State of Value-Based Care and Health Data Interoperability in the Age of AI Agents

Healthcare is complex—there's no getting around it. Since the term Value-Based Care (VBC) was coined in 2006, this model—designed to incentivize providers to prioritize patient outcomes over transaction volume—has served as the north star of healthcare reform. But there's always been one massive roadblock: interoperability. That's a fancy word for a simple idea—getting different healthcare systems to actually talk to each other, share data, and work seamlessly together.

Now, think about this: why is it that your dentist, physician, gynecologist, dermatologist, and optometrist all have separate records for you? Why isn't your health data—across all specialties— easily accessible in one place, just like your credit card transactions on platforms like Credit Karma or Mint? Why isn't there a central "health data bureau" that you can access securely with your social security number, just like your financial data? The answer lies in a longstanding hurdle: interoperability (and, yes, politics—but we'll dive into that later). In finance, systems talk to each other effortlessly. In healthcare, each system—whether it's your physician, your dermatologist, or your optometrist—works in isolation, unable to share or connect data with the others.

Health data is vastly more intricate than most other fields. It encompasses a wide range of data types: including medical records, prescriptions, laboratory test results, and diagnostic images such as X-rays, MRIs, and CT scans. This data is further expanded to include clinical notes written by healthcare professionals, patient-generated data from wearable devices like smartwatches, and even social media posts that are analyzed for public health insights. There's also genomic data used in precision medicine, and claims data from insurance companies, all playing crucial roles in diagnosing and treating conditions, as well as in healthcare research.

The issue of interoperability—getting all these different types of data to communicate and share seamlessly—is at the heart of the problem.

Interoperability has evolved from pipe dreams and coaxial cables to sophisticated frameworks like HL7 and FHIR. Now, with the rise of AI Agents, a transformative technology that's ready to break through the barriers of fragmented health data, we may finally be on the fast track to achieving true end-to-end interoperability and patient-centered care.

The story of health data sharing is best understood through its historical evolution, but AI Agents, powered by advanced transformer-based models, represent a quantum leap forward in solving the fundamental challenges that have plagued healthcare interoperability. These agents excel at processing multiple modalities of data—whether it's structured data like diagnoses and prescriptions, or unstructured data like doctor's notes and medical images. Where previous generations struggled with technical limitations and fragmented systems, AI Agents can bridge gaps that, until now, would have required significant resources, time, expertise, and technology to close.

But here's the thing: the weakest link isn't technical anymore. It's political, it's economic, and in many ways, it's self-inflicted. In this piece, we'll explore how we got here, why it's so hard to fix, and how the next wave of innovation might finally break through the barriers. Spoiler: it's not about more tech or AI Agents. It's about smarter strategies, new business models, and a shared commitment to making this work for everyone involved.

The Evolution of Interoperability: Setting the Stage for AI Agents

While the historical progression of health data exchange laid critical groundwork, AI Agents are now positioned to accelerate and transform this journey. The transformative potential of AI Agents in healthcare extends far beyond simple data translation. They represent a paradigm shift in how we approach patient care, data management, and systemic efficiency. Each historical phase created challenges that AI Agents are uniquely equipped to address:

1. **Technology Push (1970s-1980s):** In late 1970s, Computers were mainframes, and data exchange involved rudimentary methods like coaxial cables and manual rekeying. Vendors charged exorbitant sums for custom integrations, making healthcare data exchange a niche luxury. This era saw foundational developments, like the International Standards Organization (ISO) introducing the OSI model in 1979—a precursor to modern communication protocols.

   By the 1980s, market demand for data sharing began to rise. Healthcare players recognized that sharing patient data could improve outcomes and reduce costs. HL7 was born in 1987, offering a standard framework for data exchange between applications. The American Society of Testing and Materials (ASTM) laid groundwork in lab data standards. Still, these early efforts were fragmented and far from the seamless integration we imagine today.

2. **Need Pull (1990s):** As healthcare digitized, market forces drove the demand for better data exchange. HL7 v2.x became widely adopted, helping hospitals integrate disparate systems. However, this era also introduced a patchwork of standards, including DICOM for medical imaging and NCPDP SCRIPT for e-prescribing. The lack of coordination between these frameworks created new silos, limiting progress.

