



# **The New Outlook of Healthcare Interoperability**

**Changing Landscape of Care Connectivity in the New Normal**

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## Executive Summary

Healthcare data sources are multiple, ranging from EHRs, claims, billing, and practice management systems to financial systems and hundreds of other devices. Ever since its advent, data in healthcare has become an important entity, revealing over six million letters of genome sequences, to make precision medicine a reality. Yet the most fundamental and long-term goal remains out of reach: interoperability between healthcare organizations. What's needed is a scenario where information flows seamlessly between healthcare organizations, and every provider, payer, patient, and system has access to relevant information when it is needed.

### Key Challenges

- Electronic health records have been around for more than 30 years, and as of 2008, only 38% of office-based physicians were using them.<sup>1</sup>
- In a survey of hospitals and health systems, 69% of respondents said that they are able to share data within their own health system efficiently.<sup>2</sup>
- When it comes to sharing health data with other providers, payers, and patients, the adoption of interoperability-driving technologies has been sluggish.
- Although data exchange standards and regulatory incentives have encouraged healthcare organizations to improve interoperability and ensure data sharing, data inconsistencies and quality issues persist.
- Information blocking in healthcare is another challenge to achieving true interoperability.

## Recommendations

This document is a holistic report on healthcare interoperability and reviews the current landscape in detail. It discusses the importance of interoperability in advancing patient-centered care, its brief history in the U.S. healthcare domain, and a comparison with other industries.

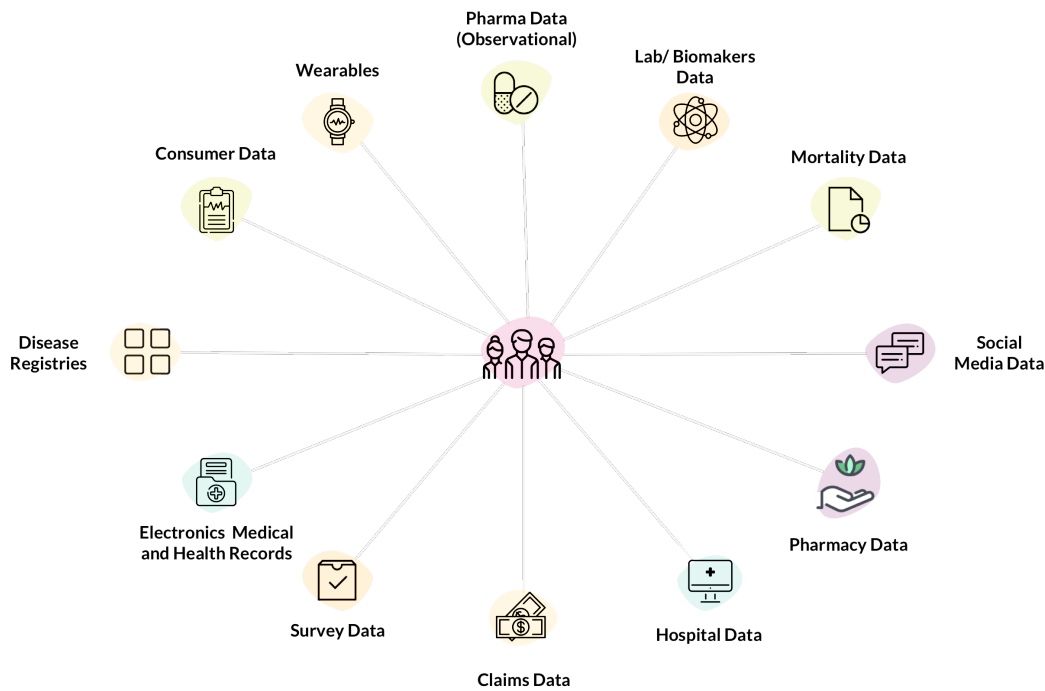
- Based on the insights obtained from the report, healthcare leaders, especially CIOs, should focus on the following aspects to create a strong IT strategy:
- Establish a common set of interoperability principles, behaviors, and performance requirements for the vendor community to drive open HIE and a data-centric architecture.
- Leverage a strong FHIR-enabled healthcare data platform to transform data management strategies and drive efficient population health management.
- Adopt an FHIR-enabled healthcare data platform built on a care-as-one framework that enables payers and healthcare organizations to comply with the latest CMS regulations, while ensuring true consent management and secure information sharing.

## Distributed Data in Healthcare and its Implications

In an evolving data-oriented healthcare system, patients receive care across multiple avenues. The patient's medical information, visit history, lab and studies records, and events of admission, transfer, and discharge are distributed across the care continuum and stored in multiple disparate data systems. Even during a single hospital stay, one patient has many contact points, and crucial patient data is available from multiple systems— from medical devices to imaging systems to wearables.

