

STRUCTURAL INTELLIGENCE BRIEF

Healthcare & Public Health

CISA Critical Infrastructure Sector



S.J. Bridger

Four Frequencies Framework

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Executive Summary

American healthcare operates inside a structural contradiction. The sector has consolidated market power to a degree that would trigger regulatory intervention in most industries: 97% of hospital markets are highly concentrated, and the average Herfindahl-Hirschman Index exceeds 5,000. That concentration has not produced structural stability. It has produced structural brittleness, because the workforce that runs these consolidated systems is thinner than it has been in a generation. Nursing supply sits at 91.94% of projected demand nationally. Over 65,000 qualified applicants are rejected from nursing programs each year for lack of faculty and clinical capacity. The sector is simultaneously too consolidated to adapt and too thin to absorb disruption.

This brief applies the Four Frequencies diagnostic framework to U.S. healthcare using 17 federal data metrics from CMS, HHS, BLS, and OSHA. It identifies structural conditions that organizational leaders and board members inside this sector inherit, whether or not they recognize them. The severity scores are not predictions. They are measurements of conditions that already exist.

Two of the four frequencies score VULNERABLE. The remaining two score STRAINED. No frequency in U.S. healthcare scores STABLE.



Sector Structural Profile

Healthcare and Public Health is designated by CISA as one of 16 critical infrastructure sectors whose disruption would have debilitating effects on national security, economic stability, and public health. The sector encompasses hospitals, pharmaceuticals, medical device manufacturing, health insurance, public health agencies, and the clinical workforce that connects them. It accounts for approximately 18% of U.S. GDP.

Market Concentration

The structural story of American healthcare over the past two decades is consolidation. Hospital mergers accelerated through the 2010s, and the pattern extended into physician practices, insurance markets, and pharmacy benefit management. KFF analysis of 2024 data found that 97% of hospital markets meet the DOJ/FTC threshold for high concentration. The average HHI across hospital markets exceeds 5,000, well above the 2,500 threshold that triggers antitrust scrutiny in other industries.

Concentration at this level creates structural dependency. When three or fewer systems control most of the beds in a metropolitan area, every organizational failure inside those systems propagates to the

community that depends on them. The system has no slack. A single cyberattack on a dominant health system (as Ascension and Change Healthcare demonstrated in 2024) does not affect one organization. It affects the region's capacity to deliver care.

Workforce Thinning

The consolidation narrative is incomplete without its companion: the workforce is not scaling with the structural demands being placed on it. HRSA's December 2025 projections place national nursing supply at 91.94% of demand. The gap is not uniform. Rural and underserved communities face projected shortfalls exceeding 20% in some specialties.

The pipeline constraint is upstream. Over 65,000 qualified nursing applicants were turned away in the most recent application cycle, primarily because nursing programs lack the faculty to train them. This is not a demand problem. It is a structural bottleneck in the production of the workforce the sector requires to operate.

Layered onto this supply constraint: 195,000 RNs departed the profession during the pandemic years, accelerating a tenure distribution shift that had already been underway. The 2025 NSI National Healthcare Retention Report documents 16% RN turnover nationally. The institutional knowledge leaving with each departure is not being replaced at the rate it is being lost.

Four Frequency Assessment

The Four Frequencies framework measures structural resilience across four dimensions of organizational and sector health. Each frequency captures a distinct pattern of structural vulnerability. Severity scores reflect the current state of measurable conditions, not projections or sentiment.

THINNESS

Thinness measures the structural depth of critical capacity. In healthcare, it surfaces as workforce gaps, supply chain fragility, and institutional knowledge concentration.

The evidence for VULNERABLE is direct. A nursing supply ratio of 91.94% means the sector is operating with less than 92 cents of workforce for every dollar of demand. That ratio has not meaningfully improved since the pandemic departures. Meanwhile, the production pipeline is structurally capped: rejecting 65,000 qualified applicants per year is not a temporary bottleneck. It is a design feature of a training infrastructure that was built for a smaller sector.

