Educating at the speed of science

The case for agentic AI systems in medical affairs external education

Introduction

Artificial intelligence (AI) has emerged as a transformative tool in healthcare and medical education, particularly in supporting diagnostic decision-making and situational simulation. Rapid advancements in pharmaceutical and medical device research necessitate continuous education for healthcare providers (HCPs) to ensure they are informed about novel treatments and methods and evolving therapeutic approaches. Without question, AI technologies in medical affairs have the power to enhance education, bridge gaps in knowledge and uptake, and enhance dissemination of critical, evolving clinical information. Medical affairs organizations have relied on traditional HCP interactions, including seminars and written materials, symposia and conferences. These analog efforts are now increasingly supplemented—or replaced—by digital tools such as remote learning sessions and web-hosted content. From the rapidly growing knowledge base to the basic need for up-to-date, future-ready healthcare, there is an increasing need to deliver the latest information and training on the developing standard of care, diagnostics and methods to the right person at the right time and in the right way—a complex and multifaceted process.

The next phase is agentic AI-driven education platforms to support the future and drive impact. Defined as systems composed of multiple interacting intelligent agents, agentic AI systems enable new forms of collaborative, dynamic learning and complex process orchestration, and are capable of delivering highly personalized, asynchronous, interactive and adaptive education and training where and when it is needed. But this will not happen automatically.

Even in the most sophisticated medical care systems in high-income countries like the US, there is an estimated 17-year time lag between the emergence of new biomedical research and advancements and widespread clinical uptake.

AI as an innovation is a quickly evolving tool uniquely positioned to help drive its own adoption. Sapkota et al. reviewed and summarized this evolution and suggest a taxonomy for the current AI landscape.

Feature	Generative AI	AI agent	Generative agent	Agentic AI
Core function	Content generation	Task-specific execution using tools	Simulated human-like behaviour	Complex workflow automation
Mechanism	Prompt → LLM → Output	Prompt → Tool call → LLM → Output	Prompt → LLM + Memory/planning → Output	Goal → Agent orchestration → Output
Structure	Single model	LLM + Tool(s)	LLM + Memory + Behaviour model	Multi-agent system
External data access	None (unless added)	Via external APIs	Typically closed-world (simulated inputs)	Coordinated multi-agent access
Key trait	Reactivity	Tool-use	Believability/ autonomy	Collaboration

(Table IV, AI Agents vs. Agentic AI by Sapkota et al. 2025): Comparison of generative AI, AI agents, agentic AI and inferred generative agents based on core function and primary goal. This table highlights the foundational purpose and operational focus of each system type, distinguishing their roles in AI workflows. It contrasts their core functions such as content generation, task execution or workflow orchestration and clarifies the primary goals each category is optimized to achieve, from generating media to autonomously managing complex tasks.

Large language models (LLMs) have impacted many domains as stand-alone generative tools and more recently as the basis or foundation for reasoning AI agents. Agentic AI systems, composed of multiple AI agents, are further capable of working autonomously together to execute complex workflows, tracking and working toward an output goal. Medical affairs organizations can use AI tools—like LLMs to parse and highlight emerging clinical data, while agentic AI enables complex workflow orchestration and adaptive collaboration and communication. Agentic AI systems appear ideally suited to drive educational platforms—as part of a strategy to supercharge closing the evidence-to-practice gap—immediately impacting standards of care for the most high-need patient populations.

Agentic AI systems, characterized by their autonomous, collaborative and adaptive nature, can enable personalized, dynamic learning experiences that significantly enhance knowledge retention and engagement. These platforms employ autonomous agents that interact to provide comprehensive, interactive educational experiences. They can simulate clinical scenarios, adapt to individual learning paces and provide real-time feedback. Notably, AI can tailor content based on the user's existing knowledge, enabling personalized learning paths. Additionally, interactive case simulations allow HCPs to practice decision-making in safe, controlled environments. Beyond educational tools, AI holds the promise and has already been used to accelerate drug development, repurpose existing medications for novel uses and expand the pace of innovation, making up-to-date information and dissemination crucial.

Across a range of disease areas, AI will drive breakthroughs in treatment modalities, even for previously unaddressed or undertreated diseases. Rare diseases offer a unique window into how clinicians will need to keep abreast of breakthroughs already becoming status quo.

