



Transforming health care with artificial intelligence

By the numbers:

US\$360 billion—annual potential savings from artificial intelligence (AI) for the US health care system over the next five years¹

Health care generates **19 terabytes** of clinical data annually in the US²

The US market for interoperable clinical data is expected to almost double to **US\$6.2 billion** by 2026 from **US\$3.4 billion** in 2022³

US\$31.5 billion—the amount of private equity funding invested in health care AI between 2019 and 2022⁴

1,500—the number of health care AI vendors, half of which have been formed in the past seven years⁵

More than three years after the COVID-19 pandemic, many health care systems globally are still struggling with its lingering effects. The need to reduce costs and improve access to care—while still confronting a shortage of skilled workers and clinicians—has driven some health care systems to adopt emerging technology to fill the gaps.⁶

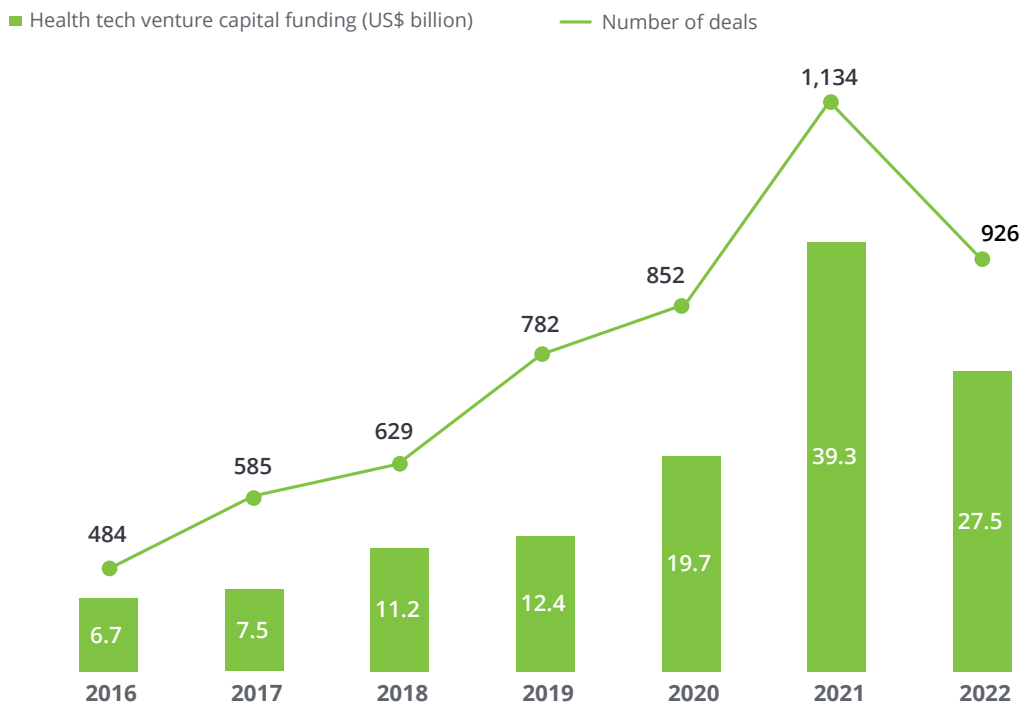
Technology offers health care organizations a chance to personalize patient interactions and treatment, taking pressures off clinicians for routine care, and enabling them to focus on the procedures that require their expertise and training.

AI and other forms of emerging technology have the potential to streamline both administrative and care processes for health care providers. Between 2019 and 2022, investors poured US\$31.5 billion in equity funding into health care AI, and the industry

has consistently been a leader in AI mergers and acquisitions.⁷ The pandemic drove an increased focus on telemedicine and online portals for acute and wellness care. For the sector and patients to continue benefitting from technology, however, providers should sustain investments in technology—much as hospital systems and operators invested in equipment and offices in the past.⁸

So far, this is happening slowly. Global funding for digital health declined by 3% in the second quarter of 2023, to US\$3 billion—the lowest in six years.⁹ Venture capital funding, which is often considered a barometer of technology investment in the industry, fell about 30% in 2022, to US\$27.5 billion from US\$39.3 billion. However, the investment levels still outpaced pre-pandemic levels, and overall funding levels continue to accelerate, excluding the boom in 2021 (Figure 1).