   The 1990s brought a mix of progress and setbacks. With personal computing on the rise, HL7's v2.x series became the go-to standard for hospital systems. Simultaneously, specialized standards like DICOM (for medical imaging) and NCPDP SCRIPT (for e-prescribing) emerged, creating silos of their own. The competition between stakeholders—often viewing data as proprietary—turned what could have been a collaborative era into one defined by inefficiency and turf wars.

3. **Coupling Chaos (2000s):** The 2000s saw attempts to integrate these fragmented systems, ushered by government-led initiatives aimed at solving the interoperability

conundrum. XML-based frameworks like HL7 v3 and standards like C-CDA (Consolidated Clinical Document Architecture) were introduced, promising more structured data sharing. However, HL7 v3's complexity led to limited adoption, and C-CDA often fell victim to divergent implementations. Despite these hurdles, regulations like Meaningful Use, pushed the industry forward, mandating certified EHR adoption and requiring standards like C-CDA for clinical document exchange. However, the complexity of implementation and divergent interpretations of these standards exposed deep systemic issues.

4. **The Political Era (2010s):** By the 2010s, regulatory frameworks began reshaping interoperability. Initiatives like the 21st Century Cures Act tackled "information blocking," penalizing actors that withheld data without justification. The game changed with FHIR (Fast Healthcare Interoperability Resources). Lightweight, developer-friendly, and designed for modern web standards like REST and JSON, FHIR broke through where earlier frameworks stumbled. Coupled with cloud computing and mobile technologies, we're finally seeing the technical pieces align to enable real-time, API-driven data exchange.
5. **The Networked Future (2020s):** Today, we stand on the edge of a new era in healthcare. The fifth-generation model envisions a fully connected ecosystem, with data flowing seamlessly across systems. AI Agents are not just participants in this future; they are the architects – designing a truly integrated health system architecture that enables autonomous and secure data exchange. This isn't just a technological inevitability; it's a moral imperative. The question isn't whether we'll get there, but when.

Why Interoperability Matters

So, why does this all matter? Simple. Without interoperability, VBC is a pipe dream. Providers can't improve patient outcomes if they don't have a full picture of their health history. Patients can't make informed decisions if their data is stuck in silos -- patients need access to their data to engage meaningfully in their care. And the entire system ends up paying more for worse results.

Here's the kicker: lack of interoperability isn't just inefficient—it's deadly. Studies have shown that delays in data sharing can lead to misdiagnoses, treatment errors, and avoidable complications. Without interoperability, delays, redundancies, and errors are the norm, increasing costs and risking lives.

Breaking the Barriers: What's Next?

The good news is that we're finally seeing progress. Here's what's working:

1. **CMS Interoperability and Prior Authorization Rule:** In 2021, CMS introduced FHIR-based APIs to streamline prior authorization, a historically cumbersome process. By

automating this workflow, the rule significantly reduces administrative burdens and accelerates care delivery.

2. **Trusted Exchange Framework and Common Agreement (TEFCA)**: TEFCA, operational since 2022, establishes a unified framework for nationwide health information exchange. Designated Qualified Health Information Networks (QHINs) ensure secure and standardized data sharing across providers, payers, and public health entities.
3. **Expansion of United States Core Data for Interoperability (USCDI):** ONC's updates to USCDI, including Version 4 set for adoption by 2028, add data classes like facility information and patient-reported outcomes. These expansions enhance the depth and breadth of data exchange, supporting a wide range of care settings.
4. **The CARIN Alliance for Consumer Access:** This alliance has pushed for patient-directed data exchange, enabling individuals to securely retrieve and share their health information through standardized APIs. This consumer-centric approach aligns with the 21st Century Cures Act, emphasizing transparency and accessibility.
5. **Public Health Interoperability Advances:** The HTI-2 proposed rule (2024) emphasizes seamless data exchange for public health emergencies. Enhancements include clinical image sharing and real-time data reporting, essential for managing crises like the COVID-19 pandemic.

While these efforts aren't perfect, they're pushing the industry toward standardization. Collaborative standards are being promoted by non-profits and working groups like HL7's DaVinci Project. Market forces are driving providers and payers to realize that interoperability isn't just a regulatory box to check—it's a competitive advantage. Smarter tech is emerging, using open-source technologies and API-driven architectures to bridge gaps between legacy systems and modern data tools.

