trends

The Generative AI Revolution: 9 Trends Reshaping Healthcare in 2025

JANUARY 2025

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Introduction

In November 2022, OpenAI launched ChatGPT, which became the fastest-growing consumer application of all time within one month. In the intervening two years, massive investment in Generative AI across industries has created unprecedented potential for healthcare transformation.

Despite this scale of investment and potential, Generative AI (Gen AI) has not yet transformed healthcare. While Gen AI infrastructure is more accessible than ever and clinicians are adopting it faster than previous AI technologies, most hospital systems remain in an experimental phase, focusing on disparate use cases and point applications that have yielded only peripheral productivity gains.

As we move into 2025, we anticipate a pivotal shift: **Gen AI will usher in the era of the AI-Powered Clinician of the future.** This transformation will redefine the talent landscape, with the primary constraint moving from technical roles to knowledge workers and their ability to embrace these new technologies. In this article, we examine both the current state of healthcare AI adoption and the transformative trends we expect to unfold over the next 12 to 24 months.

Our Observations

A Promise Unfulfilled: Gen AI Has Not Transformed U.S. Health Systems, *Yet*

Generative AI is hailed as a game-changer across industries, with investments soaring from $1.7 billion in 2022 to $14 billion in 2023, and projected to reach $109 billion by 2030[1]. Most of the funding is funneled into AI assistants, Human-Machine Interfaces (HMI), and generative tools. Over half of Generative AI startups are in early-stage funding, illustrating the nascency of most Generative AI applications. These immature tools provide narrow point solutions and fall short of reimagining how processes are executed and jobs are reconfigured.

Hospitals also face outdated infrastructure with limited cloud strategies, fragmented workflows, and a cautious approach to change—barriers that hinder the smooth incorporation of Gen AI. Forward-thinking leaders are advocating for responsible data sharing and aligning AI initiatives with organizational goals to move beyond pilot projects.

The Gen AI ecosystem is crowded and teems with opportunity, attracting startups, hyperscalers, and health incumbents. Startups often struggle to scale past regulatory hurdles and compete with

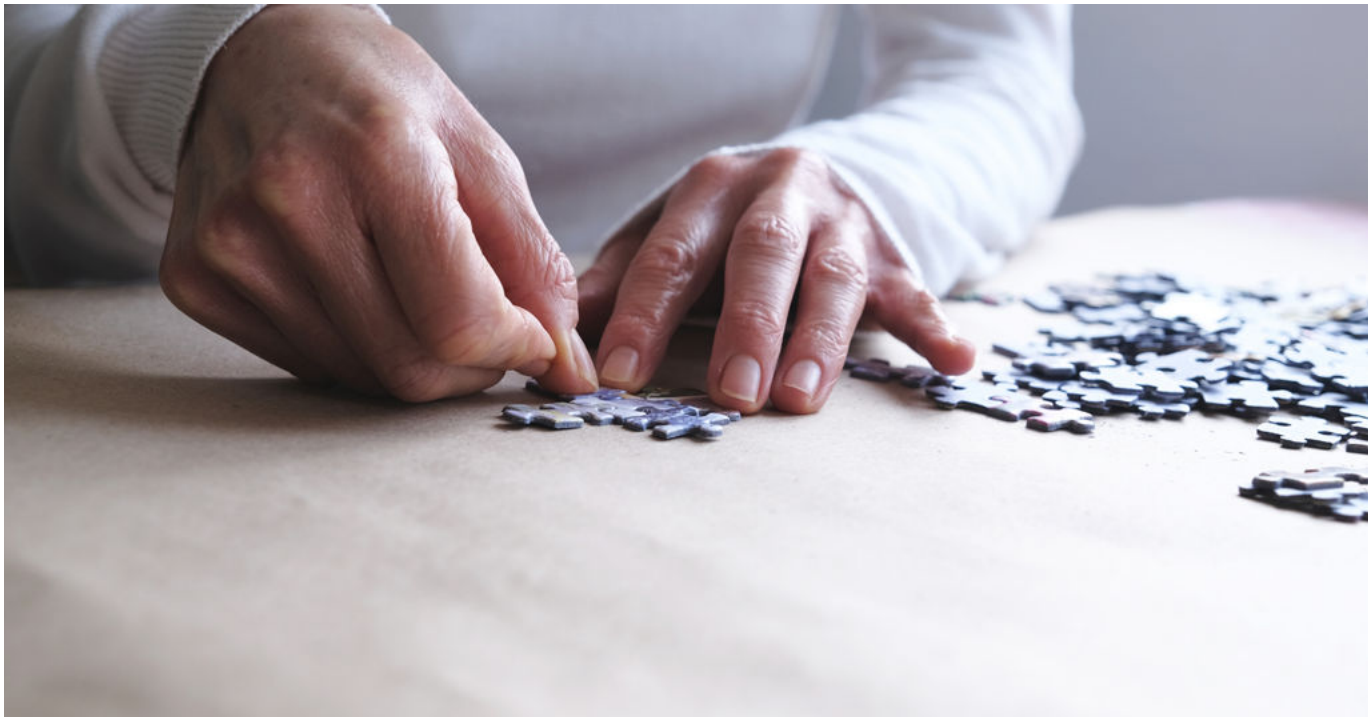
1 https://www.vspvision.com/dam/jcr:a1969a94-892a-4c31-8462-815255bdde43/Future%20of%20Generative%20AI%20in%20Healthcare_1%20(1).pdf

