

The Myth of Seamless Exchange

Why Interoperability Is Harder Than It Looks

An ebook on the disciplined process,
remediation pathways,
proportional oversight, and
resilient operational underbelly
that make health data exchange
feel effortless.



The Swan Problem

We have collectively invested billions of dollars in interoperability infrastructure, culminating in the maturation of nationwide networks and frameworks such as eHealth Exchange, CommonWell, Carequality, and most recently the Trusted Exchange Framework and Common Agreement (TEFCA), but with all that brainpower and resource, the current system relies on

Watch a swan cross a pond and you see grace. Smooth glide, no visible effort, barely a ripple. What you do not see is the pair of feet churning underwater at a frantic pace to keep that surface calm.

Health data interoperability is the frenetic paddling feet under the swan.

When a clinician opens a patient's chart in the emergency department and finds a complete history waiting there, prior medications, recent labs, an allergy flagged in red, it feels like a moment of grace. A record simply appeared, from somewhere, exactly when it was needed.

This is where the myth takes hold.

"That was seamless," the clinician says.

The exchange only *seemed* less. It only seemed to require less effort or hooplah. Underneath the calm surface, is some very inelegant splashing involving matching algorithms, consent checks, format translation, network handshakes, error queues, and human beings cleaning up the cases the machines could not. The surface looks effortless because a great deal of disciplined work is happening where nobody can see it.

This ebook is about those underwater machinations. It reveals the underbelly energy that gives interoperability its smooth jazz finish.



The State of Play: Adoption Is Very Different from Connection

American medicine is already mainly digital. Roughly 96 percent of U.S. hospitals run certified electronic health record technology. The paperwork problem, in theory, was solved years ago.

But the theory has not been fully implemented into modern workflow. Fewer than one in three hospitals can reliably find, send, receive, and integrate a patient's records from an outside provider. Adoption happened. Connection did not.

The gap between those two facts is where this whole story lives. Buying an EHR is like everyone in a city buying a telephone. It's useless sitting unconnected inside each house. Everybody has a phone but they are unable to connect to other phones. Meaning there can be no conversation.

Value shows up only when the phones can call each other and both parties speak the same language once connected. Health data is still working to make healthcare connections meaningful.