AI for research and development—from clinical trials to drug testing to repurposing medications (e.g., EveryCure - UPenn, TxGNN and TxGNN Explorer)—has already arrived. As the speed of innovation increases through AI, the speed of medical affairs-driven industry education must use AI tools to keep pace.

Use case: Rare disease and keeping pace with AI-driven innovation

More than 7,000 rare diseases—defined by the United States National Institutes of Health as conditions affecting fewer than 200,000 people—have been subject to tremendous scientific breakthroughs in the past 20 years. Yet, more than 90% of rare diseases still lack any approved treatments. With an estimated 30 million Americans living with a rare disease and millions more families impacted by rare diseases in loved ones, the impact remains significant.

Artificial intelligence has already accelerated the pace of innovation for rare disease treatment. For example, in February 2025, the New England Journal of Medicine published a breakthrough case study of applying AI to rare disease treatment. Examining evidence from 4,000 existing medications, a maverick machine learning AI tool uncovered an existing treatment that was the "top-predicted" successful intervention for idiopathic multicentric Castleman's disease (iMCD), saving the life of a patient in an astoundingly short timeframe. The patient could be the first of many to have their lives saved by an AI prediction system, which could potentially apply existing treatments to other rare conditions.

Clinicians who treat rare diseases have several practical barriers. Given the low incidence rate, they may not have routine diagnostic encounters with patients living with certain rare diseases. Accurate differential diagnosis and clinical skills must be continually refreshed, and treatment modalities constantly updated to meet the needs of patients with less common medical conditions.

As AI continues to accelerate the pace across life sciences, two sides of the coin emerge: Research and development in the rare disease space and clinicians will need to keep pace with AI-driven innovation. Artificial intelligence-driven education is crucial. Medical affairs organizations have a critical role to play in refreshing and expanding clinicians' knowledge of rare diseases from diagnosis to treatment. As treatment options evolve, driven by AI innovations in research and development, it is imperative to consider the role of medical affairs teams in continually updating the latest clinical research and standards.

Medical affairs organizations are a central conduit for continuing medical education (CME)—often the most consistent, wide-reaching and impactful source of learning for HCPs. Artificial intelligence holds promise to provide education in a more asynchronous, real-time and adaptive way and even foster a bidirectional relationship where real-life scenarios, roadblocks, pain points and educational needs can drive change in healthcare, medical education systems and product development.

Use case: Making multi-agentic AI actionable

Parkinson's disease and diffusion of innovation in the US

Of the estimated 15,063 board-certified neurologists in the US, approximately 94% practice in metropolitan areas, while only approximately 5.5% practice in nonmetropolitan areas, and only 0.5% were practicing in rural areas. The geographic distribution disproportionately favors care by a specialist neurologist in metropolitan areas on the East and West coasts, leaving many Parkinson's disease patients without access to a specialist. Only approximately 660 movement disorder specialists—neurologists with additional expertise in Parkinson's disease diagnosis and management—are practicing nationwide. For the estimated one million adults living with Parkinson's disease in the US—and 90,000 new diagnoses a year—access to a board-certified neurologist to manage advanced medications is far from guaranteed. Increasingly, primary care providers and other specialists are forced to fill the gap in care.

Parkinson's disease is a challenging, dynamic disease with a range of presentations and impacts patients in myriad ways depending on age, gender and other critical variables. Symptoms can be mild to severe, and each patient requires tailored care to optimize outcomes. Yet, up to a quarter or more of Parkinson's disease patients may be incorrectly diagnosed—contributing to the overall issues with the course of disease management. Further, many patients are unable to receive specialist care, and even general practice neurologists—as opposed to movement disorder specialists—can lag in their continuing education on treatment options.

Simultaneously, pharmaceutical advances including next-generation medications for controlling major symptoms of Parkinson's disease, such as managing "on/off" periods and specific motor issues, have transformed the patient experience. Even for first-line dopaminergic drugs, delivery modes are constantly being innovated and refined, including oral, infusion and even surgically placed continuous medication dispensing systems. Adjuvant therapies are similarly evolving. Thus, the Parkinson's disease space is ripe for continuing education. There are critical issues with suboptimal—in some cases, even dangerous mediation regimens—underdosing and other dosing errors, and many hospitalizations related to medication management.