hyperscalers like Microsoft, Amazon, Meta, and Google, which aggressively pursue hospital partnerships despite skepticism over data privacy risks and ROI. Meanwhile, **health tech leading incumbents, particularly those offering EHR-focused solutions, integrate AI cautiously, making incremental improvements as their legacy architectures often constrain them.** These efforts typically extend existing functionalities, such as enhancing patient communication and engagement tools, rather than reimagining workflows or care delivery models. In fact, our analysis of major EHR incumbents' AI plans suggests there is significant whitespace (50 – 90% across 8 key domains (e.g. clinical operations, patient experience etc.) in terms of innovation opportunity and value creation potential

Lots of Experimentation and Focus on Disparate Use Cases to Enhance Productivity

Since the launch of ChatGPT, organizations have embraced Generative AI primarily to enhance productivity, with 92% of users leveraging it for this purpose and 43% reporting the highest ROI in this area, according to IDC's 2024 AI Opportunity Study [2]. In healthcare, AI adoption is advancing beyond productivity gains to tackle complex challenges such as reducing claim denials and improving payer communications. **This evolution marks a pivotal shift, but many health systems remain caught between experimentation and enabling the changes via at-scale transformation.**

Thus far, hospitals have rapidly acquired and deployed AI solutions, building expansive portfolios of new functionalities focused on individual use cases. While these efforts have yielded some successes, they've also exposed significant struggles. **AI solutions are technically complex and costly, requiring intensive training and collaboration between technical and business teams.**



2 https://blogs.microsoft.com/blog/2024/11/12/idcs-2024-ai-opportunity-study-top-five-ai-trends-to-watch/

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OUR POINT OF VIEW

Health systems should take a domain-based (e.g., clinical operations, revenue cycle, quality) approach to transformation and prioritize related use cases that build on top of common data, and have clear business ownership and line-of-sight to near-term value. This includes fostering cross-functional partnerships, co-creating solutions, and ensuring new capabilities align with business domain goals. Leading institutions have taken this approach by establishing dedicated, AI-focused business units, integrating these competencies into their core operating models, and reshaping clinical practice. Such efforts point toward meaningful transformation—one built not on experimentation alone but on deliberate, domain-focused change.

