



## **Clinical Analytics: Can Organizations Maximize Clinical Data?**

**Sponsored by Anvita Health**

**June 7, 2010**

### **Background and Purpose**

Over the course of the past five years, installation rates for key clinical applications have risen, yielding ever increasing amounts of clinical data housed in electronic format. Key elements in the electronic medical record (EMR) suite include clinical data repository, clinical decision support, computerized practitioner order entry (CPOE), order entry, nursing documentation and physician documentation<sup>1</sup>. However, none of these applications has come close to reaching market saturation; utilization is expected to increase sharply in the future as government incentives and shifts in reimbursement models take hold.

In addition to increased market penetration of these applications, the use of these applications should also increase in those hospitals that already have the technology implemented. Many healthcare provider organizations implement technologies like CPOE in a single department and then roll it out to other areas of the organization, yielding additional clinical data.

The American Reinvestment Act of 2009 (ARRA) will accelerate adoption of technology. ARRA includes billions of dollars in Medicare and Medicaid incentive payments to hospitals and providers for the meaningful use of certified health IT products. The Centers for Medicare and Medicaid Services (CMS) have released a Notice of Proposed Rulemaking on Meaningful Use that identifies the criteria for becoming a meaningful user of health IT. Both programs have start dates of October 2010 for hospitals and January 2011 for eligible provider categories<sup>2</sup>.

Another influence on the amount of clinical data that will be available for analysis in the future will come from the shift to ICD-10. Under the current ICD-9 system there are only 17,000 codes available for identifying diagnoses and procedures. The ICD-10 in October 2013 will result in a total of 155,000 codes, allowing for the accommodation of diagnoses and procedures in a way that is not possible today<sup>3</sup>. This will enable new levels of analytics, including quality reporting, pay-for-performance and bio-surveillance<sup>4</sup>.

---

<sup>1</sup> Source: HIMSS Analytics™ Database ([www.himssanalytics.org](http://www.himssanalytics.org))

<sup>2</sup> HIMSS (<http://www.himss.org/EconomicStimulus/>) accessed on May 24, 2010

<sup>3</sup> Department of Health and Human Services <http://www.dhhs.gov/news/press/2008pres/08/20080815a.html> Accessed June 2, 2010

<sup>4</sup> Department of Health and Human Services <http://www.dhhs.gov/news/press/2008pres/08/20080815a.html> Accessed June 2, 2010

Given the spotlight on healthcare technology HIMSS Analytics launched a research study to investigate the use of clinical analytics, including the issues and challenges that healthcare provider organizations and payers are facing as they strive to meet the meaningful use requirements. The costs of this research were underwritten by Anvita Health. This report will outline the project and will discuss the primary findings from this study.

## **Study Population and Approach**

In order to gain an understanding of the challenges and issues faced by healthcare organizations, Chief Medical Officers (CMOs) and Chief Medical Information Officers (CMIOs) in from both the provider and payer community were invited to participate in this research. Respondents from the provider community primarily represent hospital organizations. Individuals who expressed an interest in the project were asked to participate in a 60-minute focus group.

Two focus groups were hosted via conference call. One group was hosted with individuals from the provider environment; the second group was conducted with individuals from the payer environment. Individuals in both groups were asked the same core set of questions. Each group was also asked a limited number of questions that were unique to their environment. For individuals who could not accommodate the focus group time, one-on-one interviews were conducted. These interviews lasted approximately 30 minutes.

All focus groups and telephone calls were facilitated by HIMSS Analytics. The focus group questionnaire was developed collaboratively by HIMSS Analytics and executives from Anvita Health. The discussion guide grouped questions by the underlying themes of the study. These themes included definition of clinical analytics, analysis of data and tools, and resources necessary for the effective use of clinical analytics.

A total of 10 CMOs and CMIOs participated in this research. By design, all respondents from the provider market worked for a hospital with a minimum of 300 licensed beds in their care delivery organization. The provider organizations represented in this research ranged from a 350-bed single hospital to an integrated delivery system with more than 2,000 beds. Respondents from payer organizations were required to represent organizations with a minimum of 350,000 covered lives. Each participant was offered a small stipend following completion of the focus group session or one-on-one interview.

It should be stated that while this small sample size is not meant to be representative of the market as a whole, the sample population does provide an excellent point for generating discussion around this topic.

## **Definitions**

While the purpose of this research was to evaluate the effective use of clinical analytics, respondents were asked to offer definitions of both business and clinical analytics. In terms of business analytics, respondents in the provider environment identified components such as financial performance, cost and expense reduction, length of stay and case mix index. Respondents also looked more concretely at the tools used to extract this information, such as SAS. From a payer perspective, the responses to this question revolved around the ability to place value on programs and identify the return on investment (ROI) from these programs.

