Business White Paper

Big Data for Healthcare Finds its Home in the Cloud

Why the HIPAA-compliant cloud is the new destination for securing and managing healthcare analytics data

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Introduction

Healthcare organizations are gathering data about their patients at an unprecedented rate and volume. Information is now routinely collected from EHRs, medical equipment, labs and from patients themselves. While a technological marvel, this explosive growth in health data has created two pressing issues. The first is how to physically manage it. Storage systems and IT departments built for data measured in gigabytes are inadequate for today's requirements, with the cost and time to update considerably prohibitive. The second challenge is how to turn all this data into actionable medical insights. At present, the situation is like owning a goldmine, with few able to get any gold out of it. The potential to significantly improve the quality of care and lower our country's skyrocketing healthcare bill resides in that data.

Working with a HIPAA-compliant, cloud-based health data management services provider with healthcare-specific expertise offers an effective solution to these issues. Such providers already have operational data centers capable of securely managing petabytes, exabytes or even zetabytes of data, while a select few of those top-tier providers offer a full set of services for securing and managing Big Health Data. There are five key phases to making such data available for large-scale analytics projects. It is important to identify a cloud provider with demonstrated knowledge of and familiarity with each phase.

The five phases of managing health data in the Cloud

1 **Acquire** – The cloud services provider must have the ability to receive data from various sources in their native format and encrypt the data as it travels to the cloud provider's data center.

2 **Transform** – In the increasingly collaborative environment of healthcare, data from disparate sources must be normalized and synthesized into a format that allows all of the data to be

used in analytics applications. Cloud services providers who can transform the data in this manner bring tremendous added value by saving internal IT departments from what is typically tedious, labor-intensive work.

3 **Manage & Securely Store** – On a related note, the cloud services provider should have the capability to support multiple databases and Big Data suite options. It is also critical to work with a cloud services provider that understands the specific needs surrounding protected health information. A HITRUST-certified provider is preferred as this option offers certified protection across a broad range of standards.

4 **Analyze** – While many will offer some or all of the first three phases, top-tier cloud services providers will have the ability to assist healthcare organizations with incorporating Big Data analytics tools that allow subject matter experts to delve into the data and use it to answer the organization's most pressing questions.

5 **Present** – While the ability to slice and dice data is paramount, so too is presenting the information in a user-friendly manner across different systems and devices, including PCs, tablets, smartphones and the web. Here again a top-tier cloud provider can assist healthcare organizations; in this instance by helping them identify and implement applications that convert analysis into a presentable format.

All of the above activities have proven to be formidable challenges for most healthcare organizations to take on – until the arrival of the cloud. This white paper will explain the new capabilities for healthcare analytics, the key engine for "Big Health Data" projects, when organizations move their data to a best-in-class cloud services provider with an exclusive focus on health data management.

1. Acquire the Data

While healthcare-related information is becoming increasingly electronic, most of it remains contained within individual applications or healthcare organizations. It's rather like a giant jigsaw puzzle with all of its pieces intact, but scattered across

the country. To turn Big Health theories and hypotheses into life-saving answers, the healthcare industry must find a way to make correlating data truly available to researchers and clinicians working together, but often from different organizations.

For that, a neutral ground for acquiring and sharing data is needed.

One house for all

In today's increasingly collaborative healthcare environment, more often than not multiple organizations will have roles in a healthcare analytics initiative--whether it's a population health study or clinical research trial. But as committed as all parties may be to the project's successful outcome, tensions can arise at the first discussion of which entity will have ownership of protecting and managing the data.

Here is where a cloud data management provider offers the psychological – and invaluable – advantage of neutrality. All of the organizations may feel more comfortable uploading their data and entrusting its management to this provider than sending it directly to other entities involved in the data project. Further, a best-in-class cloud provider will have additional services and capabilities in efficiently acquiring this data from multiple parties and systems, which will solve another set of potential problems and points of confusion. These offerings should include, at a minimum:

- A comprehensive suite of data migration services including compliant Standard Operating Procedures (SOPs) for using large appliances to securely capture and seed the initial data.