How AI Agents Enhance Interoperability and VBC

While AI has been touted as a transformative force in healthcare, some industry experts remain more cautious about its potential. A former colleague of mine, who's one of the leading figures in the health data field, offers a grounded perspective on AI's current role. He envisions AI being used in very specific, highly constrained applications for the foreseeable future. For example, CMS rules like CMS-0057-F, which require the electronic exchange of prior authorizations, might see AI auto-approving routine procedures like hip and knee replacements. These types of applications, he points out, are more about automating decision support systems or rules engines, technologies that have been around for decades, rather than the kind of revolutionary AI change we often hear about.

He cautions against expecting AI to radically lower healthcare costs or drive broad-scale changes across the industry. Instead, he believes businesses should focus on solving specific problems within the industry rather than chasing the "AI hype." This is especially true if the business doesn't have a clear, well-defined use case, market, and payment mechanism in place.

This feedback provides an important balance to the conversation about AI in healthcare. While AI agents are well-equipped to handle complex health data—think medical images, EHRs, genomic data, and even wearable health data—it's essential to remember that the real impact of AI may not come from sweeping, system-wide changes, but from targeted, practical applications. AI Agents are indeed well-suited to navigate multiple data types and modalities, and companies like Tempus and Cerner are already integrating AI into their platforms to improve data exchange and streamline healthcare delivery. However, as my former colleague suggests, a more cautious approach is needed, particularly when we move beyond simple automation into areas that demand broad systemic change. The industry needs to focus on specific, actionable use cases rather than the allure of AI for its own sake

Overall, AI Agents are poised to play a crucial role in overcoming the interoperability challenge and driving the adoption of VBC by addressing several key areas. Below are some specific use cases that have emerged since the release of GPT-3.5 architecture:

1. **Streamlining Prior Authorization for Faster Care Delivery:** The prior authorization process has long been a bottleneck in healthcare, delaying critical treatments. AI-powered systems are stepping in to change that. By integrating payer and provider platforms with CMS-mandated FHIR APIs, AI tools automate the approval process, cutting weeks-long delays to mere days. The CMS Interoperability and Prior Authorization Final Rule is leading this charge, ensuring automation is not just a nice-to-have but a must-have. For instance, payers like UnitedHealth Group are piloting AI-driven automation to streamline approvals, while platforms like Arcadia integrate claims and authorization workflows for real-time decision-making.
2. **Real-Time Integration of Disparate Health Data Systems:** AI agents are bridging the gap, serving as dynamic translators between legacy systems and modern FHIR-compliant platforms. Initiatives like TEFCA enable nationwide data-sharing, but AI adds the intelligence to make it seamless. Epic's Cosmos uses AI for networked interoperability across its vast EHR footprint, while tools like InterSystems Iris integrate disparate health systems in real-time, ensuring every piece of patient data connects meaningfully.
3. **Enhancing Care Coordination Across Providers:** By unifying multimodal data, including SDOH, clinical records, and imaging data, AI Agents enable care teams to access and act on a single, unified patient record. Microsoft Fabric's healthcare platform is an example of this, supporting better care planning and reducing redundant tests or treatments. Similarly, Cerner's HealtheIntent uses AI to integrate patient data from multiple providers, enabling coordinated treatment plans that reduce redundancies and improve outcomes.
4. **Reducing Information Blocking Through Transparency Tools:** ONC's HTI-1 rule mandates AI-driven solutions to ensure transparency in data-sharing practices. AI Agents enable compliance by monitoring and reporting potential instances of information blocking, ensuring data flows across stakeholders in accordance with VBC goals.
5. **Improving Oncology Data Interoperability for Value-Based Cancer Care:** AI-powered FHIR APIs developed with platforms like Arcadia standardize complex oncology data such

as tumor markers and genomic tests. This supports CMS's Enhancing Oncology Model (EOM), allowing oncologists to coordinate seamlessly with primary care providers.