In defining clinical analytics, respondents from the provider community focused on areas that either helped organizations provide more effective and efficient clinical care (mortality and morbidity measures) or analytics surrounding patient safety (system warning data). Among payer respondents, clinical analytics is really seen as a tool that provides information and context to physicians as they make decisions about the care of their patients or aid in better understanding the health of their covered populations.

Respondents also alluded to the fact that the “dividing” line between the two buckets was not always clear. Members of each focus group identified a third “bucket” of analytics. For the providers, this bucket was given the label of “process analytics”, which includes metrics such as efficiency of staff or turnaround time from medication order to medication administration. For the payer respondents, this bucket was given the label of “administrative analytics”, which was defined as claims data, such as CPT-4 and ICD-9 codes.

Finally, several individuals suggested that a “dividing” line and the presence of two buckets was an arbitrary construction. For these individuals, business analytics and clinical analytics are concepts that are intertwined and exist across a continuum.

In order to ensure that the individuals participating in the focus groups were responding to the questions using the same framework, a standardized definition of the term clinical analytics was shared with the group. The definition offered for the purposes of this research was that clinical analytics encompassed the capture and use of discrete clinical data to identify and measure quality, patient safety, or service line efficiencies and improvements. Examples including JCAHO Core Measures, and hospital acquired infection rates were given to the group.

## **Findings**

### **Current Use of Clinical Analytics**

Most of the respondents participating in this research indicated that they are collecting and/or leveraging clinical and/or claims data to enhance patient care cost, safety and efficiency. Furthermore, data is looked at on a variety of levels. Respondents are not only looking at information on a specific patient, but also exploring data across population-based metrics, such as data specific to a particular physician or to a certain condition, such as diabetes or hypertension.

Survey respondents identified using rule sets from a wide variety of organizations including voluntary programs (the Leapfrog Group<sup>5</sup>), government sources (HCAHPS<sup>6</sup> or the Hospital Compare Database<sup>7</sup>), or trade organizations (the Council of Teaching Hospitals and Health Systems<sup>8</sup> or the Society for Thoracic Surgeons<sup>9</sup>). These datasets allow for a wide range of data to be available, from the quality requirements outlined by the Leapfrog Group to the data on patients' perspectives on hospital care included in HCAHPS to consumer oriented data that

---

<sup>5</sup> The Leapfrog Group (<http://www.leapfroggroup.org/>) accessed May 24, 2010

<sup>6</sup> HCAPS (<http://www.hcahponline.org/home.aspx>) accessed May 24, 2010

<sup>7</sup> Hospital Compare Database ([http://www.cms.gov/HospitalQualityInits/11\\_HospitalCompare.asp](http://www.cms.gov/HospitalQualityInits/11_HospitalCompare.asp)) accessed May 24, 2010

<sup>8</sup> Council of Teaching Hospitals and Health Systems (<http://www.aamc.org/members/coth/>) accessed May 24, 2010

<sup>9</sup> Society for Thoracic Surgeons (<http://www.sts.org/>) accessed May 24, 2010

provides information on how well hospitals provide the recommended care to their patients. However, these are by no means the only rule sets available that healthcare organizations leverage.

The availability of external information does not prohibit the examination of organization-specific data, such as that derived from patients' medical records or from the databases maintained by payer organizations. Indeed, many of the respondents in this research outlined a wide variety of data that was being collected and analyzed at their organizations, including the use of surgical antibiotics, pharmacy measures, use of high risk medications or monitoring of hemoglobin A1Cs for diabetic patients.

Much of the information that healthcare organizations ultimately choose to report is driven in one of three ways. First, organizations track data that they are required to track by the government or other external organizations. Several individuals, for instance, noted that their organizations collect cardiology or primary care data because they are feeding this data into broader registries maintained by their state.

Second, the data that healthcare organizations choose to look at is also driven by cost. Many respondents in this research suggested that they would look at data that had the potential to significantly reduce costs at their organization. This leads to the tracking of "big ticket items and areas", such as cardiology, transplants, surgery, or obstetrics. For instance, this can assist with the ability to reduce the inventory of high-cost products like valves.

Finally, respondents noted that they tracked information that is required for recertification of professional staff. One example provided in this area is the Ongoing Professional Practice Evaluation (OPPE<sup>10</sup>), which examines performance data for all practitioners with privileges on an on-going basis relative to their two-year reappointment process.