Figure 1: 2022 was a strong year for health tech funding



Note: Data for deals valued at US\$2 million and above.
Source: PitchBook Data, Inc.

Part of the reason for the slowing pace of investment may be that many providers may hesitate to be early adopters of new technology, especially for clinical applications. Tight margins from declining public funding, falling outpatient revenue, longer inpatient stays, and lower demand for care post-pandemic has crimped some provider margins and reduced technology investments. The median Kaufman Hall Year-To-Date Operating Margin Index, which reflects actual margins for 900 US hospitals, was -0.2% through November 2022.¹⁰ As demand for telemedicine and other tech solutions wane, many wonder if the technological advances of the past few years will be permanent.¹¹

Yet the potential for financial benefits, improved care delivery, and more efficient uses of resources is fostering newfound enthusiasm for AI. In the US, for example, wider adoption could generate savings of as much as US\$360 billion annually—roughly 10% of the country's health care spending—in the next five years. For hospitals, the savings would come largely from improvements to clinical operations, quality, and safety; for physicians, from continuity of care; and for payers, from improved claims and provider relationship management.¹²

Streamlining administrative tasks

AI's largest and most immediate impact may be its role in streamlining administrative processes and reducing expenses. Hospital CEOs face three core business challenges: margin pressure; recruitment and retention of staff; and staff burnout. AI has the potential to ease documentation burdens, handle pre-op workflows, and simplify insurance claims, for example. Some US hospitals are employing AI to review patient records and medical policies and address insurance claims denials, potentially saving providers millions of dollars. More than 60% of denied claims are recoverable, yet because of errors and limited hospital resources, only 0.2% of in-network claims are appealed, leaving millions of dollars a year written off as uncollectible.¹³ AI can also minimize errors and improve categorization of incoming claims, reducing backlogs and potential payment concerns.¹⁴

Relieving clinicians of those administrative tasks can free up time for them to spend with patients.¹⁵ In some cases, doctors in the US spend more than two-thirds of their time on administrative work. With AI-managed electronic health records (EHRs) and in-basket management, providers can reduce administrative demands on physicians, a leading cause of burnout.¹⁶

At the same time, AI has the potential to improve access to care that is designed for patients' specific needs. Finland, which began a major overhaul of its health care system in 2023, is building a digitized system that pledges to deliver services that are both personalized and cost effective by emphasizing preventive care that may keep 80% of the population healthy by 2030. That can allow for additional support for the 20% of patients who need disease treatment or other, more extensive care.¹⁷ As part of this effort, Finland anticipates that 80% of its citizens will be using digital identification by the end of the decade, and each citizen will have access to digital medical records and e-health services.¹⁸

Improving the quality of care

In addition to streamlining services, AI can help predict patient outcomes based on their unique health profiles, recommend treatment options to both patients and providers, and alert clinicians to concerns such as contraindicated medicine or allergies.¹⁹

Meanwhile, generative AI can leverage the various datasets that contribute to medical diagnoses and treatments, including EHRs, sensors, and wearable devices. This technology can play a vital role in early detection of illnesses, interpreting radiology results, and identifying patients with the most urgent needs for treatment.²⁰

Health care providers are partnering with tech companies to develop AI tools that can better predict clinical outcomes, enhance radiological imaging, and optimize sleep monitoring. NYUTron, a large language model, predicts multiple clinical outcomes such as 30-day readmission rates, in-hospital mortality rate, comorbidity index, and length of stay. The model

reported an accuracy of 79% in predicting patients' length of stay, a 12% improvement over conventional methods.²¹

Meanwhile, Subtle Medical has developed tools for generating better radiological image data and streamlining radiology workflow. The company's proprietary deep learning algorithms enable up to 60% faster PET and MRI scan times, enhancing imaging efficiency and improving the patient experience.²²

And Zepp Health has developed its Zepp Aura sleep and relaxation platform that connects with its smart wearables. The tool offers personalized sleep coaching, sleep quality analysis, and AI-generated sleep music compositions based on the user's heart rate to help improve sleep patterns.²³