Agentic AI has the potential to revolutionize the Parkinson's disease space, bringing in the latest advances and guidelines to a range of providers—from movement disorder specialists to primary care practitioners in rural settings tasked with managing the complexities of Parkinson's disease.

This review examines the possibilities of agentic AI in HCP education and upskilling, focusing on both HCPs as learners and adopters of AI-driven technologies, and on the critical tools needed for educational content. It explores the unique humans who have been trained to think, learn and act in highly specific ways, as well as opportunities to integrate AI-driven educational platforms into professional development programs driven by medical affairs teams.

AI in medical affairs: A new frontier for HCP education

Medical affairs is the nerve center of pharmaceutical, medical device and healthcare company communication and dissemination of critical clinical and scientific advancements to healthcare professionals, patients and other key stakeholders. In the US and globally, most medical providers in both primary care and subspecialty medicine rely heavily on industry education.

Within medical education, AI has already driven efficiency gains via LLMs and offloading clinical and administrative tasks to AI tools. Future physicians are being prepared to work with AI for documentation, communication and clinical reasoning, and they are now increasingly being prepared in medical schools to enter the healthcare landscape as AI-literate clinicians.

With the introduction of agentic AI, existing single-agent AI solutions can be combined into networks to orchestrate complex processes, such as personalized continuing medical education.

Driving AI education adoption | HCPs: A unique audience

HCPs are a unique audience for the adoption of AI tools. The process of medical education influences how clinicians integrate new information, learn and adapt practices. As new information becomes available, expectations of patients evolve. Medical education does not simply teach clinical facts but rather cultivates in trainees a process of clinical hypothesis-making and interrogation. In real-life clinical scenarios, HCPs must synthesize a variety of inputs in real time; AI tools already support real-time decision-making and action, as both stand-alone technologies are integrated into electronic health records (EHRs). HCPs increasingly must be digital natives to be effective providers in many clinical contexts, including hospitals and outpatient care.

A new generation of HCPs is entering the healthcare workforce as digital natives, expected to both continually educate themselves about new AI tools and navigate AI tools in clinical settings—from hospitals to outpatient care—and complementing generational differences in patient expectations. For legacy HCPs, trained to be independent decision-makers, AI and data systems literacy and tools adapted to the unique expectations of HCPs are critical.

These generational dynamics make it clear: AI tools designed for HCPs must be adjuvant to more analog, independent decision-making or engage in sophisticated iterative processes in response to the latest information. Globally, HCPs may struggle to trust AI tools to execute clinical goals and must maintain autonomy to "override" AI outputs. AI and data systems literacy is critical. More sophisticated LLMs will be able to democratize some elements of medical education, taking variation out of clinical education. Tools for collating and updating complicated information, including curricula, medical texts and peer-reviewed medical literature, will be relevant to medical students, trainees and working HCPs alike. The field of medicine is ever-expanding, and these tools allow medicine to keep pace with this expansion. As medical students gain more facility with these tools, they will graduate into a new generation of HCPs ready to enter education driven by AI.

Even in the most complex medical care systems in high-income countries, new biomedical research and advancements are estimated to take an average of 17 years for widespread clinical uptake. This applies to new medications, new decision algorithms, new medical devices, treatment paradigms and AI as a clinical and educational tool, and is more pronounced for rare diseases and areas with limited extant opportunities for clinical intervention. Moreover, the role of human factors in the adoption of medical devices and technology represent an important and unique area of education with its own regulatory requirements and opportunities for improvement.

From usability evaluation and feedback to virtual, in-situ training, agentic networks can simulate, train, test and gather data to help refine both development and implementation of clinical innovations (A continuum of human factors considerations, from medical device development to hospital implementation – Fiona F. Tran, Shanqing Yin, 2020; Designing healthcare for human use: Human factors and practical considerations for the translational process).

As a critical conduit to educate HCPs on new biomedical advancements and education, medical affairs organizations are uniquely positioned to close this gap and immediately impact standards of care for the most in-need patients. Tools driven by AI can supercharge closing this gap with LLMs to parse and highlight new clinical data, communication tools and other technologies to ensure clinicians receive critical education and upskilling.