### **Challenges to Clinical Analytics**

As expected, individuals participating in this research identified a number of barriers and challenges to being successful in their efforts to data mine effectively. A primary problem is the format in which the data exists. This manifests itself in a number of formats. First, respondents have issues with being able to find and manipulate data that exists only in a paper format, as this requires extensive data entry and manipulation to yield a satisfactory format in which the data can be analyzed.

Second, just because data is housed electronically doesn't mean that it is ready for analysis. A number of respondents indicated that in some instances, data is captured in a free-form method, such as a note. As such, the information would need to be converted to a discrete, or structured, field for data analysis to take place, using natural language processing technologies.

Finally, there are concerns that some data elements that are required for data analysis are missing because they were captured in an alternate format that is not streamlined into the main data collection tool. One example of this is lab values that might be captured at an off-site

---

<sup>10</sup> The Joint Commission  
([http://www.jointcommission.org/AccreditationPrograms/Hospitals/Standards/09\\_FAQs/MS/Ongoing\\_Professional\\_Practice\\_Evaluation.htm](http://www.jointcommission.org/AccreditationPrograms/Hospitals/Standards/09_FAQs/MS/Ongoing_Professional_Practice_Evaluation.htm)) Accessed May 25, 2010

facility that do not seamlessly transfer to the on-line system. Hence, this data has to be either manually entered or omitted from the overall analysis.

Another challenge to being able to facilitate clinical analytics is ensuring that “apples-to-apples” analyses of the data can be facilitated. For instance, being able to understand when studying an order set where that information begins and where the data ends. Additionally, it is also important to understand what the clinical context of a particular data point exists in and how does the clinical context impact the data point. There are also issues with nomenclature, and ensuring that data is captured using the same language (e.g. data normalization and semantic interoperability).

In addition, a number of respondents indicated that they lack appropriate staffing to mine all of the data they need to evaluate. This issue exists not only with having staff with the appropriate skill set needed to review the datasets that are created, but also in the area of programmers and individuals who write the reports to extract the data. These areas are further constrained not only because healthcare organizations lack the financial resources to hire additional personnel, but also because it can be difficult to find individuals who possess the right skills for the job. To combat this, some organizations are turning to external resources to meet these needs.

Healthcare provider organizations are also struggling to understand how the government’s role in clinical analytics is going to evolve in the future. The initial guidance for meaningful use was issued on December 30, 2009 and expected to be finalized in spring of 2010. And, as organizations move through the three stages outlined by meaningful use, they will have to continue to grapple with additional requirements.

### **Tools Being Used to Analyze Data**

The respondents in this sample rely on a variety of technology solutions to meet their needs. Several of the respondents who work for provider organizations reported that they are working with their key enterprise clinical vendors to develop reports and tools to analyze clinical data effectively. Respondents are also turning to niche vendors that specialize in the development of data warehouses or data mining to assist in this type of analysis. In the case of one provider-based respondent who represents an organization that once included an HMO, they have developed tools internally and are working with a vendor who will assist in the development of the data warehouse and mining solutions in their unique environment.

Some respondents are also leveraging data warehouses in which data is populated for analysis. However, use of data warehouses for clinical purposes is not wide-spread. According to data from the HIMSS Analytics™ Database<sup>11</sup>, approximately one quarter of U.S. hospitals presently use a clinical data warehouse/mining. Furthermore, usage is more widespread among larger hospitals. More specifically, approximately 40 percent of hospitals with more than 500 beds use this technology, compared to 18 percent of hospitals with 100 beds or fewer<sup>12</sup>.

Respondents are concerned, however, that the resources that are presently available on the market are too expensive. As such, they are waiting until these solutions become more affordable in order to move forward with these solutions. Generally, respondents are unwilling

---

<sup>11</sup> HIMSS Analytics™ Database ([www.himssanalytics.org](http://www.himssanalytics.org)) May 2010

<sup>12</sup> HIMSS Analytics™ Database ([www.himssanalytics.org](http://www.himssanalytics.org)) May 2010

to make a commitment to a resource or technological solution if the resulting cost savings is not substantially greater than the investment that was originally made to the tool.

Among payer respondents, one solution was identified in which provider and payer groups enter information into a web-based data portal that allows clinicians to see medical data made available from a wide-variety of patient care settings, including hospital systems, payers and laboratories, physicians and more.

### **Retroactive Use of Data**

In most instances, organizations reported that the use of data at their organization allowed for retrospective analysis of data. Several examples were offered by the individuals in this sample, such as the ability to ensuring that the proper care protocols are offered to patients with particular conditions.

