ECONOMIST IMPACT

Vital signs

Pulse check on AI in healthcare, pharmaceuticals and life sciences

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Introduction

Healthcare, one of the most critical sectors in any society, is on the cusp of a technological transformation driven by artificial intelligence (AI). From accelerating drug discovery to improving patient outcomes through personalised medicine, AI's potential to revolutionise medicine is remarkable—and already demonstrating its significant capabilities. Yet, the road to realising these promises is paved with obstacles—from high costs to ethical concerns—that make the industry a cautious adopter, especially in external-facing applications.

An Economist Impact survey, commissioned by Databricks, polled 715 technical executives and 385 data and AI technologists with titles such as data scientists, data engineers and enterprise architects. The survey included 150 respondents representing the healthcare industry.

We found:

- **Generative AI (GenAI) has taken off in data-rich, AI-opportunistic environments like pharmaceutical research and development (R&D), accelerating drug discovery and optimising the costly and complex process of clinical trials.**
- **Data governance is a major challenge when integrating AI, felt acutely by health system respondents.**
- **Over half (53%) cite data privacy as their main worry, and most respondents expect to focus AI efforts on internal operations in the coming years, remaining cautious around external-facing applications.**

We'd like to thank the following executives for participating in interviews and sharing insights:

- **Bernd Bucher**, chief information officer, **Novartis**
- **Roman Bugaev**, chief technology officer, **Flo Health**
- **Andy Hill**, chief data officer, **Unilever**
- **Ryan Snyder**, senior vice president and chief information officer, **Thermo Fisher Scientific**
- **Sara Vaezy**, chief strategy and digital officer, **Providence**

The cure costs

Healthcare, despite its life-saving mission and sizable budgets, is in a bind. Investment is soaring, yet the discovery of groundbreaking treatments remains flat. The costs of clinical trials—with global spending estimated to reach US$68.9bn a year by 2025[1]—are not matched by progress in addressing chronic diseases like cancer and dementia. Meanwhile, next-generation therapies like cell and gene treatments for Alzheimer's and other debilitating diseases are emerging but at prohibitive costs. The industry has made impressive inroads in AI experimentation and hopes these capabilities could help tackle its mounting challenges.

AI's role in healthcare is not new. Back in 2009 a robot developed by researchers at Aberystwyth University became the first machine to independently discover new scientific knowledge. It was programmed to design experiments, record and evaluate results, and generate new questions.[2] Fast forward to today, AI is a vital tool in scientific research. Take AlphaFold: the AI developed by Google DeepMind has revolutionised our understanding of protein structures, releasing the structures of over 200 million proteins, providing data that will fuel scientific research for years to come.[3]

Bernd Bucher, chief information officer at Novartis, notes that the healthcare and life sciences workforce is already proficient in technology and data. "Our scientists are accustomed to working with statistical tools; they are essentially data scientists. They experiment daily, are technically savvy and understand data well." Meanwhile, health organisations such as Providence are fostering collaboration across disciplines to unlock the potential of AI. Sara Vaezy, its chief strategy and digital officer, explains the company's approach:

"We believe in bringing technologists, clinicians, operators and business folks together in all of this, in order to really be able to connect the dots appropriately around AI and how we can get some value out of it."

Sara Vaezy, chief strategy and digital officer, Providence

While the current focus is on text-based AI, the true frontier lies in developing systems that can process and generate content in structured and unstructured formats, allowing for richer and more integrated outputs. Quality data from sources like chest x-ray images, brain MRI scans, genome sequence data and electronic health records are proving invaluable for everything from diagnostics to surgical planning and outcome predictions.

"I think the [mistake] a lot of people are making right now is they're thinking of AI purely in terms of text prompting, and clearly the future is going to be multi-modal, where imagery, video and other forms of generative capabilities will have profound impact."

