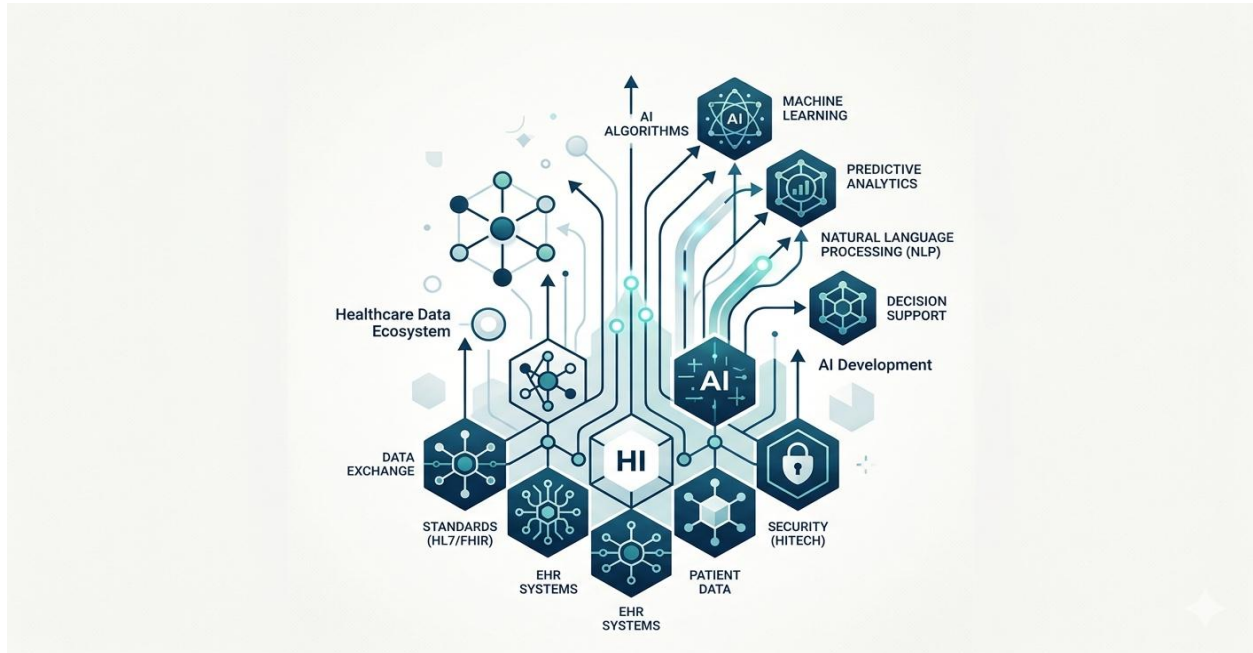


# AI Requirements and Their Dependence on Healthcare Interoperability



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June 2026

## Executive Summary

Healthcare organizations are rapidly investing in artificial intelligence to improve clinical outcomes, operational efficiency, and financial performance. Yet many AI initiatives depend on a capability that receives far less attention: interoperability. With healthcare AI projected to generate more than **\$868 billion** in value by 2030, organizations are accelerating investments in AI-driven initiatives. However, the effectiveness of those investments depends heavily on the quality, availability, and movement of data across disparate systems.

AI is real, valuable, and increasingly important. However, its success in healthcare depends on something that receives far less attention: interoperability. Healthcare AI initiatives depend on the same integration foundations that organizations have struggled with for decades. That data needs to arrive correctly, completely, consistently, and on time. Organizations with mature interoperability capabilities will be positioned to realize the benefits of AI. Those with fragmented integration environments may discover that AI amplifies existing data quality, governance, and workflow challenges rather than solving them.



## 1. Introduction: The AI Healthcare Gold Rush: Why are organizations investing so heavily in AI?

Healthcare organizations are aggressively pursuing artificial intelligence initiatives to improve clinical outcomes, reduce costs, and increase operational efficiency. Executive leadership teams are investing in AI-enabled solutions with expectations of measurable returns across both clinical and business functions.

Common healthcare AI use cases include:

- Clinical decision support
- Revenue cycle optimization
- Predictive analytics
- Population health management
- Ambient clinical documentation

The potential benefits of these applications are significant. However, every AI initiative shares a common dependency: access to reliable, timely, and complete data.

Healthcare data is distributed across electronic health records, laboratory systems, imaging platforms, revenue cycle applications, payer systems, and numerous third-party solutions. The ability to exchange and integrate information across these environments has long been a challenge for healthcare organizations.