### How Did Data Connectivity Get Out of Hand?

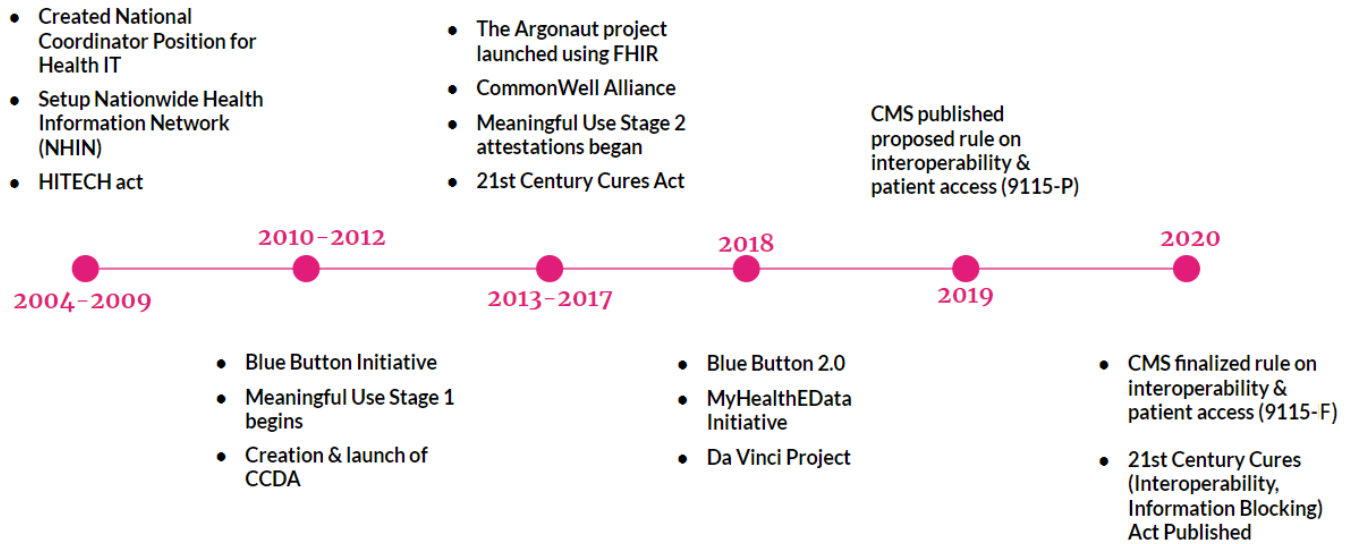
Healthcare in the U.S. stands at an estimated worth of over \$3 trillion<sup>3</sup> and produces about 30% of the world's data. The amount of data generated from lab tests, medical images, patient profiles, genome sequences, electrocardiograms and other studies, biopsies, patient encounters—to name a few—is overwhelming. Add that to the data from EHRs, claims, billings, prescriptions, research, and we have a data yield around some 750 quadrillion bytes every day.<sup>4</sup> Yet in a recent survey done by a healthcare alliance, 95% of healthcare providers said interoperability challenges limit their ability to transfer data from one medical center to another.<sup>1</sup>



Multiple Healthcare Data Sources

EHRs and other data systems have been created over time with different architectures and data schemata. When this was done on a smaller scale, and the information had to be exchanged within an organization, data from different brands of EHRs was easier to put together. Today, even though more than 78% of office-based physicians use a certified EHR to collect and store patient data and 9 out of every 10 physicians have an EHR<sup>4</sup>, only 41% of them are able to share this information across organizations.<sup>5</sup> Some physicians using an EHR still use localized, server-based platforms with no connectivity. Reworking EHR implementation is not possible, as the setup is a cost-prohibitive initiative, requiring an initial investment of almost \$33,000 per physician in mere implementation, with an additional \$17,000 per physician annually.<sup>6</sup>

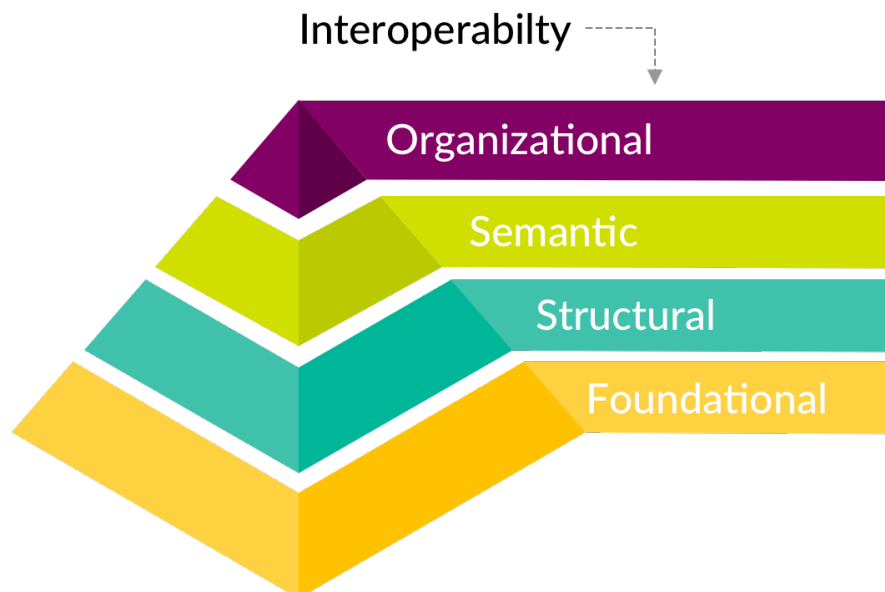
## The Journey from Paper to Digital Records



## A Brief Journey of Healthcare Interoperability

### A Quick Look at the Interoperability Concepts

Healthcare Information and Management Systems Society, Inc. (HIMSS) has defined four levels of healthcare interoperability:<sup>7</sup>



Levels of Healthcare Interoperability

Each level of healthcare interoperability can be understood from the following table:

| Foundational<br>(Level 1)   | Foundational<br>(Level 1)  | Foundational<br>(Level 1)   | Organizational<br>(Level 4)  |
|---|--|---|--|
| Establishes the inter-connectivity requirements needed for one system or application to securely communicate data to and receive data from another. | Defines the format, syntax and organization of data exchange including at the data field level for interpretation. | Provides for common underlying models and codification of the data including the use of data elements with standardized definitions from publicly available value sets and coding vocabularies, providing shared understanding and meaning to the user. | Includes governance, policy, social, legal and organizational considerations to facilitate the secure, seamless and timely communication and use of data both within and between organizations, entities and individuals. These components enable shared consent, trust and integrated end-user processes and workflows. |