Gen AI Infrastructure: From Exclusive to Accessible

A decade ago, deploying top-tier AI infrastructure was a privilege reserved for the world's largest tech companies. They alone had the resources and expertise to build, maintain, and scale advanced AI systems. Today, this dynamic has shifted dramatically. The commoditization of top-tier AI infrastructure allows non-tech organizations to deploy advanced AI solutions without requiring extensive technical teams. The rise of Generative AI as a Service has democratized access, enabling industries like healthcare to experiment and innovate in ways previously unimaginable.

The shift goes beyond interacting with closed-source APIs; organizations are now building strategies to deploy and integrate SLMs (Specialized/Small Language Models), LLMs (Large Language Models), and agentic-based workflows. These tools are not just about answering queries but enabling workflows that streamline processes, augment decision-making, and redefine how work gets done. **The capacity to design custom AI workflows tailored to specific organizational needs marks a turning point in how AI is utilized.**

This revolution in healthcare enables hospitals to move beyond generic, one-size-fits-all solutions and design bespoke AI ecosystems that address their most pressing challenges. **With infrastructure or backend-designed-to-purpose databases no longer a barrier, organizations can now focus on the critical elements needed to deliver value with AI: ensuring access to the right data, implementing process and workflow changes to drive efficiency, and removing the complexity of building and maintaining a technical stack.** This shift allows healthcare organizations to redirect their efforts toward achieving clinical buy-in, a key factor in ensuring these solutions are adopted, trusted, and successfully embedded into care delivery.

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Clinicians as Champions: How Gen AI Is Empowering Providers and Being Adopted Faster than Traditional AI

While technical teams have rapidly adopted AI, many clinicians are also embracing its transformative impact. **Clinicians who were once skeptical of AI solutions now recognize how these tools can summarize vast amounts of information, reduce administrative burdens, and empower them to operate at the top of their licenses.** Implementation has accelerated because these solutions enhance the capabilities of existing staff rather than aiming to replace them. One notable example is Emory Healthcare, where two innovative Large Language Models (LLMs) have been deployed.

Clinical Reference LLM:

This model enables clinicians to perform natural language searches for policies, procedures, and protocols with unprecedented efficiency. Improving search accuracy by 30-35% and reducing look-up times by up to 7x offers a breakthrough akin to the "Google moment" of the late 1990s. Just as search engines replaced encyclopedias and revolutionized productivity, this tool fundamentally streamlines access to critical clinical information at the point of need.

CLABSI (Central Line Associated Bloodstream Infection) LLM:

This model automates data abstraction for infection prevention, increasing response times by up to 6x. It also equips novice infection preventionists (IPs) to perform data reviews 220% faster than experienced IPs did using traditional methods, freeing up seasoned staff to focus on higher-value tasks.

Progress Is Slower than Expected Getting AI to Scale

Despite massive investment, the integration of Generative AI into healthcare remains constrained by technical and organizational complexities. Key challenges include:

- **Integration into Existing Workflows:** Embedding AI into current systems, particularly EHRs, is challenging due to legacy infrastructures that lack flexibility and interoperability with disparate data standards. Additionally, health systems face significant costs and challenges in acquiring technical talent to address these gaps.
- **Reimagining Clinical Roles:** Clinicians often lack clarity on how AI can augment their work, leading to resistance or underutilization. This hesitation stems from skills gaps and broader uncertainty about AI's longevity. For nascent to average performers, it's often easier to observe high performers, waiting to see what succeeds before committing to adoption themselves. This cautious approach, while understandable, delays the integration of AI into clinical workflows and limits its potential impact.
- **Resistance to Change:** While some clinicians are embracing AI, other clinicians and staff often hesitate to trust or rely on AI-driven tools, citing concerns about accuracy and transparency. To address these concerns, it is essential to develop explainable AI models that provide clear insights into their decision-making processes. Engaging healthcare professionals in the design and implementation of AI systems can also foster trust and acceptance. Ongoing education and transparent communication about Gen AI capabilities and limitations are crucial in mitigating resistance and promoting adoption.