While artificial intelligence introduces new capabilities, it does not eliminate the need for interoperability. In many cases, it increases the organization's dependence on it. AI systems can only be as effective as the data they receive, making interoperability a foundational requirement rather than a technical afterthought.

This paper explores why interoperability has become one of the most critical success factors for healthcare AI initiatives and examines the risks organizations face when the underlying integration infrastructure is unable to meet growing data demands.

## 2. AI Runs on Data: AI's Dependence on High-Quality Connected Data

AI requires data that is complete, connected, timely, and trustworthy across the healthcare ecosystem. To ensure the accuracy and timeliness, AI is dependent on interoperability.

AI Requirement	Interoperability Dependency
Data Volume	Data must be aggregated across systems
Data Quality	Interfaces must accurately transmit information
Data Consistency	Standardized formats and terminologies are required
Contextual Accuracy	Data from multiple clinical systems must be correlated correctly
Timeliness	Near real-time exchange is often required

*Table 1 - AI Requirements and Their Dependence on Healthcare Interoperability*

Before AI can analyze healthcare data, healthcare systems must exchange it. Where does AI get its data:

- EHRs
- LIS
- RIS
- PACS
- Billing systems
- Scheduling systems
- HIEs
- Third-party vendors

AI consumes information from numerous healthcare systems through existing interoperability frameworks, including HL7, FHIR, and API-based integrations.

While AI can generate new content, recommendations, and insights, the quality of those outputs is ultimately limited by the quality of the underlying data it receives. AI is impacted by the same interoperability issues that exist in current state:

- Incomplete medication lists can lead to inaccurate medication recommendations.
- Missing diagnoses can cause risk stratification models to underestimate patient complexity.
- Duplicate patient records may result in fragmented patient histories and conflicting recommendations.
- Delayed ADT messages can prevent AI systems from acting on current patient conditions.

- Structural differences in HL7 messages can prevent AI systems from consuming the correct data

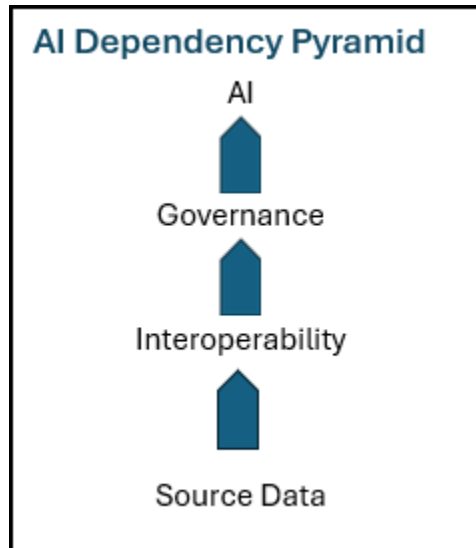


Figure 1- Each layer depends on the integrity of the layer beneath it.

### 3. Why Existing Interoperability Challenges Matter More in the AI Era

AI solutions are expected to deliver richer insights and faster decision support. In healthcare, those capabilities can improve clinical outcomes, operational efficiency, and patient experiences. However, AI systems are only as effective as the data they consume. As a result, AI is subject to many of the same interoperability challenges that have long frustrated integration teams.

The long-standing technology principle of "Garbage In, Garbage Out" applies directly to artificial intelligence. Even the most sophisticated AI models cannot consistently produce reliable outputs when the underlying data is incomplete, inaccurate, inconsistent, or outdated.

#### Data Quality

- Missing data
- Incorrect mappings
- Duplicate patient records

Poor data quality can lead AI systems to generate incomplete, inaccurate, or misleading recommendations.

#### Data Consistency

- Different coding standards
- Different workflows across organizations
- Inconsistent terminology

When similar information is represented differently across systems, AI models may struggle to correctly interpret and correlate the data.

#### Timeliness

- Delayed interfaces
- Batch processing instead of real-time data exchange

AI systems relying on outdated information may provide recommendations that no longer reflect the patient's current condition.

#### Data Completeness

- Partial patient histories
- Missing records from external providers

Without a complete view of the patient, AI solutions may miss important clinical context needed to support accurate decision-making. The more advanced the AI solution, the greater its dependence on complete, accurate, timely, and standardized information.

Healthcare organizations that have not addressed underlying interoperability challenges may find that those same challenges limit the effectiveness of their AI investments.

## 4. Governance Becomes an AI Requirement

Interoperability enables data to move between systems. Governance ensures that the data being exchanged remains accurate, consistent, complete, and trustworthy.