- Data acquisition from disparate sources and centralized into a single cloud-based repository for collaborative use.

- Scales as data volume increases, relieving need to making time-consuming infrastructure purchases.

- Takes on routine (but often overlooked) data management tasks so internal IT departments can switch focus to higher-level activities.

- An exclusive focus on health data management with proven record of customer successes.

When trust is gained, collaboration follows

Healthcare organizations are traditionally reluctant to share their data outside their own firewalls. And rightfully so. In addition to the competitive considerations, there are also the confidentiality risks. But with the right service provider, aggregating this data in the cloud can be a newly secure proposition, a topic that will be further detailed in this white paper.

2. Transform the Data

Never before has so much health information been amassed from so many sources to better the lives of entire populations of people. Yet even if all this data is made accessible in one place, there is still a significant barrier to using it: the many different formats in which it was captured. To put this into context, imagine being assigned to a complex IT project with 10 expert colleagues, each of whom speaks a different language – and only that language. All the knowledge required to complete the project is contained within that group, but there is virtually no ability to share it unless each participant hires translators to work with all the other participants. More time will be spent attempting to overcome the language barriers than actually accomplishing the assignment.

It's the same with healthcare data, even from EHR solutions, which often have their own mutually exclusive formats and interpretation of standards. This means there will be a lot of work to do just to make the data usable before clinical teams can begin deriving insights from it. Here is where the time-tested computing principle of "garbage in, garbage out" applies. Data must be scrubbed, normalized and aggregated into a standard format all can view and manipulate.

And really, almost all data will need some sort of work in this area. Even something as basic as showing provider locations on Google Maps – addresses typically come in with different abbreviations and other formatting distinctions. It's a mundane detail, but one that matters.

Shortcut through the cloud

Having to learn and map data from all these different formats is not only time-consuming, it distracts internal IT resources from higher-value work. It also requires an intensive effort to gain knowledge that, once this project is completed, probably won't be needed again.

A healthcare-only cloud provider should already possess this knowledge and unique health care tools as a part of the core business, with the mechanisms in place to transform, normalize and synthesize data from disparate sources – including clinical, financial, patient surveys, pharmaceutical, imaging and other systems – for use by the data project's chosen analytics applications. Through the use of medical ontologies, master data management, natural language processing (NLP), health schemas, unstructured and structured databases, a health cloud provider can transform the data to make it useful and easily shared across the entire healthcare continuum.

3. Manage & Securely Store the Data

It doesn't seem that long ago that electronic health data tended to roll in on gentle, manageable waves. Not anymore. With the rapid growth of electronic health records and a multitude of electronic medical devices, healthcare organizations are being flooded with data from every direction. Ultimately, this is an enormous positive, as it makes deep encounter and widespread longitudinal analysis and even comprehensive population analysis – finally feasible.

But before this can happen, a fundamental decision must be made: where exactly to store and secure it? Data is coming in so fast and exponentially now, IT departments often quickly become overwhelmed with housing it all under the strictest HIPAA security compliance. There are also the added costs of organizing the data for quickly availability in analytics applications – an increasing (and increasingly expensive) responsibility for healthcare IT departments.

A healthcare dedicated, cloud provider can help. First, no matter how much data streams in, cloud storage can easily expand and

scale to contain it. This is in stark contrast to the time-consuming effort of procuring and installing physical storage infrastructure internally. In the cloud, organizations can purchase capacity as they need it and have it instantly available, making what was once an unpredictable capital outlay an easier-to-budget operational expense.

Healthcare information is more tightly regulated than almost any other industry. It is also more fluid and difficult to manage than data from industries such as retail or manufacturing. Accordingly, a cloud provider that focuses exclusively on the healthcare industry can provide an extra measure of assurance that data security will conform to the most rigorous industry and government compliance. Here are other required indicators of a secure-savvy cloud provider:

- Is HITRUST-certified to assure data stays protected in accordance with objective government and industry standards and mandates.