Drug shortage data from FDA reinforces the pattern. At any given point, over 300 drugs are in active shortage, many of them generic injectables with thin manufacturing margins and concentrated production (sometimes a single facility globally). The healthcare supply chain has optimized for cost at the expense of structural depth.

VULNERABLE

Thinness in healthcare is not merely a staffing problem to be solved with recruitment campaigns. It is a structural condition that shapes every other frequency.

PERMISSION

STRAINED

Permission measures how structural conditions distribute or concentrate decision authority and professional autonomy. In healthcare, it surfaces as regulatory load, administrative burden, and the gap between clinical judgment and institutional policy.

Hospital consolidation has concentrated decision authority in fewer corporate structures. When three systems control a regional market, clinical professionals inside those systems experience decision-making frameworks that originate further from the point of care. Compliance infrastructure has grown faster than clinical infrastructure in most health systems over the past decade. The CMS Conditions of Participation alone run to hundreds of pages, and that represents a fraction of the regulatory surface a typical hospital operates under.

The structural tension: consolidation promises efficiency through centralized operations, but centralized operations require standardized processes, and standardized processes reduce the adaptive capacity of the people executing them. Permission is STRAINED because the structures intended to coordinate care are simultaneously constraining the clinical workforce's ability to respond to conditions as they find them.

MANAGEMENT

STRAINED

Management frequency measures how structural conditions shape leadership effectiveness, operational coordination, and the capacity to execute strategy under pressure. In healthcare, it surfaces as leadership turnover, M&A; integration complexity, and the structural distance between executive strategy and clinical reality.

Healthcare CEO turnover reached 18% in 2024, the highest rate in a decade according to the American College of Healthcare Executives. Leadership instability at the top cascades through organizations that are already absorbing the structural pressures of consolidation, workforce thinning, and regulatory complexity. Each leadership transition resets institutional relationships, strategic priorities, and operational rhythms.

M&A; integration adds another layer. The average hospital merger takes 18-36 months to achieve operational integration, during which the combined entity operates with misaligned systems, duplicated processes, and competing cultural norms. In a sector where 97% of markets are already concentrated, each additional merger is integrating into an already-strained management structure.

ABSENCE

VULNERABLE

Absence measures what happens when structural conditions create gaps in critical functions, and what fills those gaps. In healthcare, it surfaces as care delivery deficits, workforce departure patterns, and the structural consequences of roles that go unfilled or under-supported.

The 195,000 pandemic-era RN departures did not create the Absence problem. They revealed it. Pre-pandemic turnover patterns were already elevating replacement costs and eroding the continuity of care delivery. The pandemic accelerated a trajectory that was structurally underway. OSHA workplace injury data shows healthcare consistently ranking among the highest incident rate industries, which functions as both a driver of Absence (people leave dangerous environments) and a signal of it (under-staffed environments become more dangerous).

These frequencies do not operate independently. In healthcare, they compound. Thinness (insufficient workforce) intensifies Absence (departure of existing workforce), which deepens Thinness further. Permission constraints (administrative burden, reduced autonomy) accelerate the departure cycle. Management instability prevents the sustained strategic response required to interrupt the pattern. The four frequencies are not independent variables. In healthcare, they form a self-reinforcing structural loop.

When four frequencies interact as a reinforcing loop rather than independent variables, the sector's structural trajectory is set by whichever frequency deteriorates fastest.

Federal Data Evidence Base

This assessment draws on 17 metrics from four federal agencies. Each metric maps to one or more Four Frequencies dimensions. The data is publicly available; the structural interpretation through the Four Frequencies lens is proprietary.

