CHEAT SHEET

for digital health leaders

Generative Artificial Intelligence

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Key takeaways

- The field of generative AI is not new, but recent high-profile advancements in performance and increased funding mean it's likely to impact healthcare soon.
- Generative AI could transform healthcare in a variety of ways, going beyond chatbots to include search, image creation, and even synthetic data.
- Bias and misinformation are the two biggest obstacles to generative AI that could limit early use cases to non-clinical functions where they are less likely to cause harm.

What is it?

Generative artificial intelligence (AI) is a subset of machine learning that describes algorithms that create new content. This ability to generate new content distinguishes generative AI models from retrieval-based models and predictive AI.

The most common generative AI models today are text-based. These models, known as large language models, have been trained on enormous data sets in a manner that allows them to both understand input text and create responses. However, generative can be used for much more than just text. These algorithms can also be built to create images, code, and even synthetic data.

Most of today's generative AI models are still in the research and development stage, meaning there is not widespread commercial usage beyond pilot projects. The one growing exception here is with a few large language models. The most widely known example of generative AI is OpenAI's ChatGPT, a publicly available chatbot service that Microsoft recently incorporated into Bing search. Not to be out done, Alphabet (the parent company of Google) released Bard, its own generative AI-powered conversational search in February of 2023.

Potential health care use cases

Expanding the scope of asynchronous telehealth and triage tools

Utilizing synthetic data in drug discovery and clinical trials

Integrating disparate data sets to identify rising-risk populations earlier

Summarizing medical conversations in plain language for patients

Source: Advisory Board interviews and analysis.

Why does it matter?

The basics of these generative AI models, particularly text-based models, have been around for years. Now, advancements in training are showing that this technology could be ready for use across a variety of fields in the next few years.

Notably, recent studies of OpenAI's ChatGPT and Google's Med-PaLM have highlighted the potential for these models to be used for healthcare purposes. A December 2022 study led by Google researchers found that Med-PaLM performed as good or only slightly worse than clinicians across three areas: comprehension of inputs, correct retrieval of information, and correct reasoning. And in February, a study found that ChatGPT could perform at or near the 60% accuracy threshold required to pass the U.S. Medical Licensing Exam.

These studies demonstrate that we are much closer to real-world impact than many healthcare leaders might think. For example, imagine an AI tool that could take a patient's medical history and write a quick summary paragraph that highlights the most relevant parts for the clinician. That could simultaneously improve patient care and the clinician workflow. And this is just one type of generative AI — the potential image and data creation capabilities indicate there will be wide-ranging applications in medical imaging and synthetic data as well.

Potential key impacts of generative AI in healthcare

Faster, cheaper drug discovery

Improved clinician workflows

Better patient experience through support tools

Expanded access to care via digital therapeutics

Finally, investors clearly see generative AI as a key future technology. According to CB Insights, startups focused on generative AI received $2.6 billion in funding in 2022, up from just $271M in 2020. And this area is primed for continued investment, as over two-thirds of generative AI companies have yet to go through a Series A round of funding.

Source: CB Insights; Kung TH, et al., "Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models," *PLOS Digital Health*, Feb 2023; Singhal K, et al., "Large Language Models Encode Clinical Knowledge," *Google Research, Deep Mind,* Dec 2022.

How does it work?

Generative AI goes beyond just identifying and classifying patterns (predictive AI) and creates something new that resembles the learned pattern. Take, for example, a set of images of chest X-rays. A predictive AI tool might be able to sort through these and classify the findings as normal versus abnormal. A generative AI tool would be able to create a new example of a "abnormal" chest X-ray, perhaps for training purposes.

When applied to chat, this capability has the potential to transform the scope and usefulness of conversations. Many chatbots in use today are at least partially retrieval-based, meaning the responses from these chatbots are bounded by the phrases and sentences the chatbot already knows. As researchers who have compared the performance of retrieval-based chatbots to generative chatbots have shown, this limits the ability of retrieval-based chatbots to provide useful information outside of the narrow scope of potential conversations. Generative chatbots have no such limitations, as they can generate new sentences that are based on the vast amount of text they have been trained on.

However, the potential expanded scope introduces significant risk, particularly in bias and misinformation. These models leverage self-supervised learning on vast amounts of data to be able to create realistic generated responses. But this type of training can lead the models to potentially provide incorrect or misleading information. It also means that these models will reproduce racial and gender stereotypes and reflect existing biases within medicine. If these drawbacks cannot be accounted for, they could delay the use of many of these generative AI tools for clinical purposes.

Source: Björklin H, et al., "A retrieval-based chatbot's opinion on the trolley problem," *Uppsala Universitet*, May, 2021; CB Insights; Heilweil R, "What is generative AI, and why is it suddenly everywhere?" *Vox*, Jan. 5, 2023.

Conversations you should be having

01 Start your conversation by discussing the major problems facing your organization and then work backward to how generative AI can help, instead of starting with a discussion of use cases.

02 Prepare for future decisions around when an AI model is accurate enough, including weighing potential benefits of being an early mover against potential drawbacks of failure.

03 Decide how your organization can monitor future technological developments in generative AI.

04 Determine how to communicate with and respond to patients and other stakeholders who may utilize third-party generative AI tools outside of your organization.

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