

# The Healthcare Challenge

It's no surprise that healthcare organizations are challenged with massive amounts of data, including patient data, patient satisfaction scores, insurance data, billing information, patient website behavior, etc. With tightened regulations and a need to continuously improve operations and patient care, healthcare organizations are becoming even more challenged with reporting and leveraging disparate data sources.

Part of this challenge lies in the changing data landscape. In recent years, the volumes of data available have grown exponentially. Further, the varieties of this data have spanned from traditional data types, such as transactional billing data and EMR/EHR system data, to other unstructured data sources, such as sensor data, physician notes, and patient website behavior. This has created a challenge in the healthcare industry, and managing this challenge is not only costly but requires specialized IT skill sets in order to process and make use of these growing data volumes and variety. Successful healthcare organizations have learned to manage and blend all these data types in order to improve patient healthcare, resource efficiency, and financial and regulatory reporting.

In the following case studies, we highlight how some of Pentaho's healthcare customers have tackled data challenges and managed to turn the volumes, variety, and accessibility of data into opportunities that have transformed their organizations.

## Improving Quality of Care and Patient Management

Healthcare organizations can leverage the data revolution to improve quality of care and patient management. One of the ways this is achieved is by analyzing patient health history for more effective treatments and prescriptions. Other organizations have mined electronic health records and blended it with other sources of data to improve the quality of care. The challenges organizations face in



executing initiatives such as these are siloed data, data stored in multiple systems that are difficult to integrate, or a lack of an analytics tool.

The University of Oklahoma Tulsa serves uninsured individuals with chronic illnesses. The university wanted to improve outcomes and provide better preventative care. Because their data was siloed and difficult to access, the clinic was unable to monitor the effects of treatments and track vital statistics, such as blood sugar, blood pressure,

“Regardless of analysis, users know they can get anything they want, quickly and easily.”

– DARRIN BLOCKER

Decision Support Analyst, Loma Linda University Health Care

and cholesterol. As a result, they could not analyze these data points to design corrective efforts. The University of Oklahoma Tulsa turned to Pentaho in order to gather the vital statistic data and provide reporting on vital statistics post-treatment. By leveraging Pentaho, the university was able to ingest, manage, and increase visibility of these underlying data sources in an analytics tool that students and the clinic could easily access. As a result, students are now able to view how patients responded to each treatment and come up with subsequent interventions, such as frequency of clinical visits. The clinic was also able to teach this method of panel management and usage of a feedback tool to improve treatment to other programs at the university, including medical, nursing, pharmacy, and social work students.

With over 500,000 patients and 600 doctors, Loma Linda University similarly faced data availability and reporting challenges. Loma Linda was looking to make reporting available across all the departments in order to derive insights that could improve patient management. Challenged with multiple data sources and siloed data, Loma Linda wanted to set up a single version of the truth for data that was driving important decisions. They set up a central data warehouse, leveraging Pentaho to ingest and prepare data, and then offered Pentaho Business Analyzer as an analytics and reporting tool to users across the organization. Although this single source of truth was the initial use case, Loma Linda found it easy to scale to multiple use cases in the organization. The university then integrated patient data found in their Epic system with data in SAP for more detailed reporting. Since Epic did not offer a native integration with SAP, it was difficult for them to report on more advanced data than what was in Epic. The organization was able to leverage Pentaho to blend the data from these disparate systems, and in doing so, was able to take a more holistic look at quality care metrics blended with other data points for more advanced reporting. Since Loma Linda now had a way to ingest data from various sources to improve operations across the organization, the university began to

track basic event and encounter data, such as a visit times and patient satisfaction scores. Metrics such as these were blended to come up with a physician productivity score, which is used to influence physician compensation and performance. The use of data to drive strategic decision-making is not a new concept. However, obtaining the right data is becoming more and more of a challenge without modern tools and data architectures.

## Improving Resource Planning and Operations

Data can also be leveraged throughout healthcare organizations to improve the utilization of facilities, testing rooms, or equipment. At busy healthcare facilities, data can help drive operational efficiencies that improve patient flow, as well as admissions and discharges. The challenge many healthcare organizations face with doing this is, again, siloed data. On top of that, dark data – data that is being collected but not used – is not made available at critical touchpoints, meaning that there is no way for hospital staff and core decision-makers to make use of this data without a long, drawn out process of waiting for IT to prepare the data. Organizations that have been able to surface that data in more modern ways, however, have found tremendous benefit in their operations.

St. Antonious Hospital, based in the Netherlands, has six locations and treats over 500,000 inpatients and 50,000 outpatients a year. Known for their short turnaround times, St. Antonious wanted to further improve their reputation by leveraging data across the organization. They wanted to create a self-service analytics culture across the hospital so that the entire hospital staff, not just IT, could access analytics to make recommendations to streamline the hospital's processes and improve patient care. With data trapped in various siloes, St. Antonious leveraged Pentaho Data Integration (PDI) to ingest and prepare data from disparate systems more easily and quickly. St. Antonious then leveraged Pentaho analytics and Pentaho's embedded capability

“With Pentaho, Remedy Partners is addressing the changing healthcare environment by providing hospitals with real-time data to improve quality of care, efficiency and operations. We are saving health care providers over \$250,000 per day.”