At this time, there appears to be very little use of clinical data to drive a clinician's decision in real time as care is being delivered (e.g. evidence based medicine protocols); respondents did, however, clearly indicate interest in being able to use data for this purpose in the future.

### **Payment**

Healthcare organizations and payer organizations represent both sides of the issue – exclusive of the patient – when it comes to payment of healthcare services. While both agree that cost, efficiency, effectiveness and safety need to be the guiding principles of healthcare delivery in the United States, these organizations have different business models and as such, the key objective of each organization is somewhat different.

Among the respondents from the provider community, the costs were identified in the context of being able to deliver quality care, at a cost effective price. For several respondents, analytics is used to reduce supply costs, ensuring that they can reduce costs of physician preference items, and as such become leaner in terms of supply management. Others use analytics to identify workflow issues, such as how long it takes from ordering to administering a medication.

In comparison, the respondents from the payer community were concerned with being able to provide quality care for their constituents and identified issues such as outcomes-based reimbursement and the ability to improve quality within provider networks. However, they wanted to be able to do so within a framework that was driven by a system in which financial considerations are a top priority. At payer organizations, the focus is on how long patients are staying in the hospital for certain diseases and what level of care is being received and ensuring that the care protocols are optimal for the treatment required.

The final issue around payment that was identified by both providers and payers alike were concerns for the future payment structure in the United States. Respondents are extremely concerned that changes in reimbursement structures will impact their financial bottom line. Clinical analytics is a tool that will be used to assist in managing these risks.

## **Future of Clinical Analytics**

The need for analytics is only going to expand not only as healthcare organizations gain the ability to uncover more sophisticated analytics, but this is going to be driven by the steep and rapid increase in available clinical data as the result of ARRA-based incentives.

One aspect of this is the increasing use of data for evidence-based solutions. Patient care is a continually evolving process and the availability of ever increasing data sets should yield information that will allow for enhanced patient care. This is true in the provider aspect, where healthcare providers can ensure that they are prescribing the optimal treatment for patients with certain diseases or conditions. The opportunity will also exist both for payers and providers to examine more population-based data, to compare and contrast treatment plans for the same disease to identify which treatment plan had the most promising outcome.

In addition, a number of respondents, particularly in the payer community identified the importance of being able to have access to patient information that can help to guide appropriate care. This information, such as the ability of a patient to comply with the prescribed drug regimen or having an adequate support system to provide care upon hospital discharge would be information that will help to ensure that high quality, cost effective care can be established in the future.

There is also concern that the level of analytics that is necessary will become complex. As the field evolves, respondents raised the concern that the items that are appropriate for data analysis today will become commonplace and the industry will have an appetite for more complex questions that we presently don't have the tools to address. One example shared with the group was that we will no longer be concerned that all diabetic patients get two hemoglobin A1Cs per year. The industry will instead be focused on more complex measures.

## **Conclusion**

Healthcare provider and payer organizations are both key components of the healthcare delivery system in the United States. Respondents from both types of organizations agree that cost, efficiency, effectiveness and safety need to be the guiding principles of healthcare delivery in the United States. These organizations have different business models and as such, the key objective of each organization with regard to the effective use of clinical analytics is somewhat different. Among the respondents from the provider community, the costs were identified in the context of being able to deliver quality care, at a cost effective price. In comparison, in the payer community, respondents were concerned with being able to provide quality care for their constituents, with an eye to cost-effectiveness.

This paper has emphasized the value that clinical analytics can bring to organizations, while at the same time identifying the huge hurdles that exist in the area of clinical analytics. In order to have effective data to evaluate, healthcare organizations need to consider a number of aspects, including the ability of their software systems to house the data in a format that lend itself to data analysis; the willingness of clinicians to capture information in discrete data fields; and the willingness of the healthcare organization to invest in the analysis of this information, from both the perspective of staffing and tools.

There are also issues with being able to examine the data that is currently available. Resources are in short supply and organizations are forced to prioritize the data they have at hand. This

means that many organizations have to evaluate the data that they are required to evaluate at the local, state and federal level and are not able to begin to evaluate the additional questions they might like to have the opportunity to pursue.

The challenges that organizations face today with regard to clinical analytics are only going to be amplified in the future, as is evident in the later stages of meaningful use criteria. Several respondents to this research noted that when the industry figures out the answer to some of the simple questions that we are presently asking, such as, does a diabetic patient get the right preventative care, the questions that we are going to want answers to are going to be increasingly complex, requiring a higher skill set and more complex analytical tools. An example may be analyzing the genetics and proteomics of people to begin to assess the impact of these factors on their conditions and response to treatments or specific medications.