

The AI-by-Design Advantage: Why Healthcare Needs a New Architectural Model

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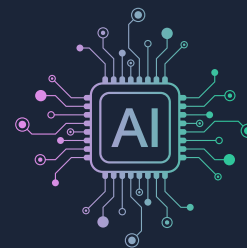
Executive Summary

The healthcare industry has enthusiastically embraced artificial intelligence, all in hopes of accelerating documentation, automating coding, and streamlining revenue cycle workflows. Yet for many practices, the promised relief from administrative burden remains elusive. While individual AI tools deliver localized gains, they have not fundamentally changed how work moves through a practice.

That's because legacy EHRs were never designed to support enterprise-wide coordination. They were built as documentation systems: siloed databases optimized for billing codes and compliance requirements, not intelligent workflow orchestration. When AI is retrofitted onto these foundations, it inherits their fragmentation. Clinical data lives separately from financial data.

Patient engagement happens in a different system entirely. The AI can optimize within each silo, but it cannot coordinate across them, which means prior authorizations still require staff to manually shuttle information between systems, coding suggestions arrive too late to capture revenue, and patient data updates in one place but not another. The result is automation that speeds up individual tasks but fails to eliminate the structural friction driving burnout and revenue leakage.

This paper argues that realizing the full promise of AI requires a shift from bolt-on tools to AI-by-design architecture. Cloud-native systems built from the ground up to unify data, coordinate workflows, and enable intelligent agents to act proactively across the care journey. This shift represents an evolution from clinician-led systems that wait for human input to systems that prepare, guide, and clear the path for the clinicians they support. Care delivery, not complexity, takes the lead.



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The Hidden Cost of Legacy Architecture: Built for Documentation, Not Care Delivery

Today's EHRs emerged largely from the need to digitize documentation in support of fee-for-service billing. They accomplished that goal remarkably well. However, by optimizing for documentation completeness, these systems embedded administrative burden directly into clinical workflows.

The architecture that made sense for documenting encounters fails catastrophically when asked to support the proactive, preventive, coordinated care that modern medicine requires.

Physicians now spend **15.5 hours per week on paperwork and administrative tasks**,¹ with nearly half their workday consumed by EHR interactions.

For every 8 hours of scheduled patient time, clinicians spend **3.4 hours working in their EHR**², often extending into evenings and weekends to catch up on charting.



The Bolt-On Trap

In response to mounting burnout, the industry has layered new tools onto existing systems. AI-powered scribes, decision support modules, and prior authorization assistants each address a real pain point. Consider ambient documentation—studies demonstrate remarkable results, with one health system **saving over 15,000 hours of documentation time annually**,³ while **physician burnout dropped from 51.9% to 38.8%**⁴ after only 30 days of use.

Yet these tools operate as external services that capture conversations and push notes back into the EHR. The doctor still manually validates against disconnected lab systems, separately checks for drug interactions, and individually coordinates billing documentation. This pattern repeats across every bolt-on solution: genuine relief from individual pain points, but relief from symptoms rather than a cure for the disease. The fundamental problem—architectural fragmentation—remains untouched.

The cost extends beyond frustrated physicians. Revenue leaks through gaps in fragmented workflows, including missed codes, denied prior authorizations, and overlooked charges for materials and supplies. Patients experience disjointed care as information fails to follow them across touchpoints. Staff turnover accelerates under the weight of **administrative burden**⁵ that technology should have eliminated. Point solutions, no matter how sophisticated, cannot solve problems rooted in how data flows—or more precisely, doesn't flow—through disconnected systems. When clinical data lives in one silo, financial information in another, and patient engagement in a third, the manual work of reconciliation falls on staff and clinicians. The promise of automation dissolves into a multiplied coordination burden.