– **DON SIDDELL**

VP, Application Development and QA, Remedy Partners

to integrate analytics into existing hospital systems. This put the right data into the hands of the entire hospital staff, who could then make recommendations that drove operational efficiencies. Moreover, St. Antonious built an API to comply with the international interoperability standard, HL7, and contributed the HL7 API to Pentaho’s open source community, making it available to other Pentaho users. By creating this self-service analytics culture across the hospital, St. Antonious saw recognizable operational improvements including a 20% reduction in emergency room turnaround times, greater visibility into the number of beds and operating theaters used, KPI reporting and tracking, and direct doctor access to hospital data such as organ transplant lists. With Pentaho’s end-to-end, embeddable and open, data integration and business analytics software, St. Antonious Hospital instilled a culture of continuous improvement and turned their data challenge into a data opportunity.

## Improving Financial, Regulatory, and Third Party Reporting

Aside from improved internal operations, healthcare organizations have a number of administrative departments and third party organizations that all demand accurate and timely reporting. Healthcare systems need to be readily available to report the appropriate data for timely reimbursements from patients and insurers. On top of that, much of the data needs to be integrated so that specific data points can be mined and reported for compliance or performance-based funding with government agencies or for research purposes at universities. This requires tracking clinical metrics and aggregating data from disparate systems. This also requires a strong analytics tool that can blend that data to prove to third parties that funding and reimbursements are justified.

Earlier, Loma Linda was cited for several use cases: patient care improvements, Epic reporting, and physician productivity scores. Loma Linda also uses Pentaho to manage compliance reporting for the Affordable Healthcare Act (ACA). This requires capturing and reporting on internal employee and student health plans across the university and business. The challenge was blending data from 15 unique systems, one of which was Peoplesoft, for population health management. Loma Linda achieved this by ingesting, preparing, blending, and reporting on this data using Pentaho. By blending data from Peoplesoft with the 14 other systems, Loma Linda was able to determine which segments were likely to get flagged as higher risk when reported for the ACA.

A large U.S. teaching hospital was looking to create a single view of their genomic sequencing data, demographics data, and EMR data. They wanted this data to be available to researchers and collaborators worldwide in order to accelerate scientific research. As they looked to modernize their data architectures to support this initiative, however, they were challenged with data accuracy, security, and a lack of in-house expertise for ingesting data into and extracting data from Hadoop. Further, they needed a way to easily disseminate data to collaborators and researchers worldwide. By using Pentaho, the teaching hospital was able to leverage existing in-house IT resources to ingest structured and unstructured data, such as EMR data, ontology data, and genotype data, into a Hadoop data lake. This data could easily be extracted from Hadoop using Pentaho and was made available to researchers and analysts for querying, reporting, and data mining. On a project level basis, controlled data sets were prepared and Pentaho reporting, analytics, and dashboards were made available to end users. This initiative reduced the bottlenecks for data access, as researchers and analysts were no longer constrained waiting for IT to prepare the data. Researchers

and collaborators now have access to secure, governed, blended data from multiple sources and are able to explore data correlations as desired. In addition, it is easier to report on the data for project funding through grants.

Remedy Partners, Inc. develops and manages episode payment programs for hospitals and health systems, commercial health insurers, and accountable care organizations. After Centers for Medicare & Medicaid Services (CMS) launched the Bundled Payments for Care Improvement initiative, healthcare providers were forced to focus on delivering superior quality of care in order to receive payment from CMS. However, that is easier said than done as patient data is usually spread out across a number of disparate systems. With Pentaho, Remedy Partners is able to integrate with over 900 healthcare provider systems, such as hospital systems and EMRs, to collect operational patient episode data around admissions and discharges. The company has been able to address the changing healthcare environment by providing real time patient data and reporting to over 2,200 healthcare facilities in order to improve quality of care, efficiency, and operations, which saves hospitals over \$250,000 per day on developing complex reporting in-house.

Several years ago, a major U.S. federal healthcare agency rolled out a health insurance marketplace to provide medical coverage to the uninsured. Immediately after the landmark roll-out, the agency was challenged to answer the very simple question of how many people were enrolling in the program. This was because their legacy tool could not capture newer, unstructured data sources. With two

full-time engineers on staff, the organization needed to manually code anything that had to do with unstructured data and did not have an efficient way to blend and look at all of the data to answer those simple questions. The U.S. federal healthcare agency brought in Pentaho, since the Pentaho platform enabled data integration with newer, unstructured data types without manual coding. By doing so, the U.S. federal healthcare agency was able to reduce data processing time from 27 hours to under forty-five minutes. By modernizing their data architecture to capture and report on unstructured information, which continued to grow as enrollments and other data points grew with the program, the US federal healthcare agency was able to answer the questions to justify the change in health-care policy.

#### LEARN MORE

Big data is leveraged in a number of ways in the healthcare industry – from improving quality of care and patient management to more efficient resource planning and operations, to better management of finance, regulatory, and third party reporting. Starting with a simple use case can create a data-driven culture that can have dramatic improvements to organizational processes. Over 1,500 customers, including the top healthcare organizations, rely on Pentaho to drive their strategic business decisions. Learn more at [www.pentaho.com](http://www.pentaho.com).

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