6. **Optimizing Population Health Management:** AI Agents analyze aggregated SDOH and clinical data to identify at-risk populations, enabling proactive interventions. CMS models, like the ACO PC Flex Model, leverage these insights to deliver team-based, proactive care, essential for VBC outcomes.
7. **Automating Administrative Burdens for Providers:** Tools like DAX Copilot use AI Agents to automate clinical documentation and streamline workflows. By integrating seamlessly with FHIR APIs, these agents ensure data consistency across platforms while freeing providers to focus on patient interactions.
8. **Empowering Patients with Interoperable Health Data:** AI Agents enhance patient engagement by enabling secure, real-time access to interoperable health records through frameworks like Blue Button 2.0. Patients can better manage their care and share comprehensive data with new providers, aligning with the principles of VBC.
9. **Accelerating Claims Data Utilization for Faster Insights:** AI Agents integrated with AWS HealthLake allow for near-real-time analysis of beneficiary claims data. This helps providers make informed decisions faster, improving care delivery and financial outcomes under value-based contracts.
10. **Facilitating Holistic Behavioral and Social Health Integration:** CMS's Innovation in Behavioral Health Model incentivizes AI-driven tools that integrate behavioral health and social supports with clinical data. AI Agents align Medicaid and Medicare systems to ensure seamless care for vulnerable populations.
11. **Creating Longitudinal Patient Records for Precision VBC:** AI Agents dynamically integrate patient data from diverse sources—genomic data, imaging, and EHRs—into longitudinal records. This provides care teams with a complete patient history, supporting personalized, data-driven interventions in VBC frameworks.
12. **Improving Quality Reporting with Real-Time Analytics:** AI Agents automate quality reporting by extracting data from interoperable EHR systems and analyzing it in real time. This supports programs like the Merit-Based Incentive Payment System (MIPS), enabling providers to align with VBC requirements more efficiently.
13. **Reducing Readmissions with Predictive AI Agents:** AI Agents leverage wearable and remote monitoring data to detect early signs of deterioration in post-discharge patients. Timely interventions reduce readmissions and align outcomes with VBC objectives.
14. **Supporting Team-Based Oncology Care Coordination:** AI Agents integrated with SMART on FHIR applications provide real-time insights into oncology care workflows. These tools ensure that all members of the care team have up-to-date data, fostering collaboration and improved outcomes in VBC initiatives.
15. **Ensuring Compliance and Security in Interoperable Systems:** AI Agents in platforms like Microsoft Purview ensure role-based access control and secure data governance. These tools protect patient data while enabling interoperability, addressing critical compliance requirements for VBC adoption.

Breaking the Barriers: A Skeptical Yet Hopeful Path to VBC and Health Data Interoperability

The journey toward achieving health data interoperability and realizing VBC is undeniably complex and fraught with obstacles. Many providers and payers are not yet ready to embrace a fully interoperable healthcare system because, frankly, sharing data is not in their immediate self-interest. While AI-driven solutions, like FHIR-based APIs and interoperable platforms, hold great promise, true collaboration will require overcoming significant resistance.

1. **The Political and Economic Roadblocks:** The reality is that healthcare providers and payers are often locked in competitive ecosystems, where data is currency and fee-for-service is the standard incentive model. For providers, sharing patient data with competitors could mean losing patients to other hospitals or care teams. For payers, opening up access to claims data or integrating health records across networks may expose proprietary insights that could undermine their competitive advantage. To achieve VBC, providers and payers need to align on shared financial goals that prioritize outcomes over volume.

   Even with frameworks like TEFCA (Trusted Exchange Framework and Common Agreement) aiming to standardize how data is exchanged, the execution is far from straightforward. Data-sharing agreements are, under current incentive framework, competitive threats for providers and payers. Therefore, the future of healthcare depends on shifting this incentive model.

   Data-sharing agreements must instead be re-structured as the foundation for improving patient outcomes at scale. This is how we can get the providers and payers to recognize that data-sharing is not only a compliance requirement but an essential tool for improving care and therefore their economics. CMS programs like the MSSP (Medicare Shared Savings Program) and ACO models are starting to reward healthcare organizations for the value they provide rather than the number of services they deliver. These models incentivize care teams to focus on improving patient outcomes, a transition that requires seamless data sharing to be effective.

2. **The Role of Government and Policy Change:** While the government has played a significant role in pushing for interoperability with rules like the CMS Interoperability and Prior Authorization Final Rule – by mandating standardized data exchange through FHIR and pushing for data transparency, these efforts are, at best, incremental. The implementation of these rules depends heavily on how much pushback they encounter from powerful players in the healthcare space. Political inertia and industry lobbying often slow down progress, especially when policies seem to challenge entrenched financial interests. In short, although government mandates like MIPS (Merit-Based Incentive Payment System) and MACRA are pushing for interoperability and value-based care, they will not be enough to guarantee a system-wide transformation without more active incentives and penalties.