Another challenge for health systems is managing growing volumes of data. The global health care sector generates 19 terabytes of clinical data annually.²⁴ AI can help it use this information more effectively. By using centralized clinical data, providers can create a more comprehensive picture of the patient, while producing more consistent results and reducing the cost of care. The market for interoperable clinical data is expected to almost double, to US\$6.2 billion by 2026 from US\$3.4 billion in 2022.²⁵

In the near term, AI can more effectively interpret and respond to queries, improving patient engagement from initial consultations to post-discharge follow ups. In addition, AI's real-time translation capabilities can improve accessibility and contribute to health equity in areas like social services. For example, after Russia's invasion of Ukraine, Deloitte Czech Republic developed a cloud-based virtual contact center called IRENA (Immediate Refugee Need Assistance), built on Amazon Connect, that used AI-enabled conversations with a virtual agent in any language patients chose.²⁶ As refugees fled across Europe in the early days of the conflict, IRENA handled 10,000 calls daily, with as many as 80% managed automatically.

Expanding access to services

It's not just providers who can benefit from AI expanded use in care delivery. AI may broaden access to care at a lower cost through retail environments. Patients can monitor their overall health and exercise patterns with smartphones and watches, increasing the focus on prevention. A large US grocery chain, with 12% market share in the US, operates 220 clinics, and companies such as Walmart, Amazon, Best Buy, and Dollar General have retail health care footprints or have tested the waters. Retailers already have customer data, they know how to use to create a high-volume low-cost environment, and can provide many basic services for less than other providers.²⁷

However, retail clinics in the US are concentrated in urban and suburban areas, and retailers have been reluctant to open clinics in rural regions because of less customer traffic. As a result, a retailer may provide patients with technological innovation, but those benefits may be limited to certain geographies.²⁸

AI could further blur the lines between humans and technology through augmented reality, smart devices, and wearables. Moreover, investment in secure data environments (SDEs) and other measures may reduce patient concerns about data security. In the future, AI has the potential to assist in three key areas of health care:

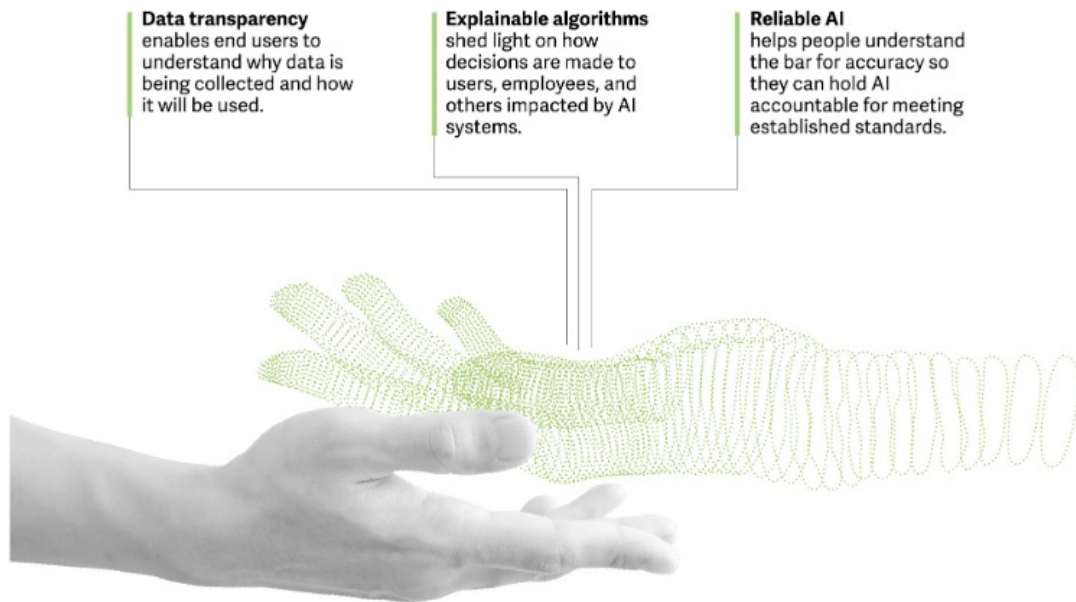
- **Intelligent diagnosis:** AI-enabled solutions could support clinicians in making precise diagnoses using inputs from in-vitro diagnostics, imaging, EHRs, patient conversations, biometrics, images, sensors, wearables, and genomics.
- **Personalized and adaptive care plans:** AI could interpret biomarker data from smart devices and wearables to generate treatment plans such as sleep analysis, dietary suggestions, and even AI-generated music for stress management. Moreover, if a patient faces challenges in adhering to a regimen, generative AI-enabled digital avatars could empathetically interact with patients to understand their barriers and offer potential solutions or alternatives.

