White Paper

The reality of healthcare interoperability

A focus on standards common to all networks

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Executive summary

Healthcare costs are rising because the U.S. healthcare system is complicated, fragmented, and outdated. Our system of healthcare was not purposefully designed to deliver care. Rather it emerged from the interactions of stakeholders with misaligned or, in some cases, conflicting incentives.

Today, we feel the impact of uncontrolled costs, and we now have a critical mass of patient data stored electronically. This gives us both the motivation and the means to begin modernizing the healthcare system.

This document outlines the problems U.S. employers face; why seamless data exchange among disparate networks is central to the solution; and the interoperability problems we must solve. In the following pages, we'll discuss:

○ How U.S. employers bear a large burden of private healthcare spending to cover their employees

○ Why data is key to managing healthcare costs, and why special effort is needed to move data between networks

○ How a focus on data standards common to all networks allows healthcare organizations to focus on making the right connections among disparate networks

### Employers face unsustainable healthcare costs

Healthcare spending, particularly in the U.S., is growing at an unsustainable rate. Whereas healthcare represented about 6% of the U.S. GDP in 1970, today it accounts for nearly 20%. Spending is somewhat lower in other OECD countries, but growth rates for healthcare costs are a problem globally[1].

An interoperability strategy relies on broad capabilities and flexible tools to overcome the variety of different connection types that need to be established.
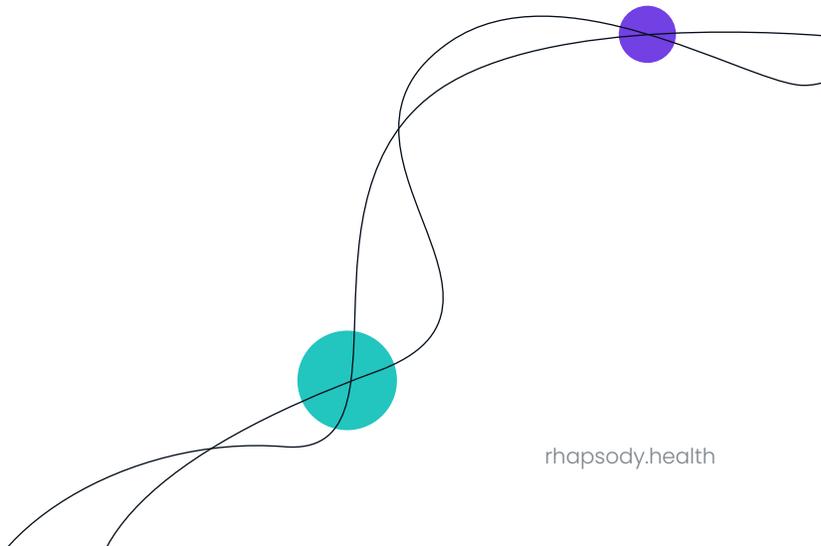
Since 1980, the gap has widened between U.S. health spending and that of other countries

Health consumption expenditures as percent of GDP, 1970–2017
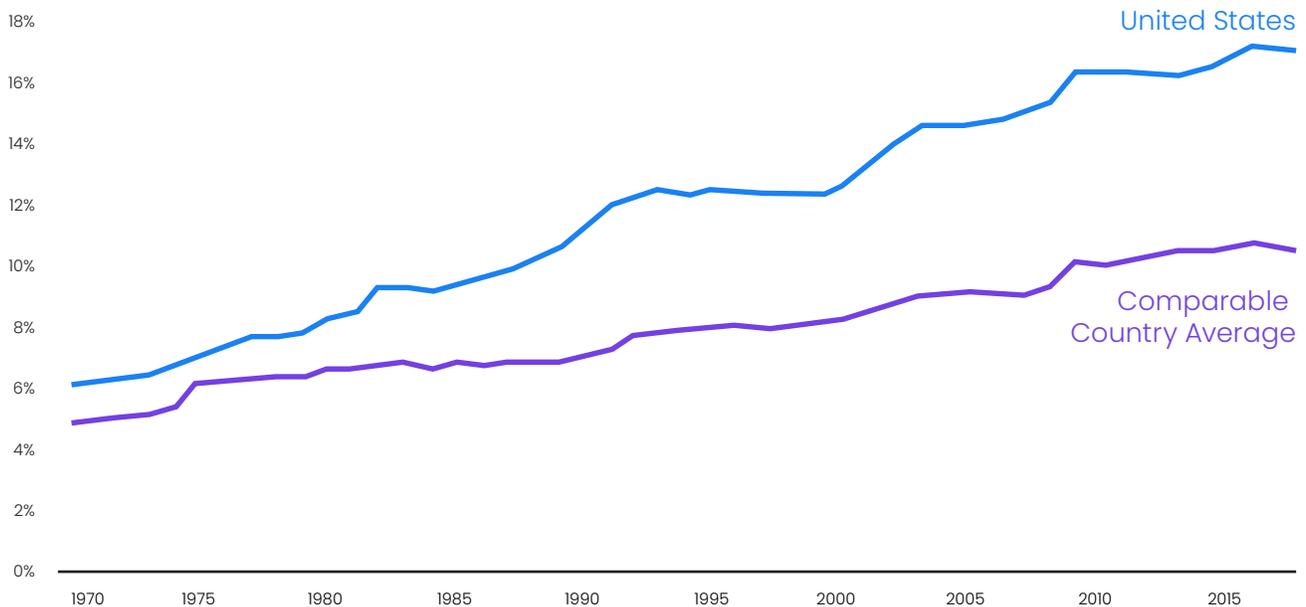
Notes: U.S. values obtained from National Health Expenditure data.
Health consumption does not include investments in structures, equipment, or research .

Source: KFF analysis of OECD and National Health Expenditure (NHE) data

Data recently released by Centers for Medicare and Medicaid Services (CMS) show that healthcare spending in the U.S. amounts to $3.6 trillion[2] and is projected to reach $6 trillion by 2027[3].

Digging deeper into the data, we see that the total healthcare spending is the sum of public spending — that is, insurance coverage provided by the government — and private spending — that which is provided by private health plans. In the U.S., private healthcare is largely paid for or subsidized by employers as a benefit to their workforce.

Healthcare spending (as a percentage of GDP) from public sources in the U.S. is reasonably consistent with that of other countries[4]. The disparity lies in private healthcare spending. Spending from private sources in the U.S. is triple the rate of comparable countries, which implies that employers in the U.S. are facing a much larger burden compared to organizations elsewhere in the world.

Challenged with rapidly increasing health insurance costs, employers with large workforces in the U.S. are finding they need to work on reversing this trend to stay competitive. They are stepping in to align incentives among their employees, the insurance companies they work with, and healthcare providers to produce better health outcomes at a lower cost.

The U.S. has increased both public and private sector spending at a faster rate than similar countries

Total health expenditures as % of GDP, 1970–2016

U.S. Private

U.S. Public

Comparable Country Average Public

Comparable Country Average
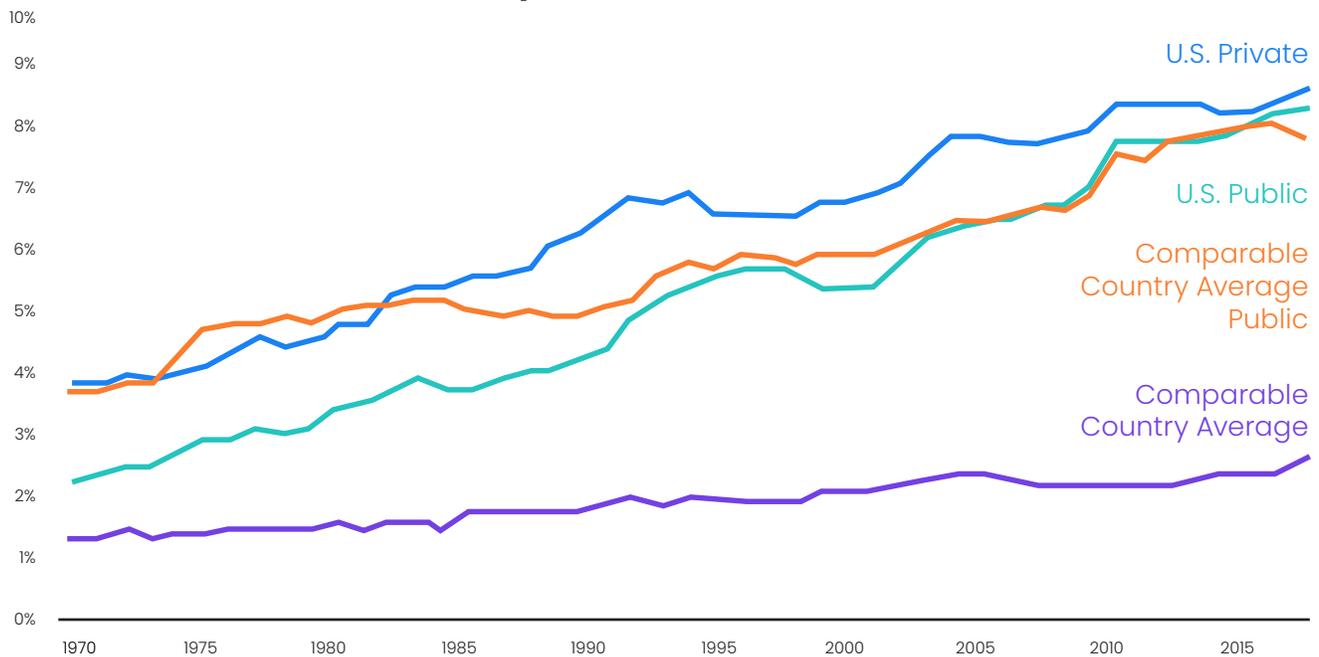
Source: Kaiser Family Foundation analysis of data from OECD