While the HTI-1 rule introduces transparency and demands algorithmic accountability in AI tools, enforcing its compliance remains a huge challenge. Companies like IBM Watson Health and Cerner are making strides, but the real-world application of these rules will face significant hurdles in actual deployment.

The Path Forward:

The ultimate goal remains a healthcare system where data sharing is the norm and providers and payers work in unison to improve care delivery. While we are not yet in the "age of VBC," the path toward it is becoming clearer. The journey ahead involves overcoming resistance, aligning incentives, and ensuring that the financial benefits of data exchange are well understood across the healthcare ecosystem. AI Agents, with their transformative potential, could play a crucial role in expediting this transition by realizing the value of shared data and aligning the economic incentives necessary for VBC.

Arcadia, Cerner, Epic, and Microsoft Fabric are already using AI agents to integrate diverse patient data, creating unified records that improve care coordination and decision-making. These systems combine clinical, claims, and social determinants of health (SDOH) data, enabling real-time insights that reduce redundancies, streamline workflows, and enhance patient outcomes. However, the full potential of interoperability remains a challenge. Epic and Cerner use FHIR standards and are involved in CommonWell Health Alliance (for Cerner) and Carequality (for Epic) to improve data sharing. However, Cerner's Millennium platform and Epic's Healthy Planet still require custom configurations and additional middleware to ensure seamless data exchange between their systems. While these platforms have made progress, they still largely focus on compliance rather than true interoperability, meaning they are "checking boxes" for regulatory standards but not always meeting the full intent of universal data exchange.

Because of these hurdles, achieving health data interoperability and VBC will require not just AI Agents but collaborative governance and alignment of incentives across all stakeholders.

1. **Standardization:** The healthcare industry has largely adopted FHIR as the standard of choice, with AI agents making this transition to FHIR smoother. However, adopting FHIR internally and enabling true interoperability are different challenges. FHIR integration is progressing, but without aligned financial incentives, VBC goals will remain out of reach. For instance, while Arcadia and Cerner are working on FHIR-based systems for interoperability, the primary reliance on fee-for-service models means that full FHIR adoption won't reach its potential until there is a shift toward VBC.
2. **Collaboration:** Bridging gaps between payers, providers, and tech vendors may sound simple, but it is incredibly difficult in practice. Providers fear legal risks or losing business through data sharing, while payers view claims data as proprietary. Private-public collaborations, like those in CMS Innovation Models (e.g., ACO PC Flex Model), show promise. However, without aligned incentives, many will prioritize proprietary systems over interoperability.

3. **Consumer Empowerment:** Giving patients control over their health data is often touted as a solution to interoperability challenges. While this is undoubtedly a key element of achieving VBC, it can only succeed if healthcare systems are willing to integrate patient-driven data into clinical workflows. Apple Health Records and Blue Button 2.0 have made strides here, but for patients to take full advantage of these tools, providers must be incentivized to accept patient-supplied data as part of the care process. It's a win-win for both sides-but only if providers feel there's a clear benefit.

A Skeptical Hope: Collaboration and Incentive Alignment Are Key

Healthcare is at a crossroads. We have the technology, the know-how, and the market demand to make interoperability a reality. What's missing is the collective will to push through the remaining political and economic barriers. Success will depend on both governmental intervention and private sector willingness to adopt interoperable standards. Efforts like CMS's Innovation Models and ONC's HTI-1 are foundational but achieving system-wide change will require continuous collaboration, with clearly defined incentives for all stakeholders.

Providers and payers may not be eager to expose their systems today, but as models of success emerge – such as those from Arcadia and Cerner – the business case for interoperability may become undeniable. With the incoming administration focused on reducing healthcare costs, increased regulatory support for interoperability, and the rise of AI agents that reduce both costs and technical barriers, momentum is building. This convergence could prompt payers, providers, and tech vendors to align around VBC goals faster than anticipated. For the first time, the path to outcome-driven patient care and the comprehensive use of health data through downstream applications is more achievable – if we can find the collective will to make it happen.