15,000³

hours saved annually with
AI-powered task support



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What “AI-by-Design” Really Means

With AI-by-design architecture, AI is embedded into the core of how data, workflows, and decisions are structured, rather than layered onto existing systems.^{6,7}

AI-by-design systems share four defining characteristics:



Unified data architecture. Clinical, financial, and operational data reside on a shared foundation, enabling real-time visibility across the care journey rather than reconciliation after the fact.



Cloud-native infrastructure. These systems are built for continuous learning, scale, and rapid iteration—capabilities that are difficult to achieve in on-premise or hybrid environments.



Intelligence embedded at the workflow level. AI does not simply surface insights to users; it coordinates actions across systems, ensuring that downstream steps are initiated automatically when conditions are met.



Event-driven execution. Work advances based on state changes—an order placed, a diagnosis documented, coverage identified—rather than waiting for manual prompts.

Importantly, these systems are designed from the ground up for automation. Data is structured for machine reasoning from inception, enabling intelligence to act across domains rather than remaining confined to individual features.

The Complete Care Journey: Pre-Visit to Payment

Consider a typical ambulatory encounter from an architectural perspective. Before the visit, someone must verify insurance, identify relevant care gaps, review recent lab results, note medication changes, and prepare a summary for the clinician. During the visit, documentation must capture the conversation while checking for drug interactions, suggesting appropriate diagnoses and orders, and ensuring billing completeness. After the visit, prior authorizations need initiation, prescriptions require sending, follow-up must be coordinated, and charges must be captured accurately.



In fragmented architectures, each step requires human intervention to bridge system gaps. With AI-by-design, agentic intelligence handles the orchestration: automatically preparing charts before appointments, documenting encounters in real-time, proactively initiating prior authorizations the moment an order is placed, and ensuring billing accuracy without manual reconciliation. The clinician remains central to medical decisions. The AI handles everything else.

Time Returned to Care

When ambient documentation operates within unified architecture rather than as a bolt-on tool, productivity gains accelerate. Practices implementing AI-by-design workflows report 30% productivity improvements, not just in documentation time, but across entire clinical workflows. For a 10-provider practice, this translates to roughly 14,000 hours saved annually:⁷ This is time that previously disappeared into manual coordination, but is now available for patient care or, critically, for rest.

Automated chart preparation means clinicians walk into encounters already informed. Voice-activated chart search eliminates hunting for information during visits. Agentic task helpers handle routine follow-ups autonomously. Each improvement compounds, creating workflows that feel fundamentally different from the fragmented experiences clinicians have endured.

Financial Performance Restored

Unified architecture enables intelligence that spans clinical and financial workflows simultaneously. Embedded coding helps suggest diagnoses in a clinical context while ensuring billing completeness. Automated prior authorization initiation happens the moment an order is placed, not hours later after manual review. Real-time insurance verification catches coverage issues before they become denials. Intelligent coverage discovery finds what insurance staff might miss.



Practices see 20% revenue uplift through improved coding accuracy and capture. For a growing 10-provider practice, this represents roughly \$1 million in potential collections improvement—revenue that was always owed but leaked through fragmented workflows.⁷

The Human Impact

Perhaps most significantly, unified AI-by-design architecture addresses what brought many clinicians to medicine in the first place: human connection. When technology shoulders the administrative burden rather than multiplying it, physicians can maintain eye contact during visits. They can listen without simultaneously navigating screens. They can practice the healing relationship that drew them to medicine, the part that technology was always supposed to enable, never replace.

AI's Promise Depends on Architectural Integrity

The next chapter of healthcare AI will not be defined by more features or faster tools, but by architectural integrity. As long as intelligence is bolted onto systems designed for documentation rather than coordination, automation will continue to relieve symptoms without curing the disease. AI-by-design represents a different path—one where unified data, event-driven workflows, and embedded intelligence allow technology to act on behalf of clinicians, not in their way. When architecture aligns with how care actually unfolds, time is returned, revenue is restored, and the human connection at the heart of medicine is finally protected.

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