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Our Expectations

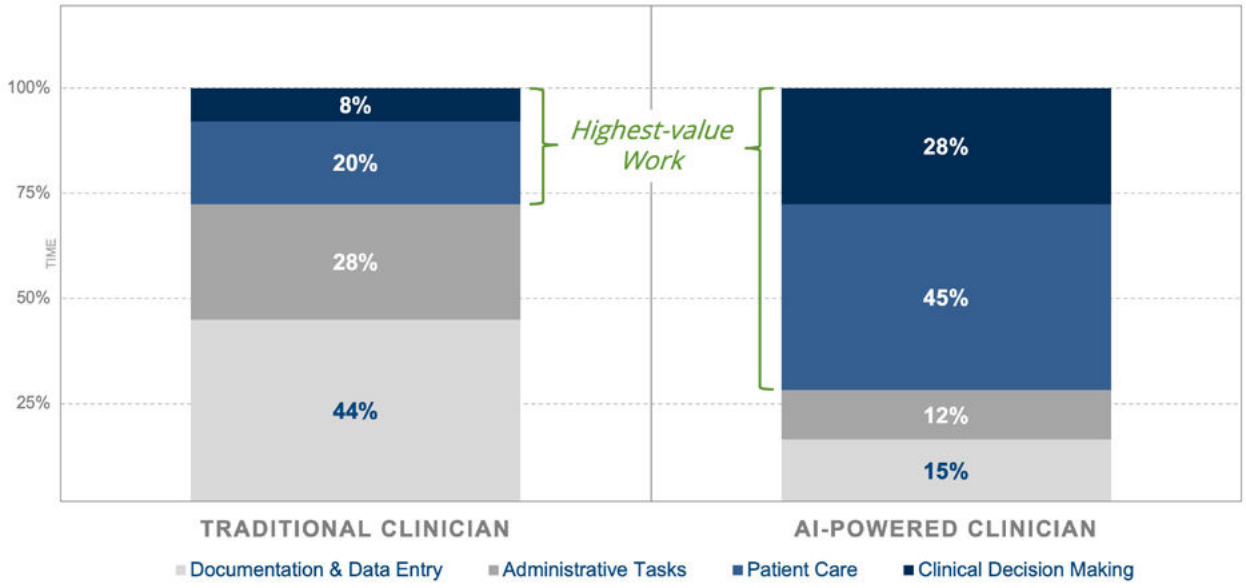
Gen AI Will Usher in the Era of the AI-powered Clinician of the Future

Generative AI presents an unparalleled opportunity to revolutionize clinical operations, creating a multiplicative effect on clinical capabilities. When clinicians combine their expertise with AI, the result is 1 + 1 = 3 (i.e., the AI-Powered clinician). **By automating time-consuming tasks such as documentation and chart abstraction, Gen AI enables a single clinician to operate at top of license and achieve what previously required multiple team members.** This force-multiplier effect represents a quantum leap beyond the transformation seen with EHR systems, where Registered Nurse roles first evolved to blend clinical expertise with technical capabilities.

As AI evolves from "thinking fast" (delivering rapid responses) to "thinking slow" (reasoned and deliberate problem-solving), the impact becomes even more profound. During rounds, linked systems can analyze biometric data and alert clinicians to anomalies, enabling a single provider to effectively monitor and respond to the needs of more patients with greater precision. This evolution is characterized by AI-driven platforms and agents moving beyond siloed systems like EHRs to orchestrate clinical and operational processes across multiple tools. **By embedding intelligent agents into healthcare workflows, clinicians gain the ability to delegate tasks like anomaly detection, care plan generation, and post-discharge follow-ups, transforming the AI-augmented clinician into a force multiplier.** These agentic systems not only optimize patient interactions but also extend the clinician's impact far beyond the hospital walls, ultimately creating a continuous feedback loop that improves outcomes and reduces inefficiencies.