18

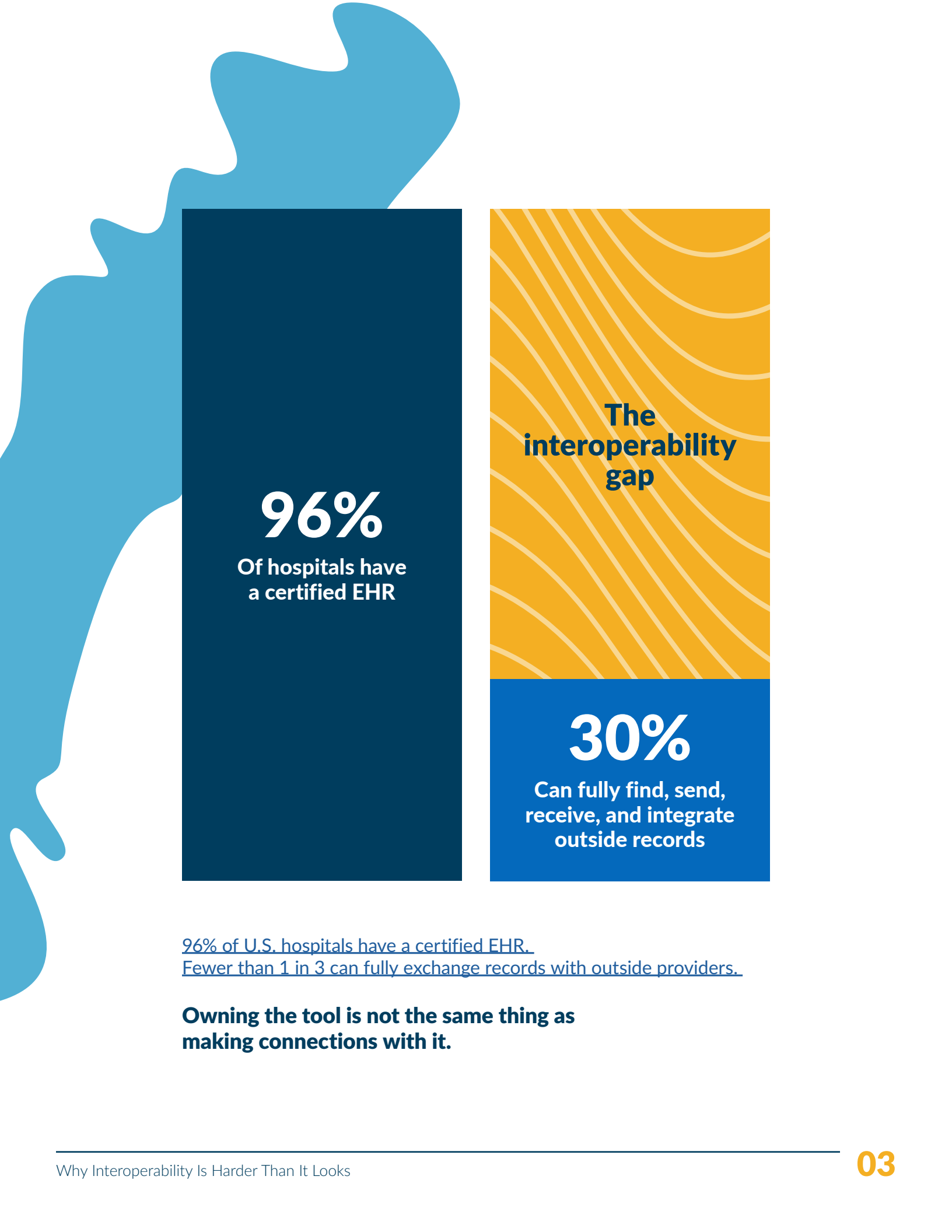
The average healthcare organization relies on around 18 different health information systems, and roughly 89 percent of hospitals still name data integration as a top challenge.

35%

About 35 percent of physicians still lean on fax, mail, or e-fax to move protected health information.

28%

In one physician survey, 95 percent said getting the right clinical information at the right time matters a great deal, yet only 28 percent found it easy to send and receive patient data across a different EHR.

The infographic features a large, light blue abstract shape on the left side. It consists of two vertical bars. The left bar is dark blue and contains the text '96%' and 'Of hospitals have a certified EHR'. The right bar is split into two sections: the top section is orange with white wavy lines and contains the text 'The interoperability gap', and the bottom section is blue and contains the text '30%' and 'Can fully find, send, receive, and integrate outside records'.

96%

Of hospitals have
a certified EHR

**The
interoperability
gap**

30%

Can fully find, send,
receive, and integrate
outside records

96% of U.S. hospitals have a certified EHR.
Fewer than 1 in 3 can fully exchange records with outside providers.

**Owning the tool is not the same thing as
making connections with it.**

Operational: Considering the Labor Behind “It Just Works”

Consider one query. A hospital asks the network, “Do you have records for this patient?”

Before an answer comes back, several unglamorous jobs have to succeed in sequence.

Getting the right patient

The network has to be certain it is talking about the same human. There is no national patient identifier in the United States, a proposal that has stalled for years over funding, so matching leans on names, dates of birth, addresses, and probabilistic algorithms doing their best with messy input.

Studies have pegged duplicate record rates inside organizations at roughly 8 percent on average, climbing past 20 percent in larger databases, and reaching as high as 30 percent in some systems. At a 20 percent rate, one in five patients is at risk of a record that is duplicated or, worse, overlaid with someone else’s data. Most of the damage starts at the registration desk, where a rushed keystroke or a missing middle name spawns a second version of a person who already exists.

Duplicate patient records commonly run 10 to 20 percent, and can reach 30 percent in some systems. At 20 percent, one in five patients has a record at risk of duplication or overlay.