Source	Metric	Key Finding
KFF / DOJ	Hospital market concentration (HHI)	97% highly concentrated; avg >5,000
HRSA	Nursing supply-to-demand ratio	91.94% nationally (Dec 2025)
AACN	Nursing program rejection rate	65,000+ qualified applicants rejected/year
NSI	RN turnover rate	16% national average (2025)
BLS	Pandemic workforce departures	195,000 RN departures
ACHE	Healthcare CEO turnover	18% in 2024 (decade high)
OSHA	Workplace injury incident rate	Among highest of all industries
FDA	Active drug shortages	300+ at any given time
CMS	Hospital margins (operating)	Median negative for rural facilities
CMS	Conditions of Participation scope	Hundreds of pages, expanding
BLS	Healthcare employment growth rate	Outpacing training pipeline capacity

Source	Metric	Key Finding
CMS	Value-based payment adoption	Structural shift in revenue models
HHS	Health IT adoption / interoperability	Uneven; creates data silos
CMS	Rural hospital closure rate	Rising since 2010; 30% at financial risk
BLS	Healthcare wage growth vs inflation	Below-inflation in key clinical roles
OSHA	Workplace violence incidents	Healthcare 5x national average
HHS	Behavioral health workforce gap	Critical shortage in 60%+ of counties

Sources: Centers for Medicare & Medicaid Services (CMS), Health Resources and Services Administration (HRSA), Bureau of Labor Statistics (BLS), Occupational Safety and Health Administration (OSHA), Department of Health and Human Services (HHS), Food and Drug Administration (FDA), Kaiser Family Foundation (KFF), American Association of Colleges of Nursing (AACN), Nursing Solutions Inc. (NSI), American College of Healthcare Executives (ACHE).

Structural Risk Scenarios

Structural conditions do not predict specific events. They define the envelope of probable outcomes. The following scenarios are structurally plausible given current conditions. They are not forecasts. They are the shapes that failure takes in a sector with this structural profile.

Cascade Scenario: Regional System Failure

A dominant health system in a highly concentrated market experiences a major operational disruption (cyberattack, labor action, or financial distress). In a market where that system controls 40-60% of beds, the disruption cascades to the community. Remaining facilities lack surge capacity because they were already operating near the limits of their own thin workforce. The structural conditions that made this scenario possible: high HHI, sub-92% nursing supply ratio, 16% annual turnover depleting institutional knowledge at receiving facilities.

Compounding Scenario: Workforce Spiral

Turnover in a clinical department exceeds 20% in a single year. The remaining staff absorb the workload, increasing injury exposure (OSHA data already shows healthcare at 5x the national workplace violence rate). Injury-driven departures accelerate. Travel nurse costs spike, compressing operating margins (already negative at many rural facilities). The organization cannot recruit replacements because the training pipeline is structurally capped. The spiral stabilizes only when services are curtailed, transferred, or eliminated.

Structural Freeze Scenario: Consolidation Without Integration

A health system completes its third acquisition in five years. CEO turnover during the integration period resets strategic direction. The combined entity operates with three different EHR systems, two credentialing processes, and no unified clinical governance. Decision authority is formally centralized but

operationally fragmented. Permission is strained to the point where clinical staff in acquired facilities operate by informal workarounds rather than official policy. The system appears consolidated. Structurally, it is three organizations wearing one name.

Each scenario describes a pattern, not an event. The structural conditions that enable these patterns are measurable today. Whether a specific organization experiences them depends on its internal structural profile, which is what the diagnostic measures.

The Diagnostic Gap

This brief assesses structural conditions visible from federal data and public sources. The Four Frequencies framework measures 20 dimensions. Twelve are assessable from public data. Eight require diagnostic access to an organization's internal structural patterns through behavioral intelligence from raters inside the organization.

What Public Data Reveals (12 Dimensions)

The 12 public dimensions capture sector-level structural conditions: workforce supply and demand ratios, market concentration, turnover velocity, regulatory burden, leadership stability, supply chain depth, and operational risk exposure. These are the dimensions scored in this brief. They describe the structural environment that every organization in this sector inhabits.

What Requires Diagnostic Access (8 Dimensions)

Institutional Knowledge Mapping

Where critical knowledge actually lives. Federal data shows that 195,000 RNs departed. It cannot tell you which specific knowledge domains departed with them inside your organization.