Driving HCP uptake of innovation and AI tools: Theory and practice

Theory: Diffusion of innovation

Fortunately for medical affairs, a new generation of HCPs is increasingly being trained to work alongside AI tools, creating more digital natives. Medical education creates a certain kind of technology user—in need of tools but requiring significant autonomy. Technology cannot decide “for” medical providers but must support clinical reasoning for real patients with a range of constraints and uncertainties. Several critical theories about learning and dissemination of medical information are applicable to HCP education driven by medical affairs. Behavior change, in this case, more widespread adoption and facility with AI tools, can be explored through the diffusion of innovations (DOI) model which posits that the processes by which innovation and new technologies are adopted follows predictable patterns. In general, there is a staged model where HCPs must be made aware, persuaded, and decide to adopt innovative technology, implement a new technology, and engage in ongoing confirmation by using and engaging with the new technology. This includes innovators at the forefront and quick to adopt (estimated 2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards—the slowest and most resistant to adoption (16%).

Practice: Adoption curve leverage

Critical levers to move individual HCPs along the adoption curve include the relative advantage—the perceived benefits of the innovation, in this case, AI-driven education and communication tools from medical affairs organizations—the compatibility or extent to which the new innovation aligns with existing practices, the complexity and ease of use of an innovation, the trialability or extent to which the innovation can be experimented with and integrated into current practice without commitment, and the observability or how visible the positive results of new technology are to others—particularly organizational stakeholders and decision-makers. To move HCPs along this adoption curve, medical affairs teams must consider several key questions:

Relative advantage
Is the AI tool clearly better than the current approach?

Compatibility
Does it align with current workflows and values?

Complexity
Is it intuitive and easy to use?

Trialability
Can it be tested incrementally with minimal disruption?

Observability
Are its benefits visible to peers and decision-makers?

This human element of technology interactions can be optimized at the various points where medical affairs interfaces with HCPs. Considering HCP user needs and expectations will need to be top of mind in both the development of LLMs and other AI-driven tools, and direct HCP feedback must be a component of both building and adoption until fully integrated into an HCP’s work environment or organization.

Conclusion

Cognizant's Medical Affairs team is not only focused on building next-in-class digital and AI-enabled tools. It is equally focused on listening to HCP learners and designing solutions that reflect their needs, realities and clinical environments. As medicine evolves rapidly, Cognizant's Medical Affairs team is primed to serve as a strategic partner—bridging human-centered learning with advanced technologies.

With Cognizant Neuro® AI Multi-Agent Accelerator and Cognizant® Multi-Agent Services Suite, Cognizant is committed to accelerating the development and implementation of multi-agent AI, while keeping the "human in the loop," ensuring that AI adoption is guided by trust, relevance and usability across prelaunch, launch and postlaunch education. While championing AI, Cognizant reinforces human expertise—pairing adaptive, intuitive AI platforms with live, expert support that empowers HCPs to learn, question and apply with confidence.

The promise of AI in medical affairs and driving HCP education and learning through an agentic AI system is expansive. For example, AI-driven tools can create dynamic diagnostic training from the "standard case" to far more unusual scenarios requiring sophisticated understanding of how to best apply products or therapeutics—from rare diseases to fast-moving cancers, training HCPs on rare cases or disease identification. Optimizing agentic AI as an adaptive coach, teacher and partner can transform medical education. These systems can personalize learning based on HCP's clinical experience and preferences—offering immersive, AI-driven scenarios that build individual strengths. With medical affairs leading this evolution, the future of HCP education will be not only smarter and faster, but fundamentally more human-centered.

Implementation considerations for medical affairs teams

Deploying agentic AI systems in medical affairs is not without its challenges. Chief among them are data governance, regulatory compliance, content validation and integration with legacy learning management systems (LMS). Each of these hurdles must be addressed not only through technical safeguards but also through trust-building among stakeholders. Pilot programs should be codeveloped with HCP advisors and legal and compliance teams to ensure defensibility and transparency.

Authors

Scott Schell, M.D., Ph.D., MBA

Chief Medical Officer
Cognizant

Lestter Cruz Serrano, M.D., BCMAS

Global Head of Medical Affairs
Cognizant

Jon Pauls, Ph.D., BCMAS

Associate Director, Technology Solutions
Cognizant

Moira Kyweluk, Ph.D., MPH

Senior Manager, Life Sciences
Cognizant