# HEALTHCARE TRANSFORMATION: FROM PERSONALIZED ADVICE TO OPERATIONAL IMPROVEMENTS

GenAI is ushering in a transformative era in healthcare, with far-reaching implications for patient care, diagnostics, and more. There's a lot happening in this field and we will focus particularly on:

* Personalized advice for patients
* Detection of diseases
* Personalized treatment
* And operational improvements

## Giving Patients Personalized Health Advice

This goes beyond basic chatbots that can help patients book appointments, refill prescriptions, or answer routine enquiries (although such chatbots do have a valuable place in healthcare). Sophisticated large language models like GPT-4, combined with human doctor expertise, has led to a new wave of virtual health assistants – developed to give actual medical advice that's personalized to each patient's specific health concerns. With millions of people around the world unable to access medical care (either because of their geographical location, for economic reasons, or simply because their local services are too stretched), we can expect to see AI increasingly pick up the slack. These AI systems not only improve patient engagement but also relieve the burden on healthcare professionals by handling routine healthcare concerns and directing patients accordingly.

As an example, Ada is a doctor-developed, AI-driven app designed to assess symptoms and offer patients medical guidance, in multiple languages (including English, German, French, Spanish, Portuguese, and Swahili). So far, the app has amassed 13 million users and has completed more than 30 million symptom assessments.1 It works by asking you questions about your symptoms (you can also create separate symptom profiles for loved ones), then pointing you to possