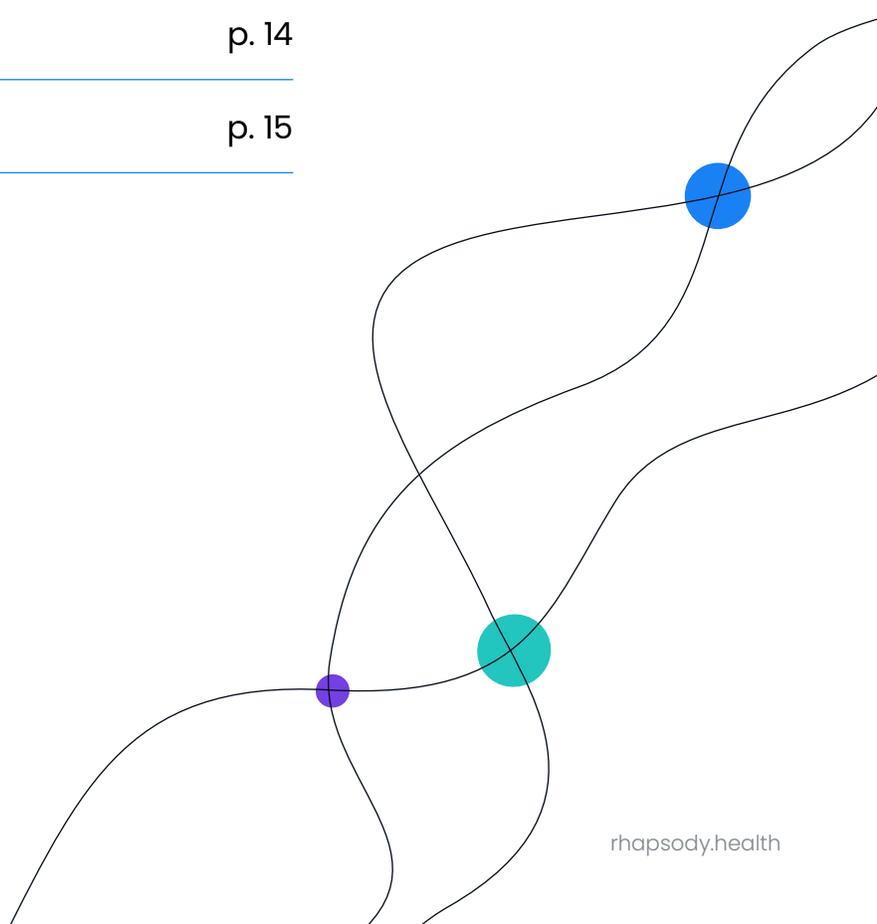


Integrating clinical data

Clinical data integration is a process.
This guide walks you through the basics.

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Introduction

The current healthcare system is going through a transformation pivoting from fee-for-service to value based care. The legacy design has created siloed and disparate data streams making it difficult for healthcare entities to manage risk.

To remain viable through these shifts, healthcare organizations need to alter their priority to what truly matters – the patient.

A reshaping foundation of incentives coincides with billions of investment dollars from organizations to implement electronic health record (EHR) systems. These EHR systems are the hub of clinical data and clinical workflows today.

Unfortunately, they are hubs siloed across thousands of organizations, meaning that the critical health data is siloed away as well, making it difficult to act on. In addition, the new rules set by Centers for Medicare and Medicaid Services (CMS) and Office of the National Coordinator for Health IT (ONC) in March 2020 and other proposed future changes mean major changes for how and what health data is shared.

The solution? Integration

Healthcare's transition from a volume-based incentive model to one of value is here. To remain viable through this shift, healthcare organizations must alter their priority of care from the provider to what truly matters – the patient.

What is clinical data integration?

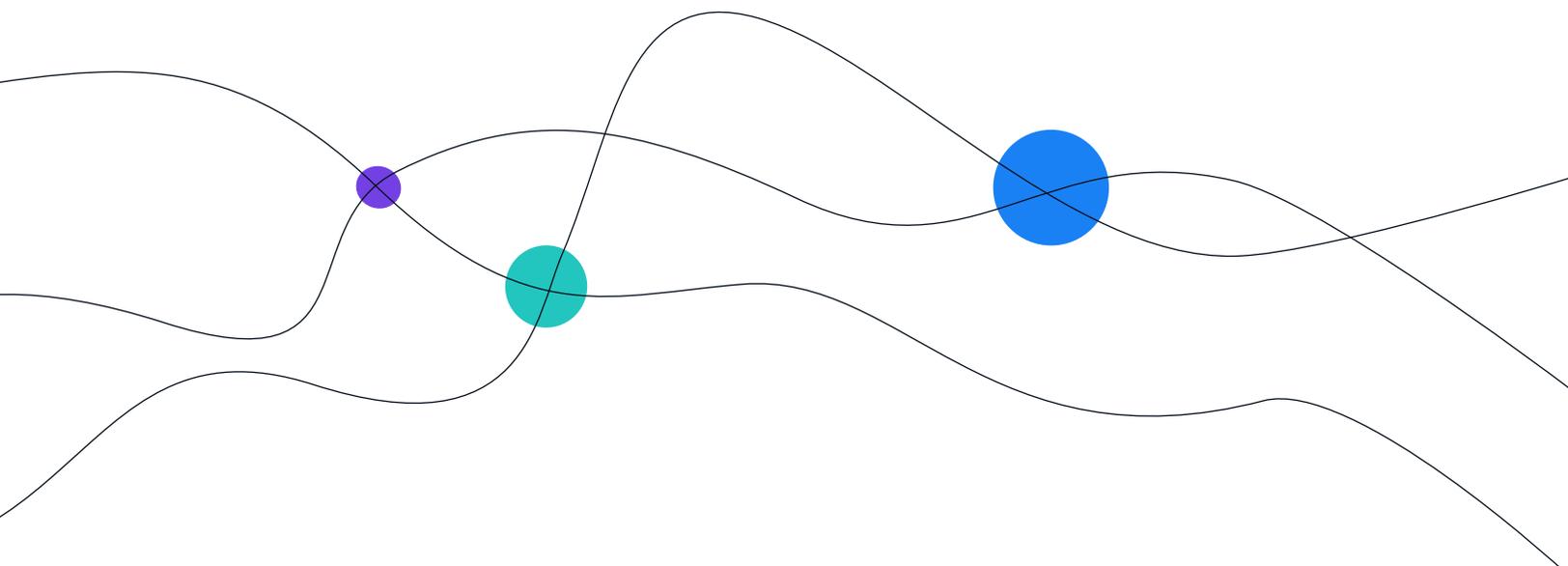
Clinical data integration is defined by the partnerships among providers, payers, vendors, and other players that bring the data or function from one application or program to that of another. Because of the sheer quantity and diversity of data, healthcare organizations, including payers, providers, and health IT developers, face major obstacles in integrating and effectively analyzing healthcare information.

Traditional health IT systems, such as EHRs and personal health record (PHR) systems, use completely different technical and semantic standards to depict and house data and are based on exclusive technical architectures. With all considered, it can be extremely difficult to properly and easily integrate data from multiple, conflicting systems.

Data integration methods vary primarily in the level on which they focus. At the application level, integration involves integrating data from individual applications by reimplementing them in one domain-wide application.

In integration at the API level, applications expose their APIs so that other applications can access their data.

Finally, at the data level, integration establishes a common domain archetype or global schema so that independently developed applications can exchange information. Data-level integration has more development flexibility than the others because it largely focuses on common exchange.



The importance of a clinical data integration strategy

Clinical data integration is how healthcare moves forward. It is the key to creating and improving advanced healthcare applications. Integrating healthcare data from a variety of providers and payers will explicitly improve the current healthcare delivery model and extensive research efforts.

Clinical data integration allows the unification of healthcare data that exists in various forms (structured or unstructured) on different data storage systems such as relational database management systems, file servers, and EHR standards, such as HL7 messages. This allows the widespread interoperability initiative to be a viable possibility.

True interoperability and successful integrations will have many industry benefits, such as increased communication between billing and clinical teams, simplified access to data to manage claims, and greater transparency in support of member-engagement endeavors. Long term, true integration also allows for the furthering of public health research opportunities and population surveillance to identify real-time issues.

With clinical data integration, value creation is synonymous with data creation, but value actualization is synonymous with how that data flows. After investing millions of dollars and years to create and gain access to electronic health information, clinical data integration helps unlock value and ROI.

The challenge is in completing integrations, which are not straightforward. A magic API will not create interoperability as it might when integrating into a CRM or Facebook. Instead, the path toward clinical data integration is filled with dozens of obstacles, with the crux being authorization and power: You can't complete an integration until the holder of the data — such as a consumer — gives you the okay to do so. EHRs can be a challenge to access, and so integrating to each one involves a project and a process.

Your business plan and processes dictate needs

Integration is a broad term. There are many forms and formats of integration. A key first step is to understand what integration needs your business model demands.

For example, let's say you're a payer looking to comply with the CMS Interoperability and Patient Access final rule. You'll need a solution that will allow members to share data with third-party apps of their choice via FHIR®.

Or, let's say you are a telemedicine product, and you want to integrate into hospital EHRs. It is wise to understand where within the EHR's interface your data will exist. Similarly, you'll want to know the workflows within the EHR that your product will fit, which can dictate the types of interfaces you'll read from and write to.

There is no one-size-fits-all to digital health. Each product, each solution, each idea mixes and matches different requirements for integration. You must understand what data requirements exist for your business model to be successful. You also need to understand the nuances of the current technologies used in integrations.

Today's rally cry is for true interoperability across organizational boundaries. To ensure success, payers must create and implement a carefully thought out clinical data integration plan.

Decoding the integration technology landscape

There are a lot of industry terms within the world of interoperability, such as EHRs, workflows, standards, interfaces, VPNs, HL7, FHIR, data storage and backup, security, and compliant infrastructure. Here's a primer on what they all mean.

EHR

Think of EHRs as the digital versions of a paper patient chart. EHRs aimed to digitize patient care but were lightly adopted in the 1990s and early 2000s. Then the government mandated, through a mix of carrots and sticks, a program called Meaningful Use (now called Promoting Interoperability), which gave about \$20 billion to clinicians to buy EHRs, thus creating the market maturity we see today.

EHRs are the central data repository of patient care, and are often the main software for customers of digital health products. Reading and writing data with the EHR becomes a critical component to the success of a fully digitized health system, including the ability of payers to interface with EHRs to access medical record data and encounter messages for better care coordination and management.

Workflows

Workflows are the specific paths that a clinician administers for patient care. Someone like a hospital technologist or an external consultant will configure innumerable workflows per organization.

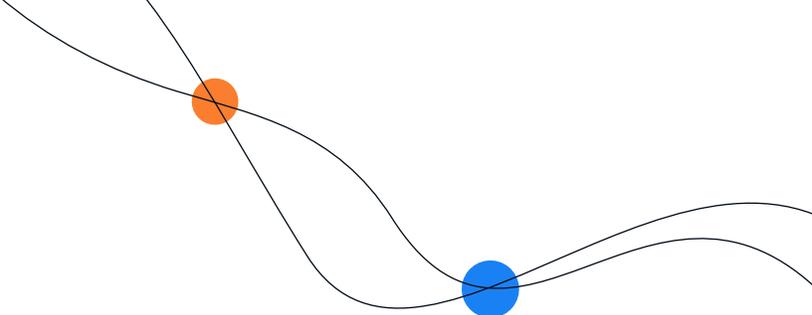
The crazy thing is often no two workflows are the same: Hospital ABC usually has a custom way to handle a certain workflow because they think that's the best way while Hospital XYZ will design a different workflow for the same pathway because they believe it to be better.

With a lack of workflow standardization, complexity across the industry exponentially increases. This is a major reason that "integrations don't scale" – a scary truth that digital health teams tend to ignore. EHR workflows are the central work path for clinical care, so integrating into the right workflow can make or break the adoption and scale of digital health initiatives.

Data standards

Healthcare interfaces are similarly complex. For example, HL7 has 18 major message types, like ADT for admissions/discharges/transfers, or ORM for orders. These interfaces are the channel in and out of hospitals and their EHRs.

Each interface has its own way of writing vs. reading, so you can think of it as each interface itself has two different ways of doing integration. Furthermore, interfaces work at the port-level, meaning each interface is a unique integration happening at a unique port. Yet another reason it's important to avoid the path of building integrations that don't scale. Modern approaches to data standards, like FHIR®, are emerging and promising.



HL7

Health Level Seven (HL7®) is a standard that the healthcare industry uses to enable messaging between applications, EHR to PMS (practice management system) for example. It is managed and maintained by Health Level Seven International (HL7) which is a not-for-profit, ANSI-accredited, standards-developing organization.

The HL7 standard is often jokingly referred to as the “non-standard standard.” This is not very fair but it does reflect the fact that almost every hospital, clinic, imaging center, lab, and care facility is “special” in terms of how it implements HL7. The reason is primarily that there is no such thing as a standard business or clinical process for interacting with patients, clinical data, or related personnel.

The HL7 messaging protocol was designed to facilitate high volumes of pre-defined data to be shared across many applications reliably. The protocol selected to make this happen was a traditional file transfer or a TCP/IP socket in both a real-time and batched fashion. HL7 v2 message structure is complex, flat, and delimited. HL7 has obviously evolved over time. The current version of HL7 is v3, however, older versions exist and make up the bulk of the standard used today primarily because of the large number customizations that have been done to each HL7 message.

FHIR®

FHIR (Fast Healthcare Interoperability Resources) is an emerging standard being developed under the auspices of the HL7 organization. It was initially developed by Graham Grieve, who insisted FHIR be open sourced. At its core, FHIR is intended to be the future of healthcare interoperability. It tries to combine the best features of HL7 V2 and V3, in which Grieve was significantly involved.

FHIR has an ambitious goal. Integration capabilities should be built into the EHR itself along with the other aspects of authentication and security. Over time, this will eliminate the need for expensive integration projects and licenses. Additionally, the use of modern concepts such as RESTful APIs and accompanying documentation will make it much easier for developers and applications to quickly connect and get the data needed.

X12

Health IT teams typically encounter X12 in the form of electronic data interchange (EDI) used for finance and health insurance. For example, X12 835 is a claim remittance and the 837 is a claim submission. The biggest difference between X12 and HL7 stems from their different levels of concern. X12 transactions are not transmitted until all of the information about the event is known. As a result, each transaction typically stands on its own and does not depend on the transactions that came before or after. X12 is often delivered in large batches.

Secure Connectivity

VPNs, or virtual private networks, are the most common secure method to communicate with the network at a hospital. While you may have other options (like SFTP or HTTPS), most hospitals use VPNs to explicitly whitelist authorization to endpoints and to manage the encryption of common secure method to communicate with the network at a hospital. While you may have other options (like SFTP or HTTPS), most hospitals use VPNs to explicitly whitelist authorization to endpoints and to manage the encryption of unencrypted data feeds such as HL7 TCP feeds. While it would be nice if hospitals more regularly encrypted data using alternative conventions, this is sometimes a non-negotiable item in how you will exchange health data with them.

Storage and backup

Integrations are what we call “transaction-based,” but logging and storing the data from the transactions becomes both a base compliance necessity and a smart business decision.

Cybersecurity

Modern cybersecurity in clinical data integration is mission critical to avoid breaches of this sensitive data. Healthcare, rightly so, is held to a higher standard than other industries because of the sensitivity of the data. It's important that your integration provider is an expert on best practices and can ensure a solid protection plan exists.

Using a trusted integration provider will prevent security events, like breaches, and offload some of the inherent financial and reputational risk of exchanging sensitive healthcare data. Important credentials to consider when selecting an integration provider include NIST (CSF) Cybersecurity Framework compliance, GDPR compliance, and HIPAA compliance.

Building the clinical data integration team

An EHR is a linear electronic record of patient health information created by one or more instances in any care delivery setting. Included in this data are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. The EHR automates and streamlines the clinician's workflow and has the ability to generate a complete record of a clinical patient encounter.

Now, to properly integrate into this data hub, a diverse and experienced team is necessary. It's time to rally the troops and ensure key subject matter experts are on point for deployment. You want to engage:

- A product owner
- Someone to run and manage the project
- A reliable business analyst to gather requirements
- A talented SCRUM master
- Development and testing resources
- An architect (Enterprise, Application, Data, etc)
- A security expert
- A trusted clinical data integration partner who brings a solution consultant and clinical data architect to the table

The results of successful data exchange between clinical applications and administrative applications are highly rewarding as the final result is transparent data sharing and improved member experiences.

Developing an interoperability plan

Clinical data integration projects can be extremely challenging because of the various interpretations of data standards and managing all parties involved. The results of successful data exchange between clinical applications and administrative applications are highly rewarding as the final result is transparent data sharing and improved member experiences.

The first step is to decide which resources you want to allocate to clinical data integration. If you do not want to build and maintain a clinical data integration team, a managed services integration approach is the best fit for your organization. In this model, the integration provider will handle hosting infrastructure, services to design and implement the integration product and interfaces, and ongoing maintenance and support.

If your organization prefers not to go the route of a fully managed interoperability stack, you will need to hire and staff clinical data integration resources and expect to pass through these stages to complete a clinical data integration initiative.

- **Planning & Paperwork** – Initial steps include preparing contracts, signing of business associate agreements, and kick-off meetings.
- **Gather Requirements** – Data necessities such as sample HL7 messages, sample JSON, associated data dictionaries, and the vendor's API with associated documentation must be received. This is also when proper VPN forms must be completed.

- **Infrastructure and secure connectivity** – The standard infrastructure must be spun up with the secure connection creation and verification (such as VPN), alongside correlated creation of connectivity response tickets.
- **Set up Interface** – An organization's and vendor's endpoints are set up, as well as the interface.
- **Testing** – Sample messages are sent, reviewed, and acknowledged by both inbound and outbound users. Any issues are identified and resolved prior to completed testing.
- **Go Live** – All channels are turned on through migration to production with total channel deployment. The organization data feeds are opened and the vendor can begin to populate the system. The hospital can either insert this data feed into the EHR or another inbound interface.
- **Ongoing Support** – Determine and implement support and alert plans.

Today's rally cry is for true interoperability across organizational boundaries. The pursuit of this goal will result in various benefits, but to ensure success, a carefully thought out clinical data integration plan must be created and implemented.

As outlined above, you can either do this in tandem with an interoperability solution provider or let the solution provider manage clinical data integration end-to-end so you can focus on competing priorities.

Scaling integrations

Okay, so you've accomplished your first clinical data integration project and you're ready to scale. That's great! What does scaling integrations look like?

Well, it's not what it seems. Sadly, "integrations don't scale" is this framework's drumbeat, and for good reason. Scalability within healthcare is a myth. There is no magic bullet for scale. There is no magic API for EHRs. There is no Easy button.

Instead, since connections are point-to-point, scaling integrations takes on a different meaning. Scaling integrations means making the internal aspects of your infrastructure as repeatable as possible. Here are seven pointers for scaling clinical data integration and your digital health transformation:

1. **Don't** reinvent the wheel on compliance
2. **Use** an integration (HL7 and API Management) solution that can handle the load today and equip you for the future
3. **Employ** the cloud so new resources are available at the click of a button
4. **Ensure** your connectivity setup is as streamlined as possible
5. **Choose** a partner who works with you to address security requirements
6. **Test** in the same way with every clinical data integration
7. **Choose** an interoperability partner who brings trusted technology and proven project management

Scale of integrations does not mean integrating once to an API and expecting to be plugged into every hospital or point of consumer health information.

Today's clinical data integration challenges

Today, data and workflow integration is the major bottleneck to information sharing for improved outcomes and greater transparency, resulting in minimal ROI, longer wait times, and delayed digital health transformation.

Integration is a bottleneck because of three unique challenges:

- Custom data mappings
- Security of data connectors
- Each integration needing differing degrees of project management

These challenges grow exponentially at scale, meaning every new integration incrementally slows the system down—the polar opposite of what healthcare needs. Interoperability today is a mess, so innovative health IT teams are forced to pick from a menu of options created for a different paradigm of care. Many are forced to limit the data they integrate because of a lack of understanding of what's available.

The reality is that simply turning that existing menu of data options into an API is not the answer.

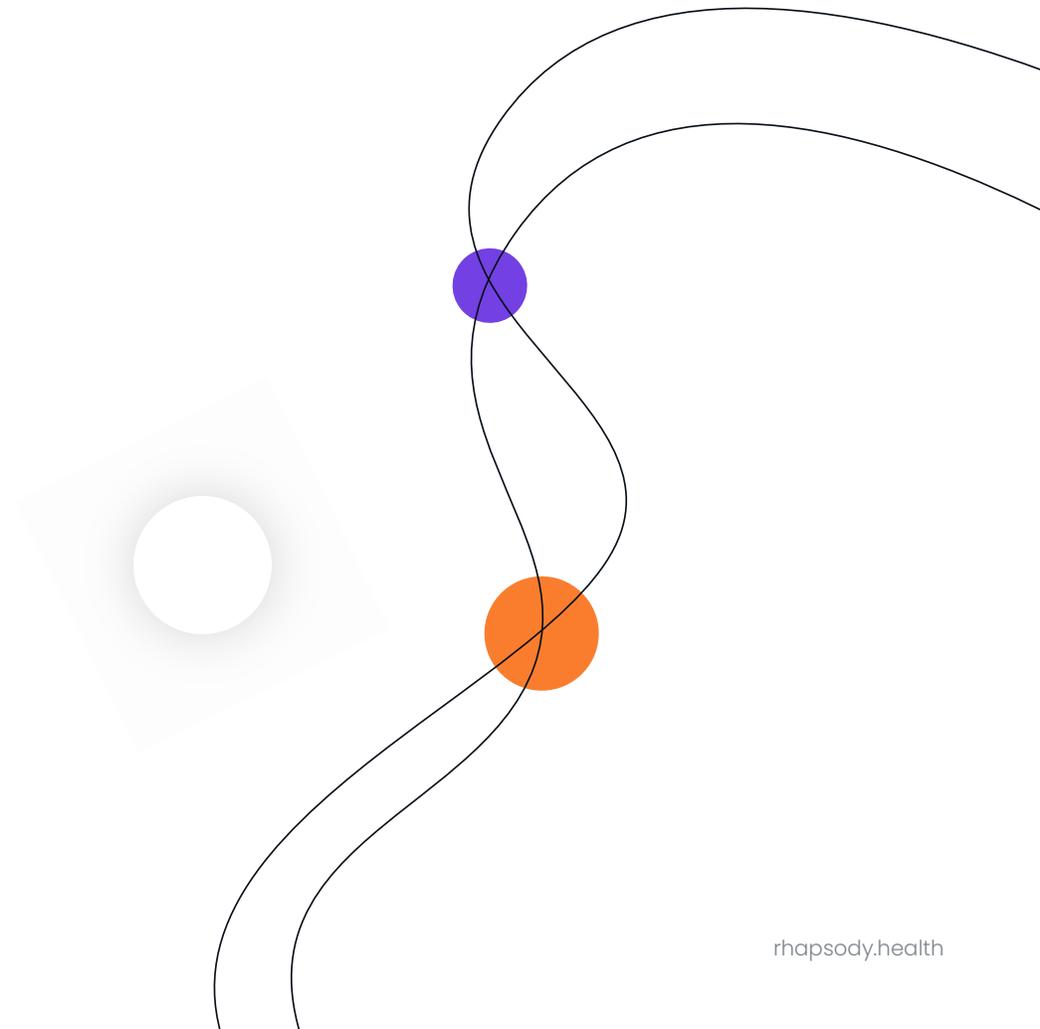
There is a better way...

The solution to clinical data integration

First, we recommend thinking of interoperability or integration as a journey. It's a process with multiple, interconnected steps. That means to stop thinking about message types and VPN handshakes and start enabling the digital health workflows needed to succeed.

You will likely need help. Believing your team can gain clinical data integration domain expertise is much more than just learning the technicalities of HL7 or FHIR. You must become domain experts throughout the full process.

A better option might be to rely on Rhapsody health solutions and expertise. Our approach to integration is helping integrate clinical data across the entire spectrum of healthcare. We combine cutting-edge automation of cloud infrastructure security, DevOps processes, and interface engines, with our extensive experience in solving healthcare integration problems—all built on a solid foundation of continuous HIPAA and data security compliance.



A proven integration track record



1,700

Customers worldwide



> 1 Million

We connect more than 1 million data endpoints across more than 1,700 healthcare organizations and over 3,000 applications, forming a network of trust.



100%

Healthcare focused



#1 in KLAS

since 2009



24/7

Global support



>99%

Strong customer loyalty
with >99% customer retention

About Rhapsody

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.

Take the stress out of clinical data integration

We handle the stress and complexity of clinical data integrations so you can focus on providing the best member experience.

For more information, visit rhapsody.health