- **Population health management:** AI could analyze large datasets and recognize patterns crucial to spotting health trends within a population. For example, by reviewing genomic, socioeconomic, and EHR data, AI could identify risk factors and predictors of diseases, such as cervical cancer. AI-enabled marketing and communications could then generate tailored audio visual or textual invitations for screening services. Responses, visits, and results could then be stored and used to build more robust models.²⁹

The essential elements of trust

Despite the transformative potential of AI in health care, adoption will likely depend on the trust and acceptance of providers, practitioners, and consumers. Health care and technology providers should prioritize responsible and safe use of this technology. To earn patients' trust, the technology should be free of bias, inaccuracies, and data breaches (Figure 2).³⁰

Figure 2: How to make AI more trusted



Source: Deloitte analysis

Currently, AI is more effective at handling administrative tasks than in dealing with predictive diagnoses or care delivery. When generative AI encounters gaps in its knowledge, it tends to fill them with plausible-sounding information that may be inaccurate. These results are often referred to as an AI hallucination or confabulation.³¹

Improving the knowledge base of generative AI requires finding quality health care data and the right foundation models—both of which may require large investments to harness the power. These investments can be essential in building public trust.³²

The Coalition for Health AI, which includes academic health systems, organizations, and expert practitioners of AI and data science, has outlined characteristics of trustworthy AI that include:

- **Safety:** AI systems should not put human life, health, property, or the environment at risk. In health care, this is fundamentally an extension of the Hippocratic Oath to “do no harm.” AI models can become unsafe for a variety of reasons, including inadequate oversight for fairness, accountability, or bias.
- **Accountability and transparency:** AI should be auditable; individuals should have access to their data that is entered into the system and the source of the information should be traceable.
- **Explainable and interpretable:** Physicians should understand how the underlying programs compile information, and the systems should produce outputs with the context in which the information is requested. In other words, health care AI can't be opaque, that is, without insight into how its results are produced.
- **Fair and equitable:** AI should not increase a specific group's risk for experiencing bias or adverse outcomes.³³

Regulatory challenges

The regulatory climate around AI in general is changing rapidly. Governments worldwide are working to establish effective regulation. The EU is leading the charge. The European Commission established a regulatory framework for AI in 2021, and final rules could be implemented as early as 2024.³⁴

The UK government in March 2023 published guidelines for regulating generative AI that include data reporting, life cycle accountability, and industry collaboration with the goal of encouraging adaptiveness and autonomy.³⁵

In Brazil, however, consensus among legal experts, academics, industry leaders, and regulators has been more difficult, and the country has yet to adopt a coherent framework for regulating the diverse applications of generative AI. In November 2022, a group of legal, academic and industry experts working with the country's National Data Protection Authority published guidelines that focused on the rights of the citizens, risk categorization, and governance measures, but the document is being debated at various levels of the Brazilian government.³⁶

The US, meanwhile, has not adopted comprehensive national regulatory legislation, resulting in a fragmented framework of state rules. To bring greater clarity, the Biden administration issued an executive order aimed at governing the risks associated with AI.^{37, 38}

The disparity in approaches to regulating and monitoring AI could pose additional challenges to health care providers.

Deploying AI responsibly in health care

AI has the potential to transform health care by optimizing both administrative functions and care delivery. It will have financial and non-financial benefits for the global health system, such as improved care quality, enhanced patient experience, and greater clinician satisfaction. Private providers may gain the greatest benefits from optimization in care, claims, and provider relationship management.