Ryan Snyder, senior vice president and chief information officer, Thermo Fisher Scientific

[1] https://www.grandviewresearch.com/press-release/clinical-trials-market
[2] https://royalsociety.org/-/media/policy/projects/science-in-the-age-of-ai/science-in-the-age-of-ai-report.pdf
[3] https://www.nature.com/articles/s41392-023-01381-z

A shot in the arm for drug discovery

Healthcare's GenAI adoption is concentrated in R&D and product development, with more than 60% of organisations using or piloting it in these areas.

This is a welcome trend that underscores AI's value. With advancements like CRISPR gene editing, mRNA technology and the first malaria vaccine, optimism abounds for a new era of medical breakthroughs.

McKinsey reckons that AI-driven drug discovery could generate US$60bn-100bn annually for the pharmaceutical and medical product industries.[4] Investors are catching on, with Goldman Sachs highlighting AI's potential in drug development as a top investment opportunity.[5]

Medical researchers use AI and machine learning as their 'binoculars' to fast-track discoveries that would otherwise take decades of traditional research. AI models can screen millions of chemical compounds, optimising their structure based on disease profiles and patient data. It could reduce the number of experiment runs and speed-up trials. As a case in point, Bayer, a German drug-and-chemical giant, leveraged AI to accelerate trials by 170,000 hours—roughly the equivalent of two decades of human labour.[6] AI can also help find novel uses for existing drugs. In 2021 AI-driven drug repurposing efforts identified that baricitinib, a rheumatoid arthritis treatment, could also combat covid-19 complications.[7]

Cross-industry collaboration and access to vast datasets could further maximise AI's potential in drug discovery and development, according to Mr Snyder. "I think there will be a focus on creating more holistic data stores that can be shared across the industry to find answers to questions that maybe we weren't even brave enough to ask in the past," he said.

The doctor's dilemma

AI has useful applications beyond the drug development lab. By leveraging clinical and genetic information, AI models can help tailor treatments and therapies to individual patients' biological profile, minimising side effects.[8] AstraZeneca is using GenAI to sift through rafts of real-world patient data, helping them identify effective oncology treatment combinations and improve safety profiles.[9]

GenAI is also poised to disrupt care co-ordination, enabling efficiencies in care delivery and benefits navigation.[10] Providence, a health organisation that runs hospitals and other healthcare facilities, developed a smart assistant with a user-friendly interface that halved response times.[11] Other applications include note-taking in consultations, allowing doctors to focus on patients without tapping on keyboards.[12] AI could also help forecast product demand to make sure drugs are being distributed effectively, and accelerate digital and data insights capabilities for sales and marketing teams.[13]

4 https://www.mckinsey.com/industries/life-sciences/our-insights/generative-ai-in-the-pharmaceutical-industry-moving-from-hype-to-reality
5 https://www.goldmansachs.com/insights/articles/ai-poised-to-begin-shifting-from-excitement-to-deployment-in-2024
6 https://www.bayer.com/en/pharma/artificial-intelligence
7 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9231077/
8 https://www.nih.gov/news-events/nih-research-matters/ai-tool-predicts-response-cancer-therapy
9 https://www.astrazeneca.com/what-science-can-do/topics/data-science-ai/generative-ai-drug-discovery-development.html
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12 https://nyulangone.org/news/artificial-intelligence-feedback-physician-notes-improves-patient-care
13 https://www.forbes.com/councils/forbesagencycouncil/2023/12/18/how-ai-can-empower-targeted-healthcare-marketing/

Despite AI's wide-ranging potential, operational use cases are seeing the most lift today, reducing manual work that previously fell to clinicians. Meanwhile, applications in patient care, which might provide clinical decision support, are slower to emerge due to factors including tight requirements around model transparency, clinician buy-in and validation. This could change as the industry builds on existing best practices in delivering user-centric applications for citizens.

Healthcare organisations must carefully consider the sensitivity of health data as they explore AI use cases and applications.

Over half (53%) of healthcare professionals in our survey cite data privacy as their main worry when implementing AI technologies.