- Performs verifiable and extensive employee background checks.

- Has additional patient data privacy capabilities, such as ability to de-identify patient-specific information.

- Has a full suite of backup and disaster recovery services.

- For "bring your own device" scenarios, will offer the option of running virtualized applications within its data center, which means the data is protected even if a device is lost or stolen as it was never downloaded to the device.

It's important to remember that healthcare organizations do remain responsible for keeping their data secure, wherever it may reside, including within a third party's data center. So here's another important trait of top-tier cloud services providers: they will offer a 'thick' Business Associate Agreement that stipulates the cloud provider is responsible for the lion's share of financial penalties, should a breach occur.

4. Analyze the Data

"All dressed up and nowhere to go." That pretty much sums up a good deal of the healthcare data being collected today, especially data that holds answers to questions that have long confounded physicians and researchers. To date, much of this information – acquired from EHRs, medical devices, and patient accounting systems, to name just a few sources – remains untapped.

Challenges with internal analytics

Some of the smartest people in the field of medicine have been involved in "Big Health Data" initiatives, from clinical research projects to population health management. Yet time and again, familiar issues surface to sabotage their efforts. The primary barrier is that implementing an internal analytics solution costs a lot of money, time and well-honed people skills. This starts with aggregating the needed data from multiple entities, each with different requirements and politics – a process that can take anywhere from six months to several years, and cost hundreds of thousands or millions of dollars. This is before the end-user analytics and visualization components of the system are even added, but rest assured, they will require similar expenditures in funding and effective people management.

Despite all this effort and money spent, most data warehousing projects – a full 70 percent – are destined for failure. In consideration of the above, you can probably see why. This leads to another very real risk: when such projects don't deliver the ROI or other hoped-for results, it can be very difficult, if not impossible, to get everyone on board again for a new capital-intensive data initiative.

Having a neutral, cost effective place to store, manage and analyze Big Health Data goes a long way in giving these projects what they need to succeed. And that's what a health-dedicated cloud services provider can offer, plus some extra benefits. The first cumbersome requirement to be dispatched with is the need to build an internal data warehouse altogether, as now data can be pulled in from different systems and uploaded into the cloud. An experienced

healthcare cloud services provider will have the resources to normalize this data for access by all approved parties – and since HIPAA privacy will be paramount, also know how to de-identify the protected health information of patients.

Where a HIPAA-compliant cloud services provider that specializes in healthcare really makes the difference, however, is an ability to offer several options for analytics capabilities through partner networks. Rather than making half-informed guesses about what will be needed, and end up stuck with a solution that's too basic or too complex, healthcare organizations can try an analytics application on a trial basis. If the solution works well, the work continues. If tweaks are needed, such as new features or more data storage, a cloud analytics solution can scale at an ease and speed that internal solutions simply can't. No more extensive reworking of back-end systems. And no more staggering upfront costs. Analytics is now a manageable operational expense instead of a budget-breaking capital investment.

Finally, expect all data to come in on a more timely and regular basis now that all partners in the initiative have a neutral place to send it. This feature alone can transform the data project, as concerns about allowing any one partner to have "control" over the data are permanently alleviated.

5. Present the Data

Today's healthcare reporting tools have incredible powers to tell stories about patient health – whether individual patients or entire populations. The same tools can also convey immediate facts about which purchases to make, drugs to use, physicians to assign and a great deal more. Yet the present reality is that not a great many physicians use these data visualization tools to such an extent.