The point is that matching requires careful attention. Somebody tunes the algorithm. Somebody sets the threshold for how confident a match must be before two records merge. Set it too loose and two strangers become one chart, a genuine safety hazard. Set it too tight and one patient fractures into five partial charts, and the emergency physician sees a fifth of the truth. Getting this right is crucial and requires constant, expert work.

Does this Mean what I think this means?

Even after the right patient is found, the data arriving from three different systems often shows up in three different dialects. One sends a modern FHIR resource, another an older C-CDA document, a third an IHE profile. Each has to be read, normalized, and reconciled into something a receiving system can actually use.

This is the translation layer, and it is where “AI-ready” data is already present. Raw records come in duplicated, inconsistently coded, and full of near-misses. Turning that into a clean, deduplicated, normalized record is the difference between data that informs a decision and data that just adds noise to the chart.

Cleaning up what the machines cannot

No algorithm hits a zero percent error rate. A federal report on patient matching said this plainly: current methods cannot correctly make every match while avoiding every false one, and no single fix changes that. Which means there is always a queue of ambiguous cases waiting for a human to examine, judge, and resolve. That queue is more of the splash under the surface.

Risk: Why Proportional Response Matters

A thermostat does not blast the furnace to full the moment a room cools by a degree, nor does not sit idle while the house drops to freezing. It moves the system up or down by the amount the room actually needs. Oversight of a shared health network works best when it behaves the same way.

The instinct under pressure is to respond in extremes. Something went wrong, so shut the whole thing down. Or, alternatively, nothing alarming happened yet, so change nothing. Both extremes are expensive. A network that halts at the first hint of trouble is useless. A network that never reacts is dangerous. The discipline lives in the middle, in a graduated set of responses matched to the size of the actual problem.

The federal information blocking framework is a working example of proportional response design. The rule discourages practices that interfere with sharing electronic health information, but it does not treat every restriction as a violation. [It carves out eight exceptions, covering situations like preventing patient harm, protecting privacy, maintaining security, technical infeasibility, and legitimate limits on fees or licensing.](#) In other words, sometimes declining to share is the correct, lawful call, and the rule states it as such. That built-in-give is what keeps a rigid rule from punishing the right call.