Table 1: Levels of Interoperability

## Where Do We Stand in Terms of Achieving True Digital Record Connectivity?

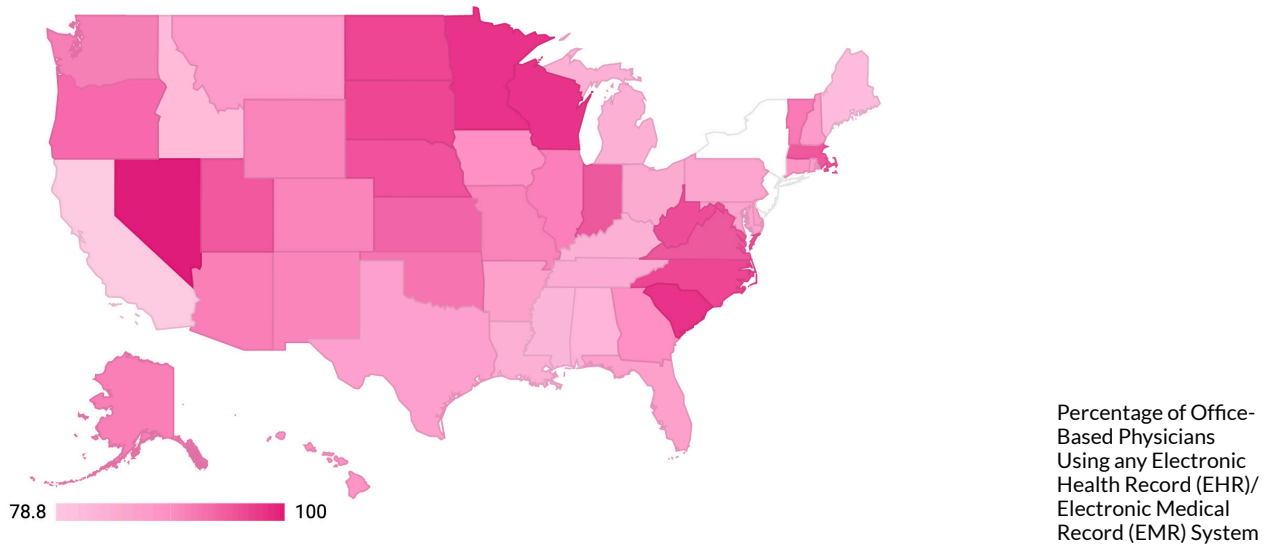
The Office of National Coordinator for Health IT (ONC) has been explicit in its push towards interoperability, from providing a roadmap to interoperability<sup>8</sup> to offering grant funding to entities involved in the governance of health information exchange.

### State-wise Analysis of EHR Adoption

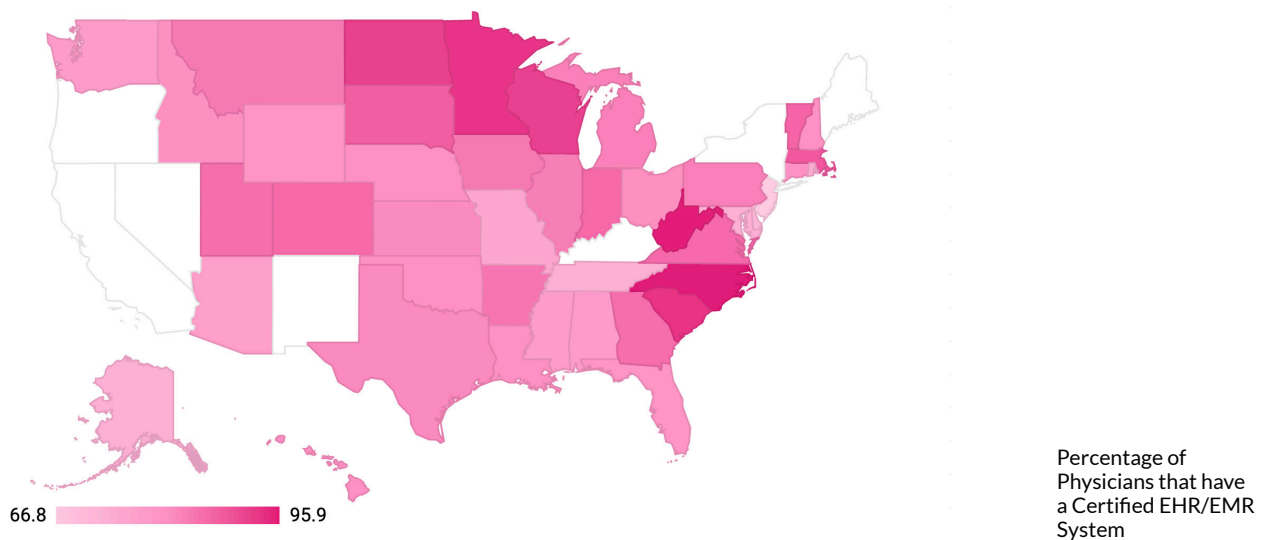
The Centers for Disease Control and Prevention (CDC) conducted a National Electronic Health Records Survey in 2017 to identify the percentage of office-based physicians using any Electronic Health Record (EHR)/Electronic Medical Record (EMR) system and physicians that have a certified EHR/EMR system.



Based on the survey, it was identified that the state of Nevada was best, in terms of EHR adoption, while the state of California had a lot of catching up to do.<sup>9</sup>



On the other hand, the state of North Carolina is leading in the field of deploying certified EHR systems while New Jersey is at the last in this race.





## What is the Culture of Interoperability in Other Domains?

Interoperability is not a new term coined by healthcare professionals. Other industries were also fragmented in their initial days. For instance, booking a simple travel expedition was initially very difficult. When people wanted to take a cruise, first they had to book the cruise on their own, then they had to call a travel agent to get a hotel for the night before the trip, then they had to book a flight, and the worst part was that they also had to worry about getting a connection between the airport and the cruise terminal. The customers were left to do everything on their own. But the million-dollar question is, how did all of this change?

## The Birth of Connectivity in the Travel Industry

The efforts toward achieving connectivity in the travel industry began decades ago to address the above-mentioned problems. In 1999, these efforts got their major push when a consortium of travel companies—including air, hotel, car rental, and supporting software companies—came together with a primary focus on the creation of electronic message structures to facilitate communication between the disparate systems in the global travel industry. To that end, they founded the OpenTravel Alliance (OTA).

