



Healthcare interoperability: Creating a clearer view of patients



For many patients, their journey through the healthcare system can be complex. It may include multiple physicians from different hospitals, clinics or practices. Each of these interactions generates critical patient data, creating a need for data exchange and interoperability across systems.¹

All stakeholders across the healthcare industry need access to different pieces of this data, and there must be appropriate controls to ensure the right information goes to the right place. Frictionless data exchange among payers, providers and vendors constitutes true interoperability — a necessary ingredient for increased patient safety and satisfaction, reduced care costs and improved care coordination.¹

While these goals are intuitive, the healthcare sector has been slow to achieve true interoperability, which encompasses not just data interoperability but semantic and syntactic interoperability as well. This three-level approach ensures data can be shared throughout the health system, in a common data language, while retaining its core meaning.

The most recent statistics show that, even in 2015, half of US hospitals couldn't electronically find patient health information from outside providers. And, even if they could find the data, roughly the same percentage were unable to electronically integrate it into their own data stores, processes and care decisions in a meaningful way.²



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Healthcare stakeholders need a clearer, more comprehensive view of patients, and cloud-based data services from Amazon Web Services are making it possible today. AWS' verified Healthcare Competency Partners have a proven track record in storing, transmitting and analyzing clinical data across the various touchpoints in the patient journey. They provide both flexibility and customization, so organizations can incorporate new tools to their existing systems, creating tailored interoperability solutions for their specific needs.

With the global network of AWS' regions and its strong support of health information exchange, health systems can break down data silos, creating a single pane of glass through which care teams can view patients' complete medical histories and care needs.

The next phase of interoperability

While much of the healthcare industry has focused solely on data interoperability, this is a narrow slice of what is possible with true interoperability. AWS is taking a broader approach. In addition to data interoperability, healthcare organizations need semantic interoperability, which ensures the meaning of the data is transferred along with the data itself, and syntactic interoperability, which requires use of a common standard and data language to make sure the data can be interpreted.

With this more advanced definition of interoperability, AWS can create custom-built solutions that provide a much clearer picture of a patient's care history and future needs, with very little work from the healthcare organization. For example, providers can determine if a patient with several diagnoses received those diagnoses in any particular order — and whether there is a significance to that order that could affect their health outcomes. Amazon Comprehend Medical, a natural language processing service for extracting medical information from unstructured text, can call up and highlight that information so care organizations can use it locally within their own systems, allowing them to realize the full value of their data.

As more healthcare organizations move to cloud-based services, they will need the ability to quickly develop, connect and run applications and services without having to build point-to-point customizations, which are not scalable and are expensive to maintain. Health Level 7 International (HL7) recently made liberating and sharing data easier with the development of Fast Healthcare Interoperability Resources (FHIR), a new standard protocol for health data exchange.⁶ FHIR's improvements over previous standards include out-of-the-box interoperability and fast, simple implementation. The FHIR specification is expected to become the next-generation standard for inter-organizational health information exchange, and healthcare companies can now build on the progress of FHIR, connecting data from specialties that use their own unique data-management techniques.

AWS' cloud services enable and secure these connections and provide a home for data exchanges, as well as the data itself. This creates an space where a variety of interoperability vendors and protocols operate and exchange data. Rather than adapting to a single, rigid option for interoperability, customers gain the freedom to work with the vendors of their choice and employ the exact service they need to provide optimal care.

Addressing unique data-management processes

Many specialties have unique data-management techniques and processes. Redox's AWS Cloud-based centralized hub addresses this issue by using standard web technologies, including a HTTP-based RESTful protocol, HTML and Cascading Style Sheets for user interface integration, and a choice of JSON or XML for data representation. With these technologies, healthcare organizations can retrieve and manipulate elements like diagnostic reports, admissions and medications using their own resource URLs.

This approach means small differences between servers are not a problem for developers, says Redox software developer Nicholas Hatt. **"Our API is based on our customers' immediate needs."**



Flexible, custom solutions with API Gateway

Amazon API Gateway is a service that allows developers to create, publish, monitor and secure APIs easily at any scale. Some of AWS's healthcare customers are using API Gateway to build innovative solutions that help healthcare organizations share data. Change Healthcare, for example, launched a service on AWS in February 2019 that allows for the free exchange of medical records between healthcare facilities.³

With access to lab results from other hospitals and previously siloed patient-history data, physicians are now able to avoid costly duplicate testing, diagnose patients more easily and initiate treatment faster. Change Healthcare's clinical data interoperability services also give patients improved access to their medical records by aiding in document retrieval, identity management and record location.



Cloud data storage: Added value brings better insights

As much as 80% of all information about a patient resides in unstructured data,⁴ but that data is useless for patient care unless it is standardized and normalized to ensure the organizations sharing with each other are speaking the same language. For example, "HTN" in one system must be correctly mapped to "hypertension" in another. Services like Amazon Comprehend Medical can translate previously unusable, unstructured data — such as from physician notes — into usable insights that can inform clinical decision making. Machine learning can bring additional value to this data, allowing healthcare organizations to draw deeper insights from their troves of patient information. The Philips HealthSuite digital platform, hosted on AWS, stores and analyzes 15 PB of patient data gathered from 390 million imaging studies, medical records and patient inputs — and the team is adding as much as 1 PB of new data per month.⁵

“They are now able to experiment on that data using machine learning to create clinical and operational models,” explains Wilson To, Worldwide Head of Healthcare Business Development at AWS. The insights gleaned from the data are helping providers identify at-risk patients, deliver timely and definitive diagnoses, and develop customized, evidence-based treatment plans with the highest likelihood of success.

All of these improvements can be achieved without creating technical debt for a hospital or health system. Products such as AWS Lambda, which allows health systems to run code without provisioning or managing servers, enable organizations to operate complete data frameworks without having to allocate any onsite server resources or pay for on-premise infrastructure.

“That can be a tremendous asset to healthcare organizations that are often sitting on legacy systems that they’d like to update and modernize but are unable to,” says Pat Combes, Worldwide Technical Leader for Healthcare & Life Sciences at AWS.



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Security: PHI is safer in the cloud

Sharing of protected health information inevitably raises questions about security. However, what initially may have felt counter-intuitive to some security professionals is now widely understood to be true: storing, processing or transmitting data to the cloud actually makes it safer than it was on premises. Stringent security controls — including HITECH and SOC certifications — become shared resources that are accessible to everyone who stores data in the cloud.

AWS released more than 1,900 new features last year alone. That pace of innovation cannot be matched by healthcare organizations on a local level. And specific to patient data, more than 100 of AWS’ key services have also been made HIPAA-eligible. With the additional designation, health systems can now safely use them for the storage, processing and transmission of protected health information.

Achieving broader interoperability

More and more healthcare organizations are recognizing the benefits of cloud-based interoperability. However, a one-size-fits-all service will not bring all of the insights that can help providers truly transform care. Health organizations need large-scale systems to store their data, next-level interoperability and the flexibility to design their own custom solutions for specific data-sharing initiatives and to integrate those solutions with their existing systems. These goals are easily achievable by partnering with AWS.

In its proposed definition of interoperability, released in March, the Healthcare Information and Management Systems Society underscores the need for both a global approach to data sharing and an organizational commitment to building the framework to support it.⁶

The all-in, highly scalable model delivered by AWS is one pathway to achieve this aspirational vision. Further, as more organizations move to the cloud and embrace interoperability, they shift from a system-centric view to a patient-centric view. This fundamental shift is what will ultimately deliver meaningful improvement in care decisions and overall patient outcomes.



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