Companies that invest in AI early and identify opportunities for applying it across the value chain are likely to gain a competitive advantage and deliver more personalized care to patients in the coming year.

However, companies must take steps to ensure AI is deployed responsibly and that its use and processes are transparent and auditable. Organizations that don't build this into their AI strategy risk alienating patients and other stakeholders. For those who build trust in AI, the technology can continue to unlock new innovations for years to come.

For AI to be effective in health care, both medical professionals and patients should have confidence in the results, understand how those results are achieved, and have confidence that their confidential information will be protected.

Considerations for providers to build trust into their AI strategy

Providers that want to foster trust around their use of AI should:

- Adopt strong governance practices around AI to help ensure the organization can innovate with confidence while reducing the risks that come with complex technology.
- Prioritize patient data privacy and protection from cyber threats by addressing external, physical, and digital risks. Once the risks are assessed, organizations must determine if these risks outweigh the potential benefits.
- Establish responsibility and accountability for AI in the organization, review rules and regulations that might determine legal obligations, and ensure that AI systems are auditable.
- Promote transparency by informing consumers how AI is using their medical data to make decisions. AI's algorithms, attributes, and correlations should be open to inspection, and its decisions should be fully explainable.



Deloitte AI Dossier

How AI is transforming health care

AI is rapidly becoming a competitive necessity in the health care sector. Yet many organizations are still understanding what AI can mean for them. Deloitte created the [AI Dossier](#) to give leaders in different industries summaries of key issues and opportunities, and how AI can help achieve them.

The Dossier identified several key areas where AI can benefit the sector.

Enhancing patient engagement

Many patients struggle to book appointments, access medical records, determine which services are available to them, and get answers to simple logistical questions. AI can improve interactions between patients and providers by:

- **Simplifying complex medical information:** Natural language processing can make medical data more understandable to patients, increasing health literacy.
- **Streamlining communication among health care workers:** AI and machine learning can filter and share relevant information efficiently.
- **Accelerating database searches:** AI-enabled databases improve information retrieval and reliability.
- **Enhancing chatbots:** Chatbots can assist with patient questions, appointment scheduling, and referrals.
- **Personalizing patient engagement:** AI-driven prescriptive analytics can suggest personalized actions for patients, increasing focus on care delivery.

Automating claims management

Traditional claims management is costly, slow, and error-prone, often relying on manual data input. AI can assist by:

- **Automating claims data extraction and input:** Robotic process automation tools extract data without manual intervention.
- **Providing real-time updates and monitoring:** AI systems offer real-time status updates and claims monitoring.
- **Automating follow-ups and denials:** Repetitive tasks related to claims can be handled instantly by AI tools.
- **Analyzing claims:** AI-enabled data analysis provides real-time insights on filed claims.

Efficient and accurate diagnoses

Diagnosis often depends on complex factors, including patient history and genetics. AI can improve them by:

- **Analyzing extensive medical data:** AI can uncover complex patterns and characteristics that might be overlooked by humans.
- **Offering recommendations:** AI technologies such as deep neural networks and machine learning can enhance the analysis of patient data.

Personalized health care

Precision medicine considers an individual's genetics, environment, and lifestyle to provide tailored treatments. AI can deliver more personalized diagnoses, prevention, and treatment by:

- **Connecting various datasets:** Machine learning algorithms link treatment outcomes to diverse health datasets.
- **Analyzing and collecting vast data:** AI and machine learning enable more effective data collection and analysis.
- **Developing personalized treatments and care:** AI analytics allow health care providers to deliver personalized care.

Optimizing hospital staffing and resources

Demand for health care rises and falls in response to a complex range of factors, making it difficult for hospitals to optimally allocate their supply of critical resources such as medical equipment and staff. Predictive AI can forecast patient volumes and help hospitals adjust staffing and resources accordingly by:

- **Predicting future resource needs:** Data mining, modeling, and AI provide insights for resource allocation.
- **Analyzing detailed data:** AI and machine learning offer a comprehensive understanding of health status.
- **Identifying high-impact patterns and trends:** AI-driven analysis reveals hidden trends and potential risks.

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[Navigating the emergence of Generative AI in health care](#)

[The Future of Health in Europe](#)

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[Digital health integration](#)

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