The driving force behind the adoption of an XML standard throughout the travel industry was the hope of eliminating one of the major impediments blocking a full conversion to electronic tickets. Before the creation of OpenTravel messaging, passengers with electronic tickets had to wait in line to receive a paper ticket from their initial airline if a flight was canceled, and they wanted to try to switch to another carrier. In addition, airline employees would need to fill out a handwritten flight interruption manifest for each ticket holder looking to rebook elsewhere. The adoption of an industry-standard setup based on XML allowed electronic tickets to be automatically transferred to another airline's system.<sup>10</sup>

## **What is the New Landscape of Healthcare Interoperability with APIs and New Regulations?**

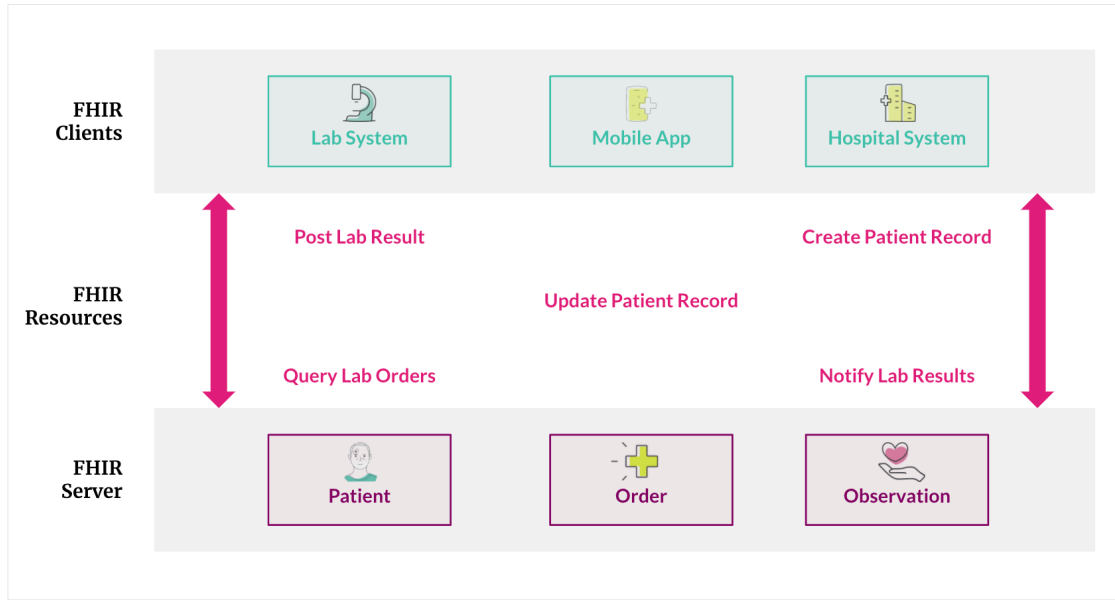
Like many other industries, healthcare can leverage modern technology powered by digitization to bid adieu to data interoperability challenges. While other industries have already benefited from the rise of technological advancements, healthcare clearly has some catching up to do. The COVID-19 pandemic has only played as a catalyst to the situation. With few folks coming to hospitals and rising focus on virtual care, interoperability emerged as one of the most important key pieces of healthcare in the new normal.

Digital disruption, in any industry, comes in waves. Consider, for example, application programming interfaces or APIs. Today, consumer technology runs on modern APIs. We have all heard that APIs play a big role in health IT interoperability, and with phrases such as "Blue Button 2.0" and "21st Century Cures Act," it's time we heard the real story behind APIs and ascertained the best way to move forward.

### **The Importance of APIs and FHIR in Healthcare**

Application Programming Interface (API) is redefining the accessibility of information in the healthcare ecosystem. Such APIs enable systematic data exchange and flow across fragmented operations in the healthcare framework. They are helping to provide safe and protected data reciprocity between the appropriate parties, not only ensuring the availability of relevant clinical information at the point of care but also delivering unified data to beneficiaries for informed planning and that too in record time.

The Fast Healthcare Interoperability Resource (FHIR) is one of the most important data standard developed by HL7, a healthcare IT standards body. FHIR uses uniform API standards and allows developers to create and customize plug-and-play applications. These apps can be plugged into any data system and will feed information directly into the provider workflow, eliminating the gaps and pitfalls inherent in a document-based exchange. FHIR has a data-level access approach and offers access to even granular data.



### What Does FHIR Mean for Providers and Patients?

Several federal agencies, including the Office of the National Coordinator for Health (ONC), have great expectations from FHIR. The instances and applications are limitless, and FHIR is all set to counter significant challenges like improving patient engagement, developing robust care management programs, designing population health initiatives, and offering valuable insights at the point of care.

Several value-focused organizations and health IT vendors are using FHIR to expand their population health management approach. They can create specialty-specific information exchange programs that connect disparate data sources and offer providers real-time data access to enhance clinical decision support. Along with improved patient engagement, reduced cycle time, and easy data exchange, providers can leverage FHIR to enable patient access to information under the guidelines of Meaningful Use and the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA).

As for patients, FHIR solves the issue of having to negotiate multiple portals to contact and provide information to their providers. Situation-specific, granular FHIR programs can perform analytics on acquired patient health information from EHRs, wearable devices, glucose monitors, and fitness trackers, and deliver a holistic view of all medications, episodes, and provider interactions. Patients can access this complete holistic record, share it among their providers, and interact with it to improve care management.

## **How Does the Final Interoperability Rule Establish New FHIR and API Standards for Smooth and Efficient Data Exchange?**

To empower patients and improve data exchange arrangements, the U.S. Department of Health and Human Services Office of the National Coordinator for Health Information Technology (ONC) and Centers for Medicare and Medicaid Services (CMS) have issued two rules under the 21st Century Cures Act. The rules support increased interoperability, with a strict ban on data-blocking practices, and facilitate patient access to electronic health information.

### **Secure Data Exchange with Standard-Based APIs and OAuth 2.0 Protocol**

The ONC rule has made it mandatory for CMS regulated payers - specifically, Medicare Advantage (MA) organizations, Medicaid Fee-For-Service (FFS) programs, CHIP FFS programs, Medicaid managed care plans, CHIP managed care entities, and Qualified Health Plan (QHP) issuers on the Federally-facilitated Exchanges (FEEs), excluding issuers offering only stand-alone dental plans (SADPs) or Federally-facilitated Small Business Health Options Program (SHOP) plans to share electronic health data with patients, which will enable them to participate more in their healthcare decisions. Members should be able to link any third-party application with their integrated health plan information and EHR data through a standards-based application programming interface (API). Because they will have access to their personal health data, patients can better assess their care and be empowered to change providers if they aren't satisfied. Patients can even change plans if the care experience does not meet their expectations.