Effective management of patients, particularly those with chronic health conditions, requires an aggregated, longitudinal view of their clinical and claims data. The same data needs to be analyzed to identify where to best invest preventative and treatment resources. Data is the key to managing healthcare costs, and it is now in a largely electronic format that can be easily moved from systems of record to systems of insight.

In 2008, less than 10% of hospitals stored patient charts in an electronic health record. Office-based physicians had somewhat higher adoption, at 42%. Today, both numbers are over 80%[5]. Although the preponderance of healthcare data is now stored in electronic format, unfortunately that does not automatically mean data flows where it is needed. Special effort is needed to move data between locations.

Focusing on the base standards common to all networks puts knowledge about the standards and workflows into the tool, allowing the users to focus more on making the right connections.
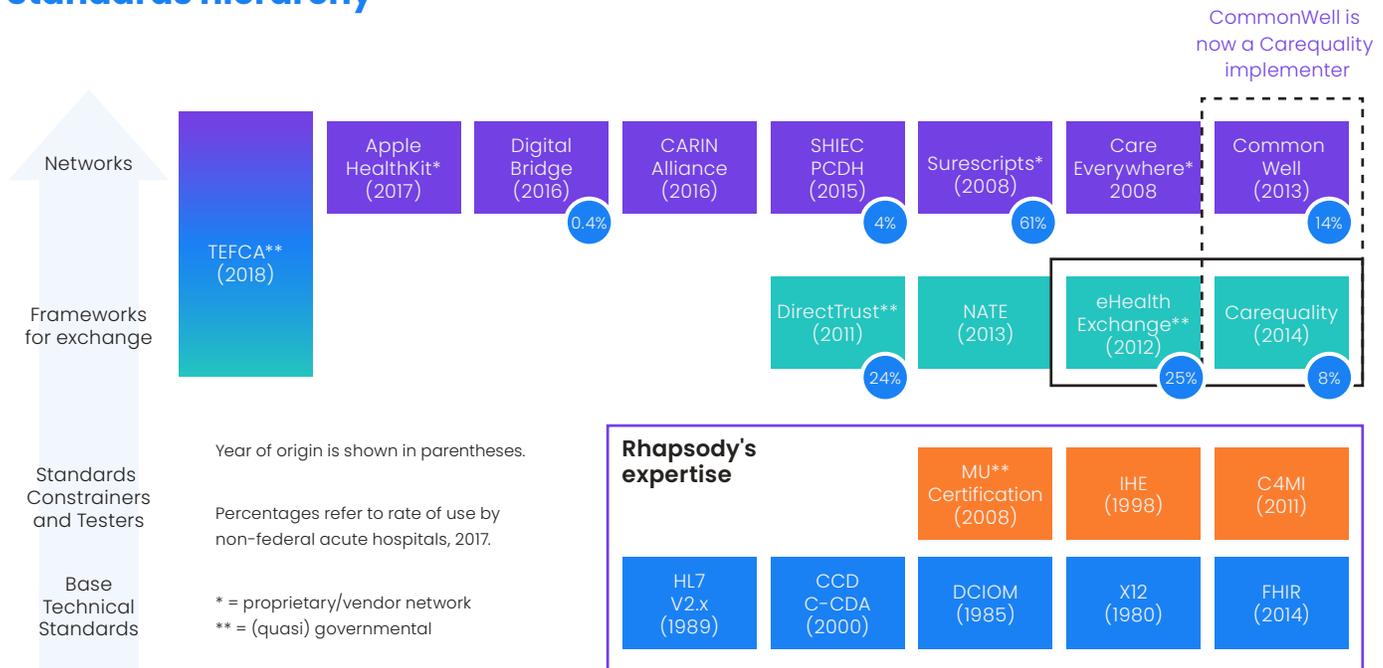
Three interoperability challenges

Transferring data across organizational boundaries requires solving three problems:

1. Creating a technical infrastructure or network to move data. These can be standards-based or proprietary/ad hoc.

2. Resolving governance issues. Healthcare data needs to be accurate in order to avoid harm. It is also private and sensitive. Therefore, a number of laws and good business practices are in place to safeguard this asset. The data governance methodology is called the framework, and all participants in a data-sharing arrangement need to adhere to the same framework.

3. Participants in healthcare data-sharing arrangements need to agree on a strong business case that provides a reason to share the data. For the purposes of this discussion, the business case is known: employees, health plans, healthcare providers, and employers need to work together to reduce spending while maintaining or improving quality.

Healthcare organizations must focus on the networks and frameworks required for data exchange. In practice, we find that since the networks and the frameworks are both required to exchange data, the boundaries between them are often unclear.

Today, there are numerous networks and frameworks in place to exchange data at a national level in the U.S. There are also dozens of regional and statewide health information exchanges (HIEs). Prominent networks and frameworks are summarized in the following figure overleaf:

Standards hierarchy

CommonWell is now a Carequality implementer

	Networks							
	TEFCA** (2018)	Apple HealthKit* (2017)	Digital Bridge (2016) 0.4%	CARIN Alliance (2016)	SHIEC PCDH (2015) 4%	Surescripts* (2008) 61%	Care Everywhere* 2008	Common Well (2013) 14%

Networks

Frameworks for exchange

	DirectTrust** (2011) 24%	NATE (2013)	eHealth Exchange** (2012) 25%	Carequality (2014) 8%

Standards Constrainers and Testers

Year of origin is shown in parentheses.

Percentages refer to rate of use by non-federal acute hospitals, 2017.

Base Technical Standards

* = proprietary/vendor network
** = (quasi) governmental

Rhapsody's expertise

		MU** Certification (2008)	IHE (1998)	C4MI (2011)
HL7 V2.x (1989)	CCD C-CDA (2000)	DCIOM (1985)	X12 (1980)	FHIR (2014)

Some networks are controlled by specific vendors, making them proprietary channels for communicating among installations of their own products. Other networks are open in the sense of being controlled only by a governing body intended to promote access to the network. Each network specializes in a set of use cases, but many networks have significant overlap in functionality.

However, all networks are based on the same set of underlying standards. These are shown in the bottom two rows (blue and orange) of the diagram.

A new initiative, sponsored by the US federal government, called the Trusted Exchange Framework and Common Agreement (TEFCA) aims to implement a "network of networks" approach that defines a common on-ramp for both the technical network and the governance framework[6]. As of this writing, TEFCA remains in a draft state and will require several years to build after the rules have been finalized.

Two case studies: Intel and Geisinger

Employers, providers, and health plans must work together to develop novel strategies for containing healthcare costs. Two organizations — Intel and Geisinger — are solving different parts of the healthcare system's sustainability problem. Intel is using technology to enable its own accountable care organization, and Geisinger is changing clinical and payment practices to reduce costs. Both are learning the value of taking control of their own interoperability tools rather than relying on existing networks.

Intel case study

Employers working to solve interoperability challenges to help control healthcare costs find themselves baffled by the array of data exchange choices available. Because there are so many networks covering different geographies and different use cases, there's simply no single network that provides access to all the relevant data.

The problem is not that there isn't a network that has the right data about the right patients. The problem is that there are too many networks, and each one covers different sub-populations of patients and different types of data. The only solution is to participate in multiple networks and fill in the gaps with ad hoc data transfer processes.

Intel is an example of a self-insured employer that wished to create an Accountable Care Organization (ACO) to control costs. Intel sought to connect five sites in four locations (New Mexico, Arizona, California, and Oregon). The work effort required three years and connections to six national networks plus regional HIEs[7].

The project resulted in improved clinical and financial outcomes, but Intel's experience shows that even though patient data is now stored in electronic format and there are multiple health data networks, substantial effort is required to accomplish the business objective of bringing the data together in a way that it can be used to improve healthcare costs and outcomes.

To summarize the lessons learned from Intel's ACO project:

- It is possible to deliver better outcomes at a lower cost through coordinated care.

- Electronic health data allows for analytics, measurements, and enhanced workflows that have not been possible in the past.

- Interoperability is required, because health data is generated and resides in separate systems and separate organizations.

- There is no single, nationwide network that provides access to all the right patients and all the right data.