Governance should focus less on who introduced the error and more on establishing processes that detect, correct, and prevent data integrity issues regardless of where they originate. The goal is not to identify who made the mistake. The goal is to ensure the issue is corrected and prevented from recurring.

### 1. Establishing Standards

Governance defines:

- Required data elements
- Coding standards
- Data definitions
- Quality thresholds

Without standards, interoperability simply transfers inconsistencies faster.

### 2. Monitoring Data Quality

Governance creates processes to identify:

- Missing data
- Duplicate records
- Mapping errors
- Interface failures
- Data drift over time

This moves governance from policy into operational practice.

### 3. Driving Remediation

When a data quality issue is identified, governance provides a structured process for:

- Root cause analysis
- Ownership determination
- Corrective action
- Validation of resolution

Effective governance is not primarily about assigning blame when data quality issues occur. Rather, it establishes the standards, monitoring processes, and remediation

procedures necessary to identify and correct issues regardless of their point of origin. Data integrity problems may arise from source system configuration, workflow variation, interface mappings, terminology differences, or downstream transformations. Governance provides the framework for managing these risks across the entire data lifecycle.

As healthcare organizations expand their use of artificial intelligence, governance becomes increasingly important. AI systems can amplify existing data quality issues, making it essential that organizations establish clear standards for data stewardship, continuous quality monitoring, and timely remediation. Without effective governance, interoperability may succeed in moving data, but organizations cannot be confident that the information being consumed by AI is reliable.



## 5. AI as an Amplifier - AI does not eliminate data problems. It scales them.

A common misconception is that artificial intelligence will solve longstanding interoperability challenges. While AI can assist with data mapping, normalization, and analysis, it does not eliminate the need for high-quality, interoperable data. Instead, AI acts as an amplifier of the existing environment.

In organizations with mature interoperability and governance practices, AI can enhance clinical decision support, automate repetitive processes, identify patterns across large datasets, and generate meaningful operational insights. The combination of trusted data and advanced analytics can create significant value.

However, the opposite is also true. When data quality, consistency, timeliness, or completeness issues exist, AI can amplify those deficiencies at a scale and speed that exceeds traditional systems.

Potential consequences include:

- Faster propagation of incorrect information
- Inaccurate recommendations based on incomplete data
- Workflow disruptions caused by unreliable outputs
- Increased operational inefficiencies
- Reduced clinician confidence in AI-generated insights

An AI model designed to assist with Prior Authorization workflow requires not just a patient match, but a visit/encounter match when appointments are consumed. However, if the scheduling application is different than the registration application, there is no means to add encounter information.

Perhaps the greatest risk is the erosion of trust. Healthcare professionals must have confidence in the information used to support patient care and operational decision-making. If AI repeatedly produces questionable recommendations due to underlying data issues, users may begin to distrust not only the AI solution itself but also the data systems supporting it.

**Recommended Actions for Healthcare Leaders**

- Assess interoperability maturity before launching AI initiatives.
- Establish data governance ownership and stewardship processes.
- Measure and monitor data quality metrics.
- Prioritize real-time data exchange for AI-dependent workflows.
- Include interoperability and governance leaders in AI planning efforts.
- Conduct periodic audits of AI data sources and data lineage.

## Conclusion

The future of healthcare AI will not be determined solely by advances in algorithms, computing power, or model sophistication. It will be determined by healthcare organizations' ability to deliver accurate, complete, consistent, and timely data across increasingly complex ecosystems. AI may be the visible innovation, but interoperability remains the foundation that makes that innovation possible.

Organizations investing in AI often focus on model selection, infrastructure, and use cases. However, the effectiveness of any AI solution ultimately depends on the quality of the information it consumes. Interoperability provides access to that information, while governance ensures that it remains trustworthy.

AI can accelerate insight generation, automate workflows, and improve decision-making, but it can also amplify existing data quality and governance challenges. The organizations most likely to realize the full value of AI will be those that first establish strong interoperability frameworks, effective governance practices, and a culture of continuous data stewardship.

The question is not whether healthcare organizations should invest in AI. The question is whether they have established the interoperability and governance foundations necessary for AI to succeed. Without those foundations, AI may simply accelerate existing problems. With them, AI has the potential to transform healthcare delivery, operations, and patient outcomes.

As healthcare organizations expand their AI initiatives, the question is not whether interoperability remains important. The question is whether organizations can afford to overlook it. **In the age of AI, the importance of interoperability does not diminish—it increases.**