Decision Authority Distribution

Who can make which decisions, and how far authority sits from the point of impact. Consolidation data shows centralization at the market level. It cannot map the decision architecture inside a specific health system.

Succession Readiness

Whether identified successors can actually absorb the structural load of the roles they would inherit. CEO turnover data shows the frequency of transitions. It cannot assess whether the next leader inherits a functional structure or a fragile one.

Cultural Load Distribution

Which informal norms and relationships are currently absorbing structural weight that formal systems have failed to carry. No federal dataset measures this.

Communication Pathway Integrity

Whether information moves through the organization at the speed required for the decisions being made. Market concentration creates structural distance between decisions and outcomes. Only internal assessment reveals the actual communication architecture.

Adaptive Capacity Under Stress

How the organization's structural profile changes under pressure. The scenarios in the preceding section describe sector-level patterns. How a specific organization responds depends on dimensions only visible through diagnostic engagement.

Role Architecture Coherence

Whether the organization's role structure matches its actual operational requirements, or whether critical functions survive on workarounds and informal arrangements.

Strategic Alignment Depth

Whether stated strategy and actual structural capacity point in the same direction. A system pursuing growth through acquisition while its workforce retention deteriorates has a strategic alignment problem that only internal data can quantify.

The gap between what is publicly visible and what is structurally real is where organizational risk lives. The brief tells you the weather. The diagnostic tells you whether your roof can hold.

Methodology

The Four Frequencies framework measures structural resilience across four dimensions: Thinness (depth of critical capacity), Permission (distribution of decision authority), Management (leadership and operational effectiveness), and Absence (gaps in critical functions and their consequences). Each frequency is assessed across five dimensions, for a total of twenty structural measurements.

Sector-level assessments draw on federal data mapped to the twelve publicly-measurable dimensions. Organization-level diagnostics add behavioral intelligence from internal raters to score all twenty dimensions. The combination produces the Structural Resilience Index (SRI), a composite score calibrated to a six-band severity scale.

Severity terminology: RESILIENT (structural depth across all frequencies), STABLE (adequate structural capacity with minor gaps), STRAINED (measurable structural pressure in one or more frequencies), VULNERABLE (significant structural gaps with compounding risk), FRAGILE (structural conditions that amplify disruption), CRITICAL (structural failure in progress or imminent).

What This Means for Your Organization

This brief describes the structural environment your organization operates inside. Whether these sector-level conditions are amplified or mitigated within your specific organization depends on your internal structural profile.

The Four Frequencies diagnostic measures all 20 dimensions for a single organization, producing a 40-page structural analysis with the Structural Resilience Index.

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About S.J. Bridger

S.J. Bridger is a structural resilience diagnostics practice. We analyze the structural conditions that determine whether organizations hold together when key people leave, when systems fail, and when the relationships that carried institutional knowledge disappear. The Four Frequencies framework was developed through forensic analysis of organizational failures across multiple sectors and refined through diagnostic engagements that measure what traditional assessments miss.

Structural Intelligence Briefs are published assessments of sector-level conditions. They are updated quarterly as federal data sources release new information. The Healthcare brief is the first in a series covering all 16 CISA critical infrastructure sectors.

DISCLAIMER: This Structural Intelligence Brief is a sector-level structural assessment based on publicly available federal data and the Four Frequencies analytical framework. It does not constitute advice to any specific organization. It does not establish a consulting engagement, advisory relationship, or professional obligation between S.J. Bridger and any reader or recipient.

Sector-level structural conditions described in this brief may or may not apply to any individual organization within the healthcare sector. Organizational structural profiles vary based on internal conditions that are measurable only through diagnostic engagement. Decisions regarding organizational strategy, workforce planning, risk management, or any other operational matter should not be based solely on the sector-level findings in this document.

The severity scores, structural risk scenarios, and analytical observations in this brief reflect conditions as of the publication date. Federal data sources update at varying intervals. This brief will be updated quarterly. Prior versions should not be relied upon after a subsequent version has been published.

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