- An interoperability strategy relies on broad capabilities and flexible tools to overcome the variety of different connection types that need to be established.

Geisinger case study

Geisinger Health System is an integrated delivery system (IDS) in northeastern Pennsylvania and a longtime Rhapsody customer. Geisinger is both a healthcare provider and a health plan. About one third of the 2.5 million patients served by Geisinger's clinicians are also members of their health plan. Geisinger is clinically and financially responsible for patients in this "sweet spot."

Starting in 2005, Geisinger began a structured program of continuous improvement intended to lower costs and improve outcomes[8]. Their initiatives focus on eliminating or automating steps of healthcare processes, involving patients in their own care, and systematically lowering supply chain costs. Because Geisinger participates in the clinical and financial aspects of care, they're able to address processes more holistically than health plans that must work with a variety of providers in other organizations.

Geisinger's keys to success:

- Electronic record keeping allows data to be shared and managed in a way that supports improvement initiatives.

- Targeting specific objectives for improvement, identifying metrics to measure, and setting expected outcomes provides the framework for innovation.

- Providing substantial, aligned incentives for all participants ensures focus on the right outcomes.

Data is the key to managing healthcare costs, and it is now in a largely electronic format that can be easily moved from systems of record to systems of insight.

Proposed approach:
Focus on base standards

One approach to the profusion of interoperability networks is to focus on the fundamentals. The core standards and workflows are the same for every network. The main differences relate to policies, governance, onboarding, testing, and the supported use cases.

Focusing on the base standards common to all networks puts knowledge about the standards and workflows into the tool, allowing the users to focus more on making the right connections.

Rhapsody health features built-in support for a wide variety of interoperability standards.

Protocol standards

- TCP including SSL and TLS – widely used for internal hospital integration (Minimal Lower Layer Protocol, MLLP)
- FTP, SFTP, FTPS
- File pickup from directory
- HTTP, HTTPS, and REST style web services, including FHIR
- SOAP style web services
- Amazon S3, SNS, SQS
- Database queries
- ...plus many others

Messaging Standards

- JSON
- XML
- HL7 v2.x
- CCD/C-CDA
- HL7 FHIR
- X12
- NCPDP
- Custom structured formats, such as CSV
- DICOM
- Integrating the Healthcare Enterprise (IHE): built-in support for PIX, PDQ, ATNA, XDR, XDS. Other profiles through configuration
- ...plus many others

Your interoperability solution should also include:

- Audit log of configuration changes and data access to help organizations comply with HIPAA
- Store and forward queuing to guarantee message delivery
- Automatic failure detection, retries, and error handling
- Alerts, notifications, and escalations for error conditions
- Command-line or API access to engine functions
- Ability to deploy on premises or in the cloud

It's important to look for an interoperability solution that includes built-in support for a full array of healthcare standards and requirements. This will help accelerate implementations and reduce technical risks to projects. Interoperability projects can be built faster, more consistently, and adherent with prescribed standards.

Also consider whether the interoperability solution is certified for several criteria under the Meaningful Use/Promoting Interoperability program[9], and whether your chosen vendor has a deep focus on exchanging data between hospitals and public health agencies, plus the foundational security and auditing criteria required of all certified products.

Conclusion

Healthcare costs are on an unsustainable course, and many methods are being developed across the country to slow and eventually reverse the rate of growth. Most approaches to cost containment rely on technology to help improve outcomes, reduce waste, and focus clinicians on the patients who need attention.

However, our experience has shown that there is no simple, consistent way to access patient data. Today's reality is that a variety of techniques must be brought to bear on the interoperability problem. The best question to ask is not "what's the best network to connect to?" but rather "what's the best tool to build all the necessary connections?"

Annexes

Read the full Intel case study **here**

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Rhapsody reaches far and wide in the realm of connecting healthcare

Rhapsody partners with healthcare organizations around the globe delivering its adaptable Interoperability Suite to reliably connect, classify, and clean data. Rhapsody health solutions power the applications and workflows that improve clinical, operational, and financial outcomes today while helping teams respond to and prepare for changes on the horizon. Rhapsody is committed to empowering people throughout the healthcare ecosystem, from specialty clinics to large care networks, from public health to health technology, and everything in between Rhapsody connects more than 1 million data endpoints across more than 1,700 healthcare organizations and over 3,000 applications, forming a network of trust.

- Clinical data integration
- Public health
- Patient engagement
- Patient outcomes
- Prior authorization
- Virtual care
- Consumer engagement
- Health information exchange
- Communications
- Embedded at the bedside
- Release of Information
- Analytics
- Supply chain