However, transmitting information across third-party platforms, especially sensitive healthcare data, needs the utmost caution. The rule puts privacy and security concerns to rest by compelling APIs to leverage the highly secure protocol, OAuth 2.0. ID Connect, an overlay developed for the OAuth 2.0 protocol, which allows authentication of health plan member information utilizing an authorization server.

## ONC Health IT Certification Program Criteria: Supporting FHIR Release 4.0.1

The use of the HL7 Fast Healthcare Interoperability Resources (FHIR) Release 4 standard is mandatory under the new rule. The certified API technologies will be required to support FHIR Release 4.0.1. The latest FHIR standard released offers many improvements from the previous one. Nearly 3,000 changes were made in the FHIR R2 to come up with the fourth release. FHIR R4 supports RESTful architectures and ensures seamless information exchange through documents and messages. Built on an evolutionary development pathway from HL7 Version 2 and CDA, it allows their standards to co-exist and even support each other.

The new rule has put an end to information blocking and anticompetitive practices that may have been followed by health IT vendors, provider health information exchanges, and healthcare networks. It lays out the new regulations to stop data blocking while listing the exceptions for actions that will not be regarded as such.

To strengthen the interoperability proposition, the rule further mandates that EHRs feature the clinical data necessary to explore new avenues of care delivery. Through the core data classes and elements of the U.S. Core Data for Interoperability (USCDI), clinical information such as patient medications, procedures, tests, and even vital signs can be shared.

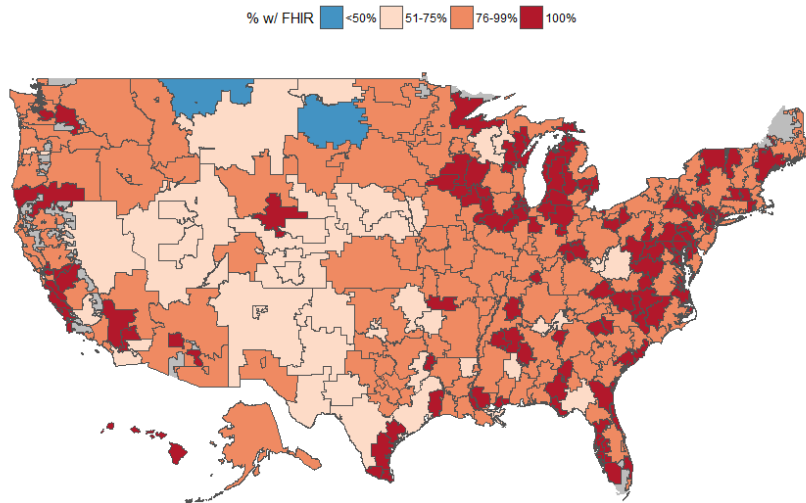
## Catching-Up With FHIR: Where Does Healthcare Stand?

Overall, we find that health IT developers serve almost 87% of hospitals and 69% of Merit-based Incentive Payment System-eligible clinicians with products certified to any FHIR version. When estimated for just FHIR Release 2, the hospital percentage remains the same while the clinician percentage drops a bit to 57%.<sup>12</sup>

In 2018, Health IT Buzz analyzed how health IT developers used FHIR to meet 2015 Edition certification requirements using CMS and ONC data. Additionally, they assessed how hospitals and clinicians' access to 2015 Edition certified-APIs vary across the U.S.<sup>13</sup>

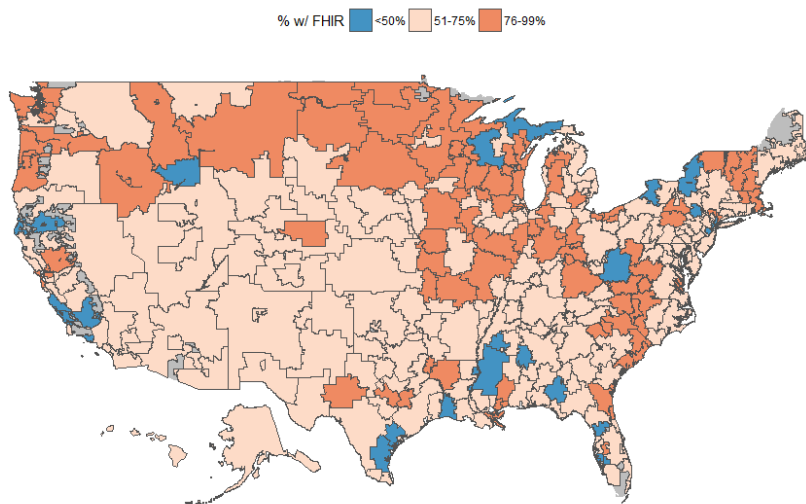
Based on this analysis, it was identified that:

- Approximately 32% of the health IT developers certified to § 170.315(g)(8) (Application access—data category request) published that they are using FHIR, specifically FHIR Release 2
- Nearly 51% of health IT developers appear to be using a version of FHIR combined with OAuth 2.0



Source: CHPL; Medicare EHR Incentive Program  
 Notes: (1) gray areas = HRR with no hospital; (2) The most recent attestations to the Medicare EHR Incentive Program were used to determine EHR installations for all hospitals. These attestations may not reflect the most currently installed technology for all hospitals. In some cases, %'s may be underestimated for HRRs.

Percentage of Hospitals with a 2015 Edition Certified-API Enabled with FHIR-By Hospital Referral Region



Source: CHPL; Medicare EHR Incentive Program  
 Notes: (1) gray areas = HRR with no clinicians; (2) The most recent attestations to the Medicare EHR Incentive Program were used to determine EHR installations for all clinicians. These attestations may not reflect the most currently installed technology for all clinicians. In some cases, %'s may be underestimated for HRRs.