Providence leverages personalisation to enhance patient services and improve the relevance of self-service tools, but Ms Vaezy stresses that this is an area where the organisation is very careful, noting the importance of maintaining patient privacy and ethical data practices. "We do it in a way that's consistent with HIPAA [the US's Health Insurance Portability and Accountability Act] and GDPR [the EU's General Data Protection Regulation]."

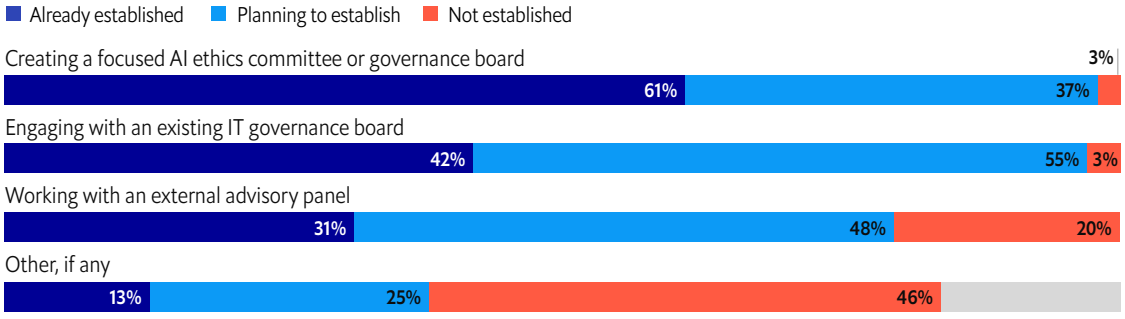
From ethics to execution

Nearly all survey respondents said that they have established or are planning to establish focused AI ethics committees or governance boards (see figure 1).

Novartis has developed an AI Risk and Compliance Management Framework to address AI's unique challenges in healthcare. This framework covers responsible AI use, including biases, ethical considerations, and legal and intellectual property concerns. Each AI project undergoes a assessment based on existing processes in data privacy and good manufacturing practices, categorising projects into high-, medium- and low-risk bands.

Bernd Bucher, chief information officer, Novartis

Figure 1: AI governance measures in place and planned, across respondents in the health sector



Source: Economist Impact

As health and wellness organisations integrate AI, it is crucial to monitor its impact on employees. For example:

Unilever uses an internal Net Promoter Score to gauge sentiment on AI adoption, ensuring the transition is collaborative and supports productivity.

Andy Hill, chief data officer, Unilever

Similar approaches across the health industry could help balance technological progress with workforce well-being.

Beyond privacy concerns, healthcare organisations are grappling with how to build the necessary infrastructure to support AI. Successful implementation requires a robust data management system, strong security and enough compute power to handle the vast amounts of data that AI processes. Building this infrastructure is neither cheap nor simple, especially in an industry already straining under the pressures of high operational costs.

Balancing the rapid pace of AI development with the need for stable and durable infrastructure is a significant challenge. On one hand, "in the case of AI, there are aspects of it that are moving rapidly, so you can't fall in love with a specific tool or approach and stick with it forever," says Mr Snyder. "Some aspects of AI architecture make it too disruptive to make significant changes very quickly. However, within the data layer, in particular—that's a really important area to feel good about the choices you've made."

Successful AI transformation requires a robust data management layer that keeps data decentralised yet accessible. Strong integration capabilities, robust IT security and service management are essential.

"The application layer of AI involves building new products and solutions by combining external and internal developments," says Mr Bucher. This includes ensuring sufficient compute and storage capacity and a fast network to support AI-driven processes.

Meanwhile, the lack of standardisation in AI development and infrastructure could slow the pace of adoption; 37% of respondents cited consolidation of source data systems as one of their biggest challenges in scaling AI.

"A set of open standards that others agree on doesn't exist today, so you're building in a vacuum. Every application is building its own set of infrastructure and tooling around LLMOps or MLOps because there are no open standards. At a point, it is going to start impacting the pace of innovation. It already does [to some extent]. The government will probably catch up at some point and start putting in some standards."