8 Exceptions to information blocking

Preventing harm

Privacy

Security

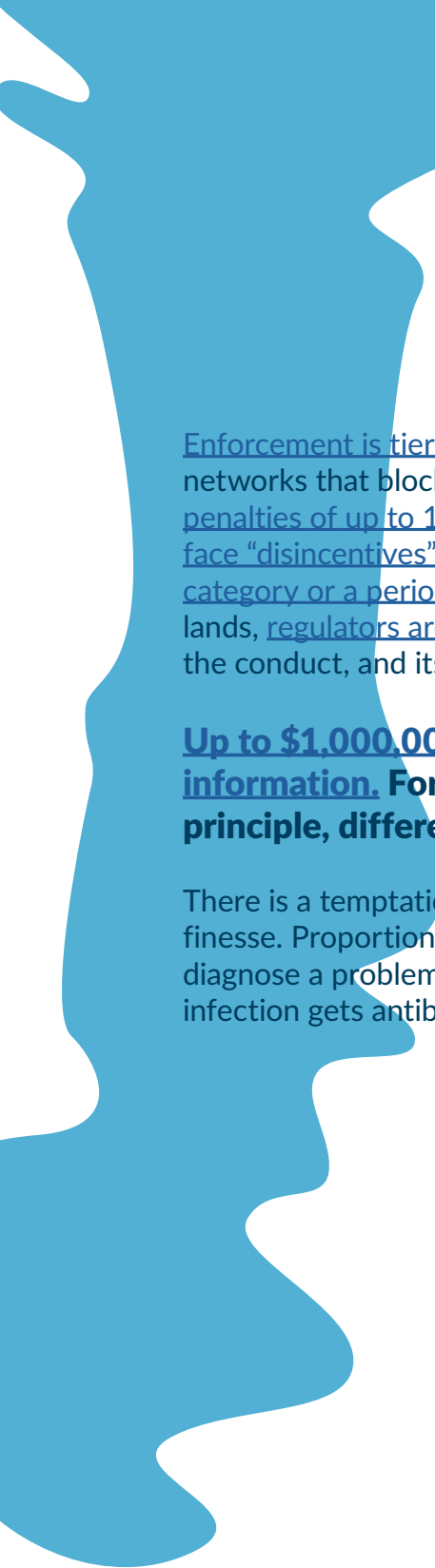
Infeasibility

Content and manner

Licensing

Fees

Health IT performance



Enforcement is tiered the same way. Health IT developers and health information networks that block information can be seriously sanctioned through civil monetary penalties of up to 1 million dollars per violation. Healthcare providers, by contrast, face “disincentives” rather than fines, such as a zero score in a Medicare performance category or a period of exclusion from a shared savings program. Before any penalty lands, regulators are directed to weigh the specific facts and circumstances, the nature of the conduct, and its effect. The response scales to the actor and the harm.

Up to \$1,000,000 per violation for developers and networks that block information. For providers, graduated program disincentives instead. Same principle, different proportional weight.

There is a temptation to read proportional response as softness. But it’s really about finesse. Proportionality requires a measured, intelligent response in order to actually diagnose a problem, size it, and pick a response that fits. A splinter gets a bandage. An infection gets antibiotics. There is no wasted resource here, no over-reaction.

**Measured
response
saves effort
and money.**

Governance: The Rules of the Road and the Remediation Pathways

When driving on a highway with no patrol car in sight, drivers still complicitly agree to cooperate in order to avoid chaos or harm. Drivers continue to follow the expected rules of engagement. People stay in their own lanes and pay attention to others in their area.

That same kind of courtesy and implied agreement is expected on the interoperability highway. Nationwide health data exchange requires that same kind of shared rulebook, plus a clear process for what happens when someone runs a light.

In the United States, a large part of that rulebook now sits inside the Trusted Exchange Framework and Common Agreement, known as TEFCA, created by the 21st Century Cures Act of 2016. TEFCA sets up a “network of networks.” At the top are Qualified Health Information Networks, or QHINs, which act as connectivity brokers linking everyone beneath them. Below each QHIN sit Participants, and below them Subparticipants. A single legal agreement flows its obligations downhill, so a promise made at the top binds all the way to the bottom.

Health Gorilla is one of these QHINs. It is also the only entity that holds both a national QHIN designation and California’s state-level Qualified Health Information Organization designation, which is a useful illustration of how national and regional rulebooks stack. The scale involved is not theoretical. Health Gorilla reported query volume climbing from around 200,000 to more than 66 million in roughly a year, growth of about 21 percent a month.

Health Gorilla query volume grew from ~200,000 to 66,000,000+ in about a year, roughly 21% month over month.
Governance is what keeps a firehose that size safe to drink from.

Established remediation, spelled out in advance

The defining feature of good governance is that the response to trouble is documented or auditable before trouble arrives. A well-run network does not improvise. It follows a path everyone agreed to outside of a crisis.

TEFCA's structure shows what that looks like in practice:

- Problems are meant to be caught early. A Governing Council with QHIN and Participant voices is designed to surface issues and settle them before they harden into formal disputes.
- Data quality concerns have a named escalation route. If quality problems surface as data moves between parties, the issue can be raised to the coordinating entity under a specific provision of the Common Agreement, and can proceed through a defined dispute resolution process.
- Disputes follow a standard operating procedure. The first stage is deliberately informal and non-binding, a structured chance for parties to meet, confer, and resolve things amicably before anything escalates.
- Consequences are graduated and time-bound. A breach that is not cured within 15 calendar days of notice becomes a defined "Threat Condition." From there the path can run to suspension, and only ultimately to termination. Security incidents carry their own clock, with reporting required within five business days of determining one occurred.

Governance also means the roles are clearly assigned. Under TEFCA, the coordinating entity oversees the QHINs and never touches the actual patient data flowing between them. Each QHIN, in turn, is responsible for onboarding and policing its own Participants and Subparticipants. Accountability has an owner at every layer. When something breaks, there is no question about whose job it is to fix it.