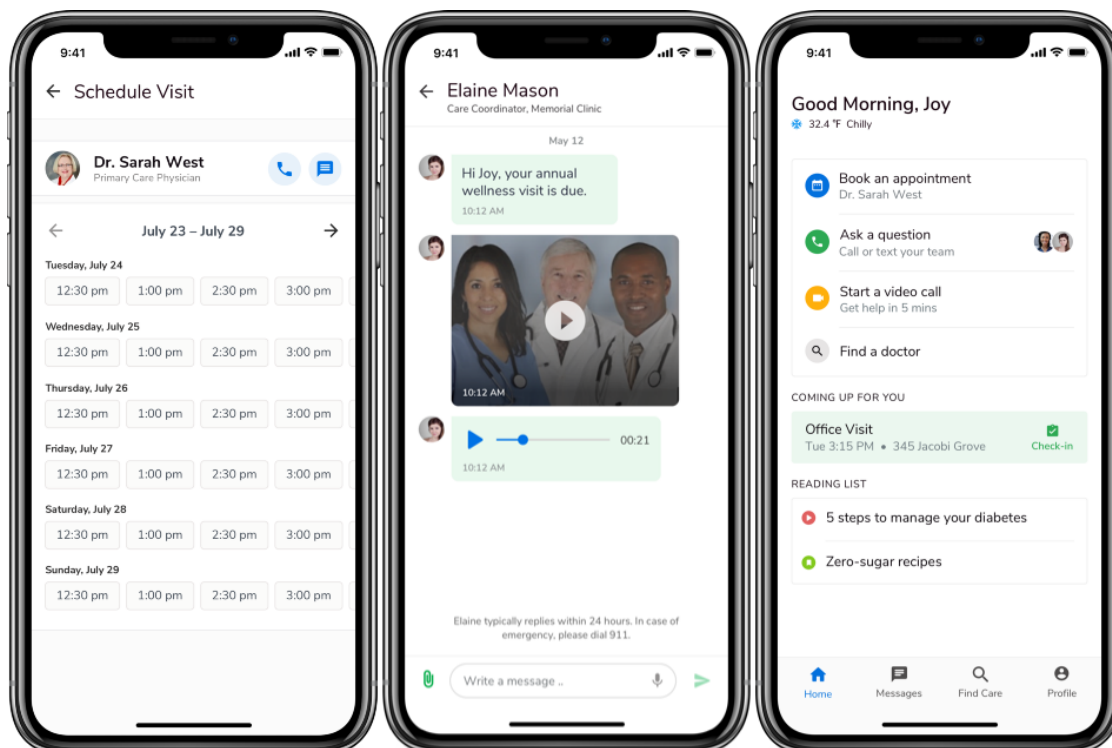
Percentage of Clinicians with a 2015 Edition Certified-API Enabled with FHIR-By Hospital Referral Region

## Mapping out the Future of Healthcare Interoperability with the FHIR-enabled Data Activation Platform

**“Healthcare providers and technology developers may have powerful economic incentives not to share electronic health information and to slow progress towards greater data liquidity.”**

Don Rucker, MD, National Coordinator for health I.T.

In the coming years, the momentum of patient-centered care delivery will intensify. Getting providers and payers to work together to provide patients access to their healthcare data will substantially improve care and utilization management functions. Giving control of the healthcare journey to patients through an FHIR-enabled Data Activation Platform will reduce the number of unnecessary tests and procedures and the pressure on medical resources, thereby driving more efficiency in the healthcare system.

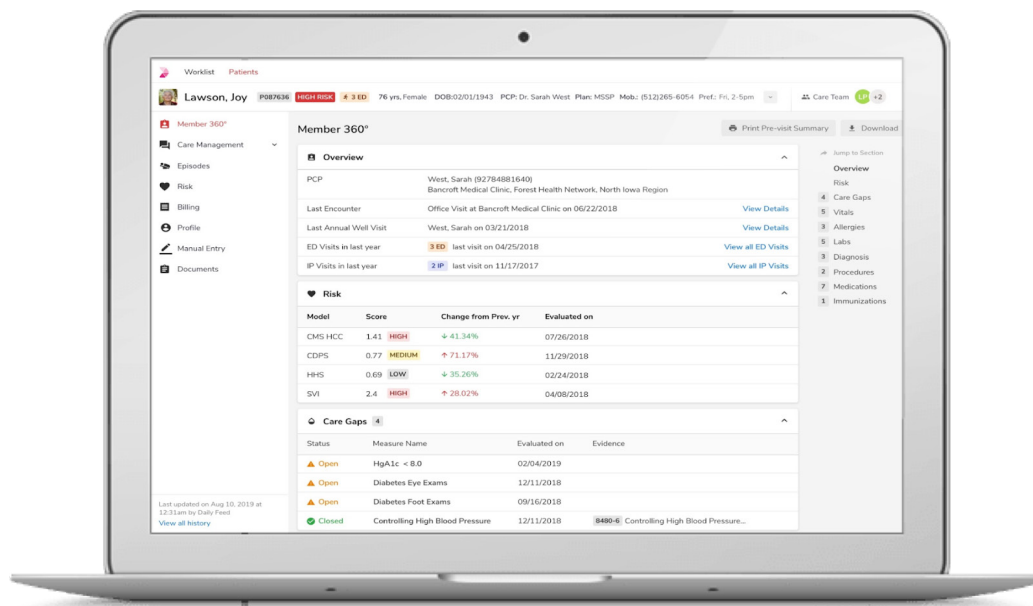


Building Connectivity  
with a Truly FHIR-  
enabled Interoperable  
Data Platform



## Enabling Transparency in Data Exchange

In many EHR contracts, providers are prohibited from sharing certain information related to the EHRs, which includes screenshots or videos. In some cases, providers only perceive that they are not allowed to share such information, even though they don't actually have a legal obligation if they do so. ONC's final interoperability rule has laid out updated certification requirements that ensure providers using certified health IT can share information about usability, user experience, security, and interoperability. EHR users can even share relevant videos and screenshots; however, there are still certain exceptions.