It would be nice if physicians, researchers and other clinicians could just shepherd the needed data into a visualization tool and quickly get about their business of finding the great cures for all that ails the world. Obviously, it isn't quite that simple (yet). For clinical visualizations, much of the needed information may sit in unstructured notes rather than structured data fields. Organizations

attempting to use that information to build visualizations are often flummoxed by how to do so. In a related issue, deciding how to structure a report can be a time-consuming endeavor in itself. With so much data available it's easy to get carried away, ultimately delivering a monster of a report that ends up burying the key insights under piles of factual, but irrelevant information. The larger the forest, the more difficult it becomes to find a specific tree.

Additionally, data visualizations must be easy for business users to access. The most innovative, most well-designed dashboards in the world will be of little use if they are not formatted for the screen business users typically use to view them. That goes for mobile device users, too. While it may not be feasible to design every aspect of a report interface around a smaller screen, a version for iPads and other portable devices is a huge advantage in an increasingly mobile healthcare environment.

Other key but sometimes overlooked best practices for data visualization:

- **Make the reports/visualizations relevant based on the user's role, identity and concerns.** Each set of users – clinical, research, financial, executive, IT, marketing, etc. – requires different metrics. In many cases, business users will be looking to answer a specific question or set of questions. For example, management might want to understand the financial and clinical impact of standardizing on a particular brand of knee replacement components. A visualization designed to answer that question can demonstrate the risks, rewards and success rates of various components currently being used to help the organization make the right decision.

- **Begin with the end in mind.** This may seem an obvious piece of advice, but too often organizations fail to fully communicate with business users in advance of application development what these stakeholders need to see or want to accomplish in structuring the report.

- **Make visualizations easily accessible by users.** Circling back to our observations about today's mobile healthcare landscape, this is especially important for physicians and nurses who are

constantly on the move. While they may occasionally be at a PC or laptop, today there is a high likelihood that they will be using a tablet or smartphone to access the dashboard/report. Incorporating responsive design techniques that recognize the type of device being used will generate far better results and satisfaction than a "one size fits all" approach.

- **Achieve HIPAA compliance.** It will be far easier to obtain data from outside data sources if the organization requesting it can demonstrate that it will be well-protected in storage, in transit and in the way it is presented. This may mean restricting who can access certain types of data for visualizations. It almost certainly means de-identifying patient data before it can be used or shared for certain purposes. Whatever the requirement, having a strong data management mechanism in place is critical for protecting all parties.

- **Create reports that can lead to action.** Consider a hospital that wants to reduce its readmissions. A dashboard might show readmissions rising, but unless someone looks at it, this fact will go unnoticed. If email alerts are incorporated when readmissions cross a certain threshold, however, notifications can be sent to designated people who can review the dashboard, drill down to the information behind it, and initiate actions to correct the situation.

Conclusion

Meaningful Use, Advanced Imaging, HIEs and EHRs are driving massive growth in data volume, which brings new challenges and opportunities for healthcare analytics applications to generate meaningful insights. Many organizations are finding it difficult to house these analytics solutions within a traditional IT infrastructure, which requires considerable capital outlay in servers and other equipment, plus continuous security and performance monitoring.

With the ClearDATA Healthcare Managed Cloud, organizations can cost-effectively store, manage and securely share their data from a single location. This offers unprecedented benefits for solving Big Health Data challenges:

- Protected health information resides in a HIPAA-compliant, HITRUST-certified environment

- New capability to store and analyze large datasets to glean meaningful insights into patient care, population health and healthcare administration

- Centralize, normalize and analyze data within the same location it is managed and stored

Healthcare is not a science problem, it's an information problem. Without a doubt, healthcare is moving to a more collaborative and shared model focused on patient outcomes. As powerful analytics are at the center of these changes, now is the time to deploy these new advances in data intelligence. A HIPAA-compliant cloud services provider offers just the right place to launch.

About Us

ClearDATA is the nation's fastest growing healthcare cloud computing company. More than 310,000 healthcare professionals rely on ClearDATA's HIPAA compliant cloud computing HealthDATA platform and infrastructure to store, manage, protect and share their patient data and critical applications.

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