As depicted in ***Figure 1*** below, the AI-powered clinician of the future will flip the scales in terms of focus of time, dedicating 73% of their time to highest value work—patient care and clinical decision making—compared to traditional clinicians who spend three quarters of their time on administratively burdensome tasks. The transformation will also accelerate onboarding and proficiency. AI-guided workflows and personalized learning pathways dramatically reduce the time for new clinicians to reach peak effectiveness, enabling expert-level care delivery sooner than ever before. As intelligent prompting replaces traditional coding, **AI fluency—understanding how to effectively prompt models, validate outputs, and collaborate with technical teams—becomes as critical as bedside skills.** The AI-Powered Clinician of the future will achieve outcomes that were previously impossible for any single provider.

Figure 1. Traditional Clinician vs. AI-Powered Clinician
(Based on Impact Advisors' Experience & Analysis)



Top Hospitals Will Transform AI Expertise into Profitable New Ventures

Leading hospital systems are seizing opportunities to innovate and monetize their proprietary data by building businesses in the white space around their EHR ecosystems. These systems are leveraging their data as a golden ticket to incubate startups, train proprietary AI models, and deploy Gen AI platforms tailored to their unique challenges. By fostering accelerators and showcasing Gen AI-powered solutions, organizations like Providence[3] are positioning themselves as pioneers in the field while building new revenue generating businesses on the back of these innovations.

The gap between AI pioneers and laggards is widening. **Leaders are actively monetizing their data and unique IP, incubating AI-driven businesses, and identifying high-value opportunities for Gen AI applications beyond the core functionalities of EHR systems.** They are also addressing one of the largest barriers to adoption: successful embedding of AI back into EHR workflows. Many existing

3 https://www.prnewswire.com/news-releases/providence-and-microsoft-enable-ai-innovation-at-scale-to-improve-the-future-of-care-302084162.html

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tools fail at this critical juncture, limiting usability and adoption. Understanding the architectures of EHRs and building data pipelines that enable seamless integration has become a key differentiator for forward-thinking organizations.

Proprietary data is emerging as the ultimate competitive advantage in healthcare AI. The most successful hospital systems will leverage this asset and have a clear data strategy to define their edge while fostering innovation capabilities.

AI Talent Will Shift from Technical Teams to Knowledge Workers

The talent bottleneck for scaling AI has shifted from technical (e.g., data scientists and engineers) to knowledge workers (e.g., clinicians, care managers, and administrators). Empowering these professionals to adopt, trust, and effectively use AI is essential for unlocking its transformative potential in healthcare.

Despite its promise, AI implementation faces significant barriers. A 2024 LinkedIn/Microsoft report found that only 39% of global knowledge workers using AI have received formal training, while fewer than 24% of healthcare organizations offer such programs [4]. Moreover, many medical schools lack standardized AI curricula, leaving clinicians underprepared to confidently integrate AI into their workflows. **There is a need to significantly upgrade the AI skills among knowledge workers while also addressing their motivation for adoption** (i.e., the "What's In It For Me? (WIIFM)").

Healthcare organizations must prioritize empowering knowledge workers to harness AI effectively to fully realize AI's potential to enhance clinical effectiveness and patient outcomes. Key actions include:

- **Investing in AI Literacy:** Scalable, role-specific training programs can close knowledge gaps. For example, University of Florida researchers found that structured AI courses improved participants' knowledge scores by 65%.[5]
- **Aligning Leadership and Users around the "Why":** Clear strategies that connect leadership vision with clinical and operational needs foster trust and ensure AI solutions meet operational goals.
- **Clearly Articulate the "WIIFM":** Knowledge workers need to clearly understand ***"what's in it for me?"*** in terms of how the AI solutions will augment their role, help them achieve their objectives, and operate at the top of their license.