This is the most load-bearing pillar. Rules of the road and remediation pathways are what let a stranger's data network earn the word "trusted."

Economic: The Cost of Instability in Payer and Provider Ecosystems

The financial link between payers and providers moves the money that keeps care running, so every day it holds steady is money the system does not lose.

Start with the steady-state cost of friction. Roughly one in every four health care dollars is wasted, somewhere between 760 billion and 935 billion dollars a year, according to a landmark analysis in the Journal of the American Medical Association. A meaningful slice of that traces to fragmented, poorly connected data. Multiple industry estimates puts the cost of poor interoperability at more than 30 billion dollars annually from duplicate testing, manual re-entry, delayed decisions, and administrative overhead. Communication failures alone are cited as a contributor to roughly 30 percent of malpractice cases.

Prior authorization is a good example of the tax friction imposes. Physicians spend nearly 13 hours a week, close to 600 hours a year, working through prior authorization requests. Only about 35 percent of those requests are handled electronically. The rest still move by phone and fax. That is a fully solvable data-exchange problem sitting in plain sight, busy billing the system in staff hours.



\$1 in every \$4
health care dollars wasted every year

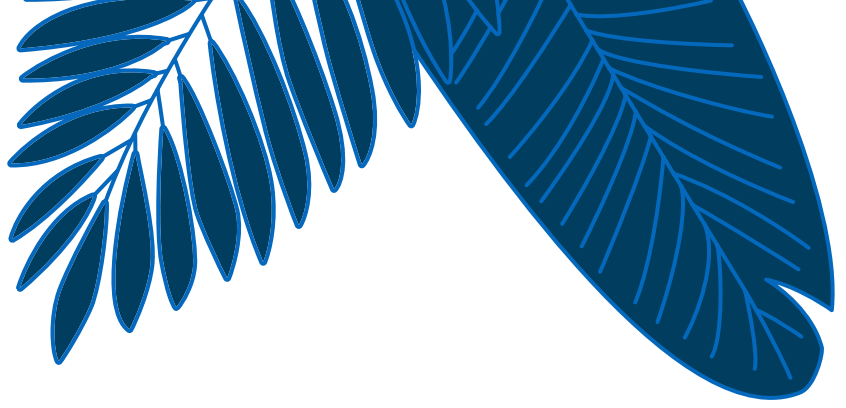
When the pipes actually freeze

For a concrete picture of instability, look at February 2024, when [a ransomware attack hit Change Healthcare](#), a clearinghouse that processes a very large share of U.S. medical claims, on the order of tens of percent of all transactions and trillions of dollars a year. The entry point was mundane and could have happened to anyone: it was a system without multi-factor authentication.

As expected, the small and rural practices, the ones with the thinnest cash reserves, were pushed toward the edge. [Some borrowed hundreds of thousands of dollars just to make payroll](#). A ratings agency noted the obvious pattern: providers that relied on a single clearinghouse with little financial headroom suffered most, while larger, diversified organizations weathered it.

Stability as an asset

The solution is already well-known. It's a matter of implementation. [Cleaner data and reliable exchange reduce](#) duplicate tests, cut denials driven by identity mismatches and missing eligibility data, and shrink the administrative hours spent chasing records across portals. The same connected infrastructure that prevents the disaster also produces the everyday savings. A payer and provider ecosystem that exchanges data dependably spends less, denies less, and argues less.



The Resilient Underbelly: The Look of Discipline

Interoperability's resilient underbelly is built from the four pillars working together:

Operational discipline

keeps the everyday energy, matching, translation, exception handling, running smoothly enough that the surface stays calm.

Proportional oversight

makes sure the response to any given problem fits the problem, so the network is neither reckless nor paralyzed.

Established governance

and remediation give everyone a shared rulebook and a written path back to normal when something breaks.

Economic resilience

through dependable exchange, means a single failure becomes an inconvenience rather than a catastrophe.