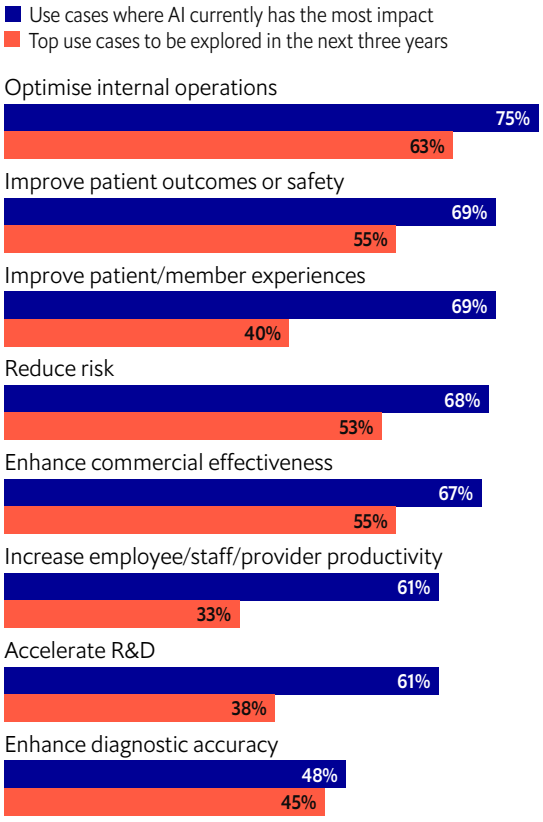
Sara Vaezy, chief strategy and digital officer, Providence

Staying in-house

The future of AI in healthcare remains promising, but the industry is a cautious adopter. Most surveyed experts agree that AI will have the greatest impact internally, optimising operations rather than revolutionising patient care. This is likely to be the case for the next three years, our survey indicates, showing vigilance regarding external applications.

Even when AI models are implemented in certain areas of healthcare, continuous maintenance and monitoring remain crucial. "Over time, a model's performance will degrade," says Ms Vaezy at Providence. This performance degradation process, known as model drift, can be particularly detrimental in critical healthcare settings. "So you have to basically retrain it [the AI model] over and over—nudge it in the right direction."

Figure 2: Top use cases now and in the future



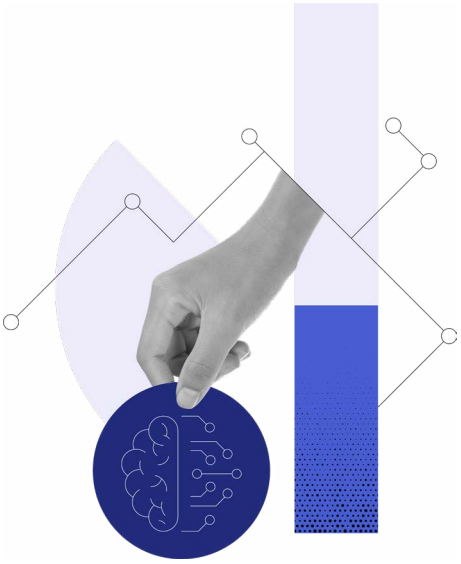
Source: Economist Impact

Then there is the issue of talent.

Just 43% of healthcare and life science respondents agree that their organisation is able to secure sufficient AI talent, compared with 53% across all industries.

This is a troubling shortfall given the complexity of integrating AI into medical practice. With the global shortage of healthcare workers projected to hit 10 million by 2030, the sector is in desperate need of skilled professionals who can manage its digital transformation.[14] Instead, burnout, mental health issues and the drudgery of administrative tasks, many of which could be automated, are driving some professionals away from the field.[15]

The question is whether the system can overcome its own inertia to embrace the digital revolution—and whether AI can live up to its lofty promises. It takes years, if not decades, to translate innovations from the lab to the patient's bedside. For now, the healthcare sector is balancing excitement and caution.



[14] https://www.weforum.org/agenda/2023/01/medical-recruitment-crisis-davos23/
[15] https://www2.deloitte.com/us/en/insights/industry/health-care/healthcare-workforce-shortage-solutions.html

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