4 https://www.microsoft.com/en-us/worklab/work-trend-index/ai-at-work-is-here-now-comes-the-hard-part

5 https://arxiv.org/pdf/2407.18939

The "Last Mile" of AI Integration Will Separate Leaders from Laggards

Healthcare organizations must master the "last mile"—the critical gap between having advanced AI capabilities and achieving consistent use (i.e., from insight to decision to action to outcome). Health systems like Cleveland Clinic[6] and Cedars-Sinai[7] have shown that **success requires excellence across three dimensions: technical, workflow, and behavioral integration (i.e., how decisions are made)**.

Technical integration means embedding AI seamlessly into existing systems, especially EHRs. Many generative AI solutions show impressive features but fail at the point of delivery. For example, an AI system might excel at synthesizing patient histories and generating care recommendations, but if these insights are not smoothly integrated into the EHR or require users to context-switch between multiple interfaces, utilization declines. Organizations like Cedars-Sinai tackle this by embedding AI outputs directly into the EHR at the point of care in an intuitive, incorporated existing workflow and decision support capability.

Workflow integration ensures AI enhances rather than disrupts established processes. At Mayo Clinic, cross-functional partnerships between frontline staff and technical teams ensure AI solutions augment key moments in daily operations. This means understanding not just what information to generate, but when and how to present it. They are integrating Generative AI to assist with documentation during patient encounters, synthesize relevant information before rounds, and generate tailored care plans—all within the natural flow of work.

Behavioral integration addresses how healthcare professionals adopt and trust AI systems in practice. Successful organizations ensure Generative AI outputs are transparent and verifiable. For instance, when AI suggests treatment modifications or synthesizes research evidence, it provides clear citations and reasoning that users can validate (e.g., in Emory's clinical reference case highlighted above). Early wins, such as reduced documentation time and improved care plan comprehensiveness, build momentum and demonstrate AI's value as a partner rather than a black box.

Success across these three "last mile" dimensions enable organizations to progress from building and experimenting with AI capabilities to fundamentally evolving clinical practice.

6 https://www.beckershospitalreview.com/healthcare-information-technology/cleveland-clinic-ceo-the-future-of-ai-and-quantum-computing-in-healthcare.html

7 https://www.cedars-sinai.org/newsroom/cultivating-innovative-ai-solutions-to-enhance-patient-care

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Conclusion

Over the next 24 months, healthcare organizations that fully embrace Gen AI will gain unprecedented operational efficiencies, allowing them to strategically reallocate resources and reshape their organizational structure. Leaders will be able to reduce investment in routine administrative functions while deepening their capabilities in key areas:

- **Custom developed IP in areas of strategic importance (~30%):** Building proprietary solutions for critical challenges like patient-specific chart abstraction and disease prevention, where AI automation can reduce manual review time by up to 70% while improving early detection rates.
- **Partnering with specialty vendors with differentiated technology (~30%):** Accelerating clinical efficiency through partnerships in areas like ambient listening for documentation, freeing up to 40% of clinician time per day for direct patient care.
- **Leveraging platform technology vendors for core EHR innovations (~40%):** Enhancing patient engagement and communication through AI-powered interfaces that can reduce administrative staff needs while improving patient satisfaction scores.

The organizations that emerge as leaders will achieve more than just cost savings—they'll fundamentally restructure their operations, shifting resources from routine tasks to high-value activities that drive growth.

The organizations that emerge as leaders will achieve more than just cost savings—they'll fundamentally restructure their operations, shifting resources from routine tasks to high-value activities that drive growth. **By reinvesting efficiency gains into advanced AI capabilities, these institutions will create a virtuous cycle: better clinical outcomes lead to improved market position, generating more data and opportunities for AI innovation, which in turn enables further advances in care quality and operational efficiency.** This compounding effect will make it increasingly difficult for slower-moving organizations to catch up, creating lasting competitive advantages for early movers.

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Contributors

Joe Christman

Vice President, Data & AI, Impact Advisors

Brian Cole

Director, Data & AI, Impact Advisors

Andrew Jung

Associate Director, Data & AI, Impact Advisors

Brian McCarthy

Board Member, Impact Advisors

Operating Partner, Chicago Pacific Founders

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