We Need the Splash

“Effortlessness exchange” only happens with a great deal of activity, energy, coordination and yes, splash happening under the surface.

A patient record appears in two seconds because one hundred systems performed their jobs well. A matching engine was tuned, a translation pipeline was built, an exception queue was staffed, a rulebook was agreed, a remediation path was written down, and a network was made resilient enough to survive a bad day. That's some serious effort.

But the noise and the fuss are necessary to reach the goal of making interoperability a smooth, reliable exchange. So here's to all those system builders and compliance checkers and identity authorizers. Here's to the data dedupes and standardizations, to the oversight of the QHINs, CMS rule makers and the thousands of machinations that must be systemized, executed and overseen so that, at the end of this long parade of effort, a patient receives excellent care that feels seamless and full of grace.

Shrank, William H., Teresa L. Rogstad, and Natasha Parekh. "Waste in the US Health Care System: Estimated Costs and Potential for Savings." *Journal of the American Medical Association* 322, no. 15 (2019): 1501-1509. <https://jamanetwork.com/journals/jama/fullarticle/2752664>. Summarized in CapMinds, "EHR Interoperability Solutions for Health Systems in 2026," <https://www.capminds.com/blog/ehr-interoperability-solutions-comparing-approaches-costs-roi-for-health-systems-in-2026/><https://www.capminds.com/blog/ehr-interoperability-solutions-comparing-approaches-costs-roi-for-health-systems-in-2026/>

blueBriX, "The economics of interoperability: how FHIR reduces the cost of care delivery." <https://bluebrix.health/blogs/the-economics-of-interoperability-how-fhir-reduces-the-cost-of-care-delivery>

Fullcast, "How to Solve Healthcare Data Interoperability Challenges" (18 systems, 89% integration challenge, ~30% malpractice communication failures, \$30B loss). <https://www.fullcast.com/content/healthcare-data-interoperability-challenges/>

Edenlab, "Interoperability Challenges in Medium Healthcare Organizations" (35% fax reliance). <https://edenlab.io/blog/interoperability-strategy-healthcare-organizations>

athenahealth, "Healthcare's Interoperability Challenges" (physician sentiment: 95% vs 28%). <https://www.athenahealth.com/resources/blog/interoperability-challenges-in-healthcare>

MedCity News, "Healthcare's Most Fixable Cost Problem: Administrative Waste" (prior authorization hours, ~35% electronic). <https://medcitynews.com/2026/04/healthcares-most-fixable-cost-problem-administrative-waste/>

4medica, "For Safety's Sake, Healthcare Must Address Its Patient Matching Problem" (10 to 30% duplicate rates). https://www.4medica.com/industry_publication/for-safety-sake-healthcare-must-address-its-patient-matching-problem/

Bipartisan Policy Center error-rate figures via "Patient Matching within a Health Information Exchange," PMC. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4696093/>

AHIMA and ONC patient identification and matching materials, including the ONC “Patient Identification and Matching Final Report.” https://www.healthit.gov/sites/default/files/resources/patient_identification_matching_final_report.pdf

HIMSS, “HTI-2 Final Rule Fact Sheet: TEFCA and QHIN Designations, Governance and Appeal Rights” (Threat Condition, 15-day cure). <https://www.himss.org/resources/hti-2-final-rule-fact-sheet-tefca-and-qhin-designations-governance-and-appeal-rights/>

eCFR, 45 CFR Part 172, Trusted Exchange Framework and Common Agreement (dispute resolution as informal, non-binding; QHIN requirements). <https://www.ecfr.gov/current/title-45/subtitle-A/subchapter-D/part-172>

ASTHO, “TEFCA Frequently Asked Questions” (data quality escalation under Common Agreement Provision 15.6; Governing Council). <https://www.astho.org/4a4b15/globalassets/pdf/tefca-frequently-asked-questions.pdf>

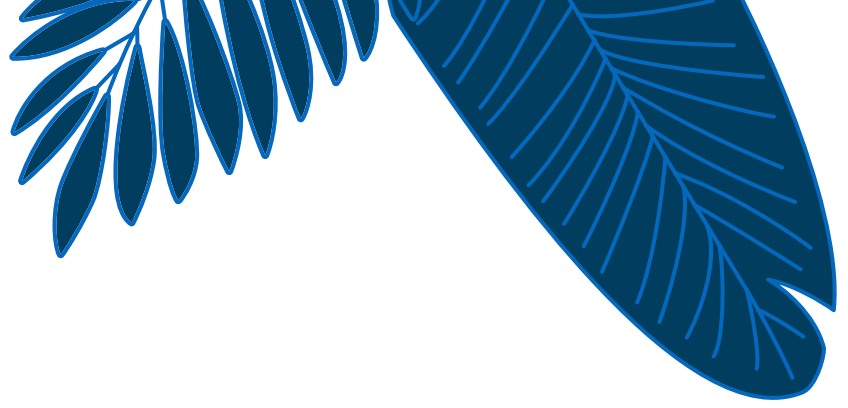
ONC TEFCA Recognized Coordinating Entity FAQ (RCE and ONC do not access ePHI; QHIN oversight of Participants; dispute resolution SOP). <https://rce.sequoiaproject.org/rce/faqs/>

The Sequoia Project, “Enforcement Process for Information Blocking Penalties.” <https://sequoiaproject.org/interoperability-matters/information-sharing-workgroup/enforcement-process-for-information-blocking-penalties/>

InterScripts, “21st Century Cures: Information Blocking” (eight exceptions; enforcement structure). <https://interscripts.com/knowledge/21st-century-cures-information-blocking/>

Ropes & Gray, “New Teeth to the Information Blocking Rule” (provider disincentives; CMPs up to \$1M). <https://www.ropesgray.com/en/insights/alerts/2024/07/new-teeth-to-the-information-blocking-rule-long-awaited-disincentives-for-health-care-providers>

Reed Smith, “HHS Finalizes Rule on Health Care Provider Information Blocking Penalties” (OIG weighs facts and circumstances). <https://www.reedsmith.com/our-insights/blogs/health-industry-washington-watch/102k29s/hhs-finalizes-rule-on-health-care-provider-information-blocking-penalties/>



Coppersmith, “What You Need to Know about TEFCA” (five-business-day security incident reporting; QHIN security requirements). <https://www.cbllawyers.com/wp-content/uploads/2022/02/2.2.2022-Coppersmith-Briefs-TEFCA-Common-Agreement.pdf>

HFMA, “Cyberattack on Change Healthcare brings turmoil to healthcare operations nationwide.” <https://www.hfma.org/technology/cybersecurity/cyberattack-on-change-healthcare-brings-turmoil-to-healthcare-operations-nationwide/>

American Hospital Association, “Congress Urged to Help Hospitals Impacted by Change Healthcare Cyberattack.” <https://www.aha.org/lettercomment/2024-03-20-congress-urged-help-hospitals-impacted-change-healthcare-cyberattack>

Healthcare Dive, “Small, financially struggling providers at risk from Change cyberattack: Moody’s.” <https://www.healthcaredive.com/news/change-healthcare-cyberattack-provider-financial-impact-moodys/709875/>

Nixon Peabody, “Change Healthcare cybersecurity breach: impact on healthcare providers.” <https://www.nixonpeabody.com/insights/alerts/2025/11/12/change-healthcare-cybersecurity-breach-impact-on-healthcare-providers>

Kodiak Solutions three-week revenue-loss estimate, reported in coverage of the Change Healthcare outage.

Health Gorilla, “Health Gorilla Achieves Federal Designation as a Qualified Health Information Network” (QHIN and QHIO dual designation, December 2023). <https://www.healthgorilla.com/blog/health-gorilla-achieves-federal-designation-as-a-qualified-health-information-network>

Healthcare IT News, “How Health Gorilla is advancing interoperability as a TEFCA QHIN” (query volume growth). <https://www.healthcareitnews.com/news/how-health-gorilla-advancing-interoperability-tefca-qhin>