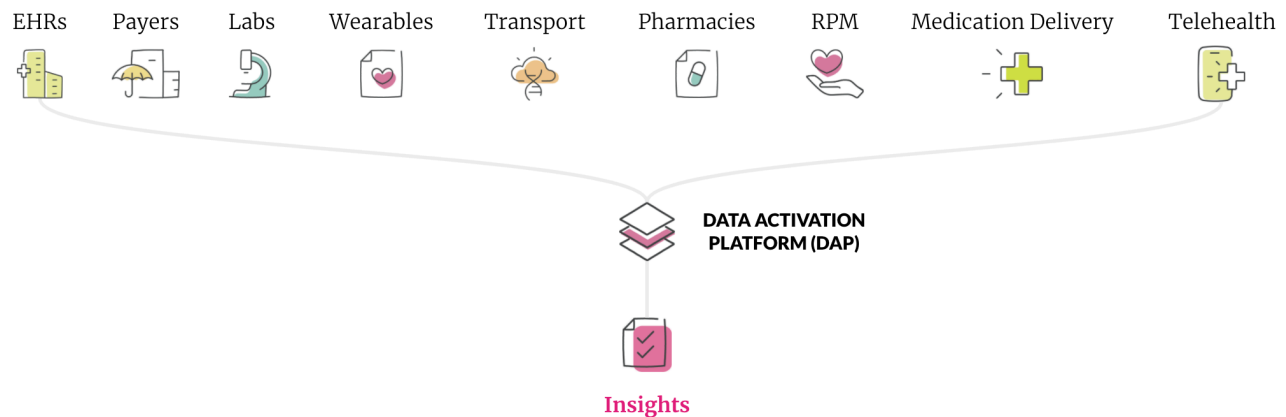
How a Truly Interoperable Platform Helps in Getting a 360-degree View of Patients

## Data Sharing Through Electronic Notifications

Smooth exchange of patient data between different providers, practitioners, and facilities is also critical to providing excellent care delivery. The final ONC rule has mandated the adherence to new Conditions of Participation that enable better care coordination and improved outcomes. When a patient is admitted, transferred, or discharged, Medicare- and Medicaid-participating providers are required to share the relevant data with the medical team assuming care of the patient through electronic notifications. This will ensure timely care delivery, fewer bounce-back admissions and medication errors, seamless follow-ups, improved outcomes, and ultimately, it will lead to increased patient satisfaction. While this has appeared as an interoperability mandate, it will benefit health plans and their provider networks, enabling them to achieve better results and reduce network leakage.

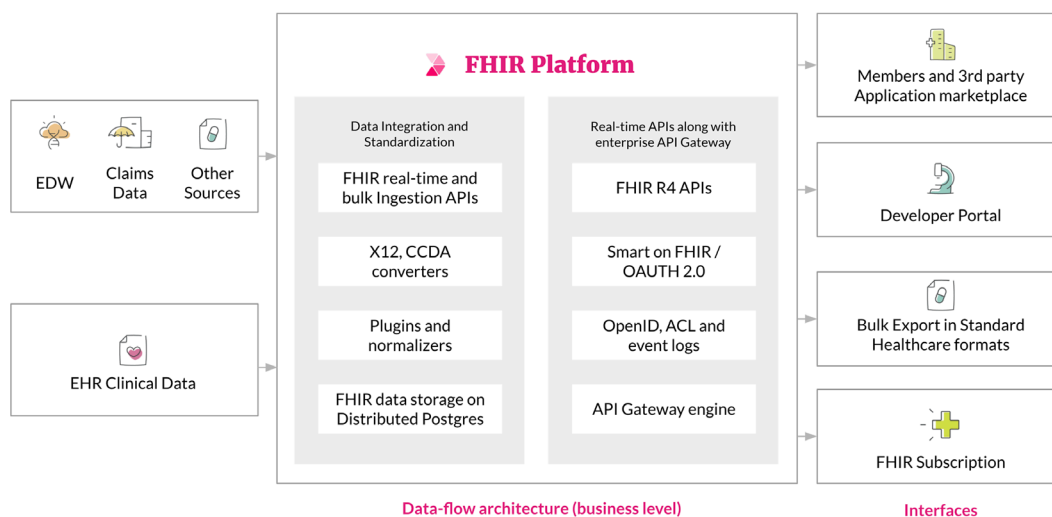
## How Does Innovaccer's FHIR-enabled Data Activation Platform Address the Interoperability Challenges?

Innovaccer can help healthcare organizations achieve true interoperability and have greater access to healthcare data with its one-of-a-kind FHIR-enabled Data Activation Platform. The platform provides the capability to connect to various third-party data sources/vendors, pull that data into our data activation platform (or application platform), and eventually process and expose that data to various applications. Examples of such third-party data vendors could be wearable devices such as Apple Watch or Remote Patient Monitoring Devices such as Vivify.



Innovaccer's Data Activation Platform Ingests Data from Every Source to Generate Insights

### How does the FHIR-enabled Data Activation Platform Function?



FHIR-enabled Data Activation Platform

## Features of the FHIR-enabled Healthcare Data Platform

### **FHIR server**

HL7 FHIR 4.0-compliant RESTful APIs with parsers for HL7, CDA, X12, XML, fixed-width (CCLF) to leverage clinical, financial, and administrative data

### **FHIR applications**

The most advanced FHIR applications to engage all stakeholders — provider network, members, employers, and payer team members

### **FHIR resources and Smart on FHIR**

Extensive support for R4 FHIR resources to address all of your interoperability challenges, as well as support for OAuth 2.0, OpenID Connect, and Smart Launch

### **Enterprise-grade security**

Fulfills network security, authentication, and authorization, ACL, HIPAA, and other compliance requirements with years of maturity

### **Full-feature analytics suite**

Activated data leveraging is highly customizable with extensible analytics and interactive dashboards, including pre-built views and measures engine

### **Pre-built, rich integrations**

One-click integrations with Stripe, Twilio, Patient Ping, Aunt Bertha, and more than 65 pre-built EMR connectors, enabling rapid speed to value

### **De-identification engine**

PHI/PII data is de-identified for a secure, interactive developer environment

### **API gateways**

Complete control of your platform through an intuitive administration interface, including usage monitoring, traffic management, and IPs prevention

## **FHIR-enabled Data Activation Platform Supports All Healthcare Stakeholders**

The FHIR Healthcare Data Platform supports critical FHIR API resources and enables the most efficient implementation to solve multiple data-exchange challenges for providers and payers. With more than 65 pre-built connectors to electronic health records and more than 200 connectors to information technology vendors, the data platform ensures real-time integration without additional engineering requirements.

