challenges

While there are many possible benefits to be obtained using analytics, challenges remain, including the following:

- **Lack of data integration and poor standardization:** Historically, healthcare organizations have lamented the insufficient funds available for IT investment. Now, the issue is a lack of standardization and nonexistent data integration.

In a survey of 263 healthcare professionals, 71% of respondents cited data integration from multiple sources as a main goal, while 56% indicated data standardization was a top priority. More than 8 in 10 (86%) said these goals were difficult to achieve. The standardization problem is clearly visible in physician notes, as their descriptive narratives can be difficult to analyze. Techniques such as natural language processing (NLP) can help mine critical details from such unstructured data.

- **Lack of collaboration across the healthcare value chain:** Most organizations consider the data they generate to be proprietary and sacrosanct and are, therefore, unwilling to share that data with other stakeholders. EHR vendors have built data warehouses and are beginning to share masked patient data with their clients. For the accountable care organization model to be successful,

Quick Take

Mobilizing Via M-Health

Helping consumers and patients fill an active role in healthcare is an essential component of the new healthcare business model. The explosion of mobile devices and apps dovetails with this requirement. Mobile health, or “m-health,” fulfills two key needs: enabling consumers to manage their health service relationships more easily and giving individuals powerful portable tools for managing chronic conditions and staying well.

One application we have developed at our clients’ request will allow consumers to easily manage their health plans from a variety of computing platforms, including smartphones and tablets. The app enables them to search for providers, receive immediate explanation of benefits notices, get messages about coverage changes, obtain a secure ID card for use at physician offices and emergency departments, and use a variety of ease-of-use features, such as click-to-call. Another app offers personalized wellness management via smartphone or tablet. This app enables patients and members to easily enter or automatically download health information, such as blood pressure, blood sugar, cholesterol levels, weight, body measurements, etc. Then, in easy-to-read charts, the app shows them how their current results relate to their goals and offers a variety of tips and information to help them achieve those goals.

Authorized physicians may access data from the app to monitor patient progress more frequently, without the time or expense of office visits. Plans and physicians may also customize the app to be alerted to changes in a patient’s condition that require intervention. Employers may even use the app in wellness campaigns, with games and graphics encouraging participation. The objective of these features is to prevent minor conditions from escalating to more serious problems that cost more to treat and manage. Apps like these will put health management tools literally at the fingertips of consumers and patients, giving them the more active role in their health choices they are demanding – and that will help reshape healthcare.

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increased collaboration and sharing of patient information among different healthcare providers should become a wider practice.

Other players see analytics as a commercial opportunity. Organizations with analytics expertise offer their services to health information exchanges to improve the quality of information and outcome of care. Pharmaceuticals companies and the research arms of insurers have aligned to explore ways to improve the health of the elderly and individuals with chronic conditions. Payers have rich sources of information on claims with disease codes from patients admitted to different clinics and other administrative information. If this data could be combined with the patient information generated by providers, it could provide a wealth of actionable insights.

Kaiser, an integrated provider and payer, for example, was able to reduce 30-day readmission rates at one of its medical centers from 13.6% to 9% in six months by using a collaborative payer/provider approach. Aetna, one of the largest private insurers, partnered with BayCare health system to improve management of patients with chronic conditions such as diabetes and heart failure, as well as reduce readmission costs.

Other challenges include limited access to skills and resources, the lack of a clear vision on the benefits of analytics, and limited funding and management support for analytics (see Figure 2).

The Way Forward
Funding from the government for EHRs will be made available only to organizations that meet the proposed CMS criteria for the meaningful use of EHR (see Figure 3, next page). Healthcare providers were mandated by CMS to begin capturing and sharing data in 2011-12. Providers need to use advanced care processes with decision support in 2014 and show improved outcomes by 2016. If these criteria are not met, their reimbursements from Medicare will be reduced.

The resulting decision support systems will be based on analytics that take health information from the established EHR and other health IT systems and apply statistical/artificial intelligence techniques to identify various risk factors, stratify patients based on health conditions, provide actionable information to physicians at the point of care and measure progress on health outcomes.

Given that healthcare organizations can reap multiple benefits from using analytics, it is imperative that they create an environment conducive to nurturing this capability. They must create a knowledge- and analytics-driven culture that pervades the entire organization. In fact, all clinical information stored in standard data formats such as EHRs must be captured and transformed into actionable data on which analytics can be applied. The following principles should be considered when building a framework for data use across the healthcare industry:

### Challenges of Analytics Use

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Poor data quality: Diverse data sources makes it difficult to create a single source of the truth</td>
<td>52.2%</td>
</tr>
<tr>
<td>Limited access to skills and resources</td>
<td>48.3%</td>
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<tr>
<td>Information is not available in a timely manner, so decisions are made without being data driven</td>
<td>43.5%</td>
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<tr>
<td>Limited analytics champion/sponsorship</td>
<td>39.7%</td>
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<tr>
<td>Lack of a clear vision on how the organization can benefit from analytics</td>
<td>39.2%</td>
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<tr>
<td>Poor data: Too many manual systems deployed, resulting in insufficient electronic data</td>
<td>27.3%</td>
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<tr>
<td>Poor data: Too many manual systems deployed, resulting in insufficient electronic data</td>
<td>26.8%</td>
</tr>
<tr>
<td>Poor data: Too many manual systems deployed, resulting in insufficient electronic data</td>
<td>16.3%</td>
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<tr>
<td>Culture not ready to become a data-driven organization</td>
<td>6.7%</td>
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<tr>
<td>Other</td>
<td></td>
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Figure 2
Data use should focus on patients’ protected health information for research, but their privacy should be protected in compliance with HIPAA.

Data transparency is a must and should be overseen by a reliable steward.

The initiative should begin by collecting, piloting and deploying high-use, high-value subsets of data around specific diseases.

Organizational focus should shift from transactions to quality and outcomes.

The need for training and skill development in health IT and clinical informatics should be addressed.

A data analytics framework (see Figure 4) can be used by various stakeholders to not only manage disease treatment but also improve the quality of patient outcomes. However, the security of data is paramount.

### Framework for Analytics

- **Health management/disease management**
- **Security of data**
- **Data use**
- **Application of technology**
- **Regulation and compliance**
- **Quality of outcomes**
- **Stakeholders (payers, providers, pharmaceutical companies, etc.)**

*Source: HealthIT.gov Figure 3*

*Source: Cognizant Research Center Figure 4*
Organizations should adhere to the following best practices:

- **Develop a culture that emphasizes fact-based decision-making.** Available data should be structured and analyzed to provide a guideline for the organization to improve on efficiencies and for quick decision-making. The data should be freely available to stakeholders who want to use it. A balance must be achieved between data quantity and quality so that physicians are not overwhelmed; only relevant insights should be made available to them.

- **Provide feedback where required.** Most clinicians will appreciate a comparative analysis with another clinician. If analytics are used and the shortcomings are presented in the right format, then an overall improvement in the outcomes should follow. Clinicians should be told clearly what they need to change, such as the drug administration process or the use of testing.

- **Ensure integration of data and greater collaboration between IT and domain experts.** Both structured and unstructured data from within and outside the organization should be integrated to build a solid information foundation from which to draw both insights and foresights. These insights should be deliverable across the organization and applications. Only then can analytic tools be applied to deliver results.

- **Convert most manual data into electronic form.** The data from transactional systems should be made available to those who need it or could benefit from it. Timely availability of information is important, provided information security is given high priority.

- **Evaluate and make secondary use of transactional data.** For example, healthcare organizations should consider revenue-generating partnerships with pharmaceutical companies to leverage their transactional data ethically and ensure mutual benefits for both industry segments.

- **Use a pay-per-use model, especially as volumes increase.** This would help to variablize costs and avoid higher fixed investments.

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### Footnotes


The risk of whether a patient will develop a costly health condition.

The risk of higher costs from delivering unnecessary services, delivering services inefficiently, or committing errors in diagnosis or treatment of a particular condition.


The term “health information exchange” (HIE) refers to electronic sharing of health-related information among organizations, with the goal of reducing duplication of services and operational costs for healthcare providers.

About Cognizant

Cognizant (NASDAQ: CTSH) is a leading provider of information technology, consulting, and business process outsourcing services, dedicated to helping the world’s leading companies build stronger businesses. Headquartered in Teaneck, New Jersey (U.S.), Cognizant combines a passion for client satisfaction, technology innovation, deep industry and business process expertise, and a global, collaborative workforce that embodies the future of work. With over 50 delivery centers worldwide and approximately 150,400 employees as of September 30, 2012, Cognizant is a member of the NASDAQ-100, the S&P 500, the Forbes Global 2000, and the Fortune 500 and is ranked among the top performing and fastest growing companies in the world.

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