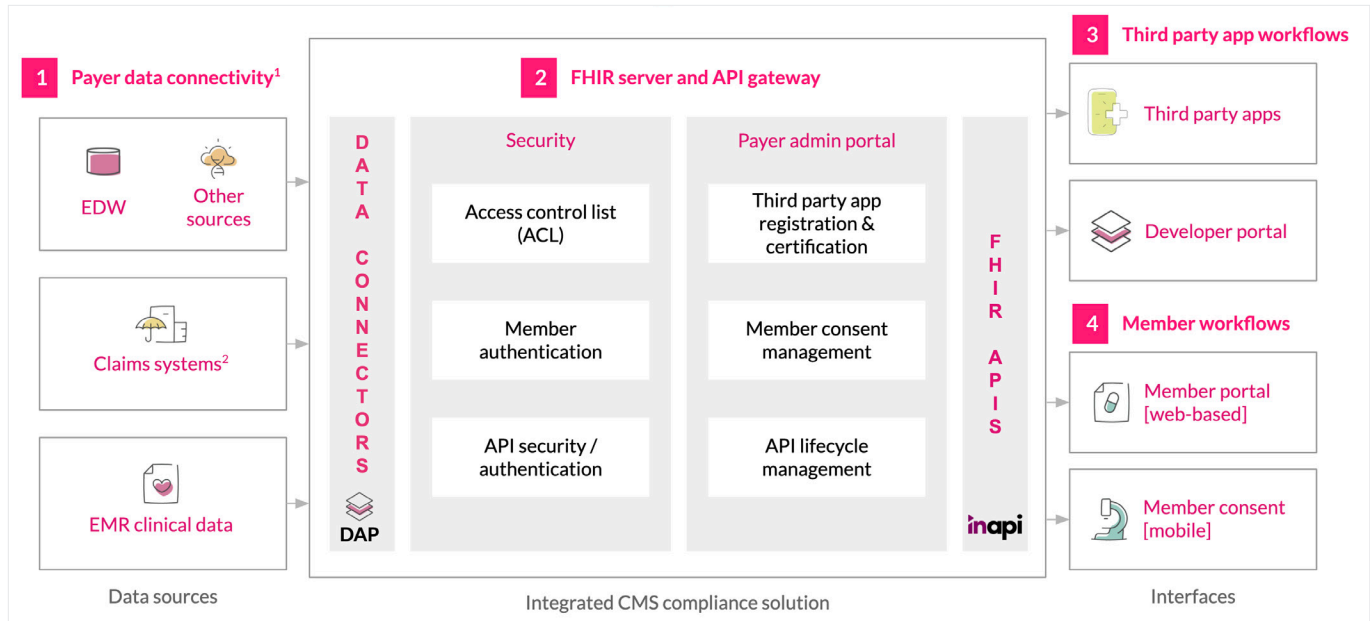
The platform is HIPAA-compliant and provides enterprise-grade security for data exchange by enabling secure connections through OAuth 2.0 and Smart on FHIR authorization protocols. Additionally, the platform supports a real-time interactive developer and sandbox environments with de-identified data to build FHIR applications rapidly.

The open framework of the FHIR-enabled Healthcare Data Platform enables a plug-and-play integration with other components and services with little to no coding required. The platform provides a rich set of capabilities, from scalable FHIR APIs, an optimized FHIR data lake, a best-in-class API gateway, and cloud infrastructure, among other features. This comprehensive FHIR Healthcare Data Platform supports a large network of FHIR connections enabling healthcare organizations to care as one.

The platform complies with the latest version, FHIR v4.0.1, and includes more than 400 search parameters and more than 800 analytical enrichments to clinical and claims data. The breadth of data the platform provides allows it to serve as a foundation upon which custom applications can be designed and built by any healthcare organization.

## **Cloud-based CMS Compliance Solution Enabling Payer Interoperability and Patient Data Access**

Despite the shift in compliance deadlines due to the pandemic, payers have already begun plans to meet regulatory mandates and achieve true interoperability. Innovaccer's CMS Compliance Solution allows payers to benefit from interoperability sooner and reap an early adoption advantage. The cloud-agnostic solution is compatible with Microsoft Azure and Amazon Web Services (AWS) and delivers rapid speed to value.



Innovaccer's CMS Compliance Solution

The key characteristics of the solution's member portal include:

### Authentication Process

The member portal has enabled an authentication process to ensure that only members or designees can access only the required data. Our presumption is that this authentication would leverage the Alliance's existing member authentication (as opposed to having members and their representatives create new logins/passwords for CMS compliance needs).

### Consent Management

Members will be able to manage their consent at a granular level with the ability to change or withdraw consent at any given point of time. Granular consent includes the ability to configure consent beyond binary Yes/No to make specific selections on personal information and sensitive healthcare information (e.g., specific diagnoses).

### Information Access

The Alliance's members will have direct access to their claims and encounter-based information with the member portal, covering all required data elements per the Patient Access API. Innovaccer's platform can be configured with existing member portals, wherein the provisioned user accounts can be synced with Innovaccer's platform using Single Sign On (SSO) capabilities through SAML protocol.

## **Powering Innovation in the New Normal of Healthcare Interoperability**

Enabling patients to take control of their healthcare journeys is a great way to fulfill quality and cost objectives while accelerating the value-based care movement's momentum. CMS will add more fuel to this movement. Beginning on April 1, 2022, states will be required to share Medicare and Medicaid enrollment data with beneficiaries daily. Not only will the accessibility of this data ensure better care coordination for the member population, but it will also allow patients to monitor the services they receive and the costs they incur. These rules will eventually weed out inefficient practices and establish cost transparency and fair competition in the healthcare space.

## About Innovaccer

Innovaccer, Inc. is a leading San Francisco-based healthcare technology company committed to making a powerful and enduring difference in the way care is delivered. The company leverages artificial intelligence and analytics to automate routine workflows and reduce manual overhead to facilitate more person-centered care. Its KLAS-recognized products have been deployed all over the U.S. across more than 1,000 locations, enabling more than 37,000 providers to transform care delivery and work collaboratively with payers. Innovaccer's FHIR-enabled Data Activation Platform has been successfully implemented with healthcare institutions, private health plans, and government organizations. By using the connected care framework, Innovaccer has unified records for more than 24 million members and generated more than \$600M in savings.

For more information, please visit [innovaccer.com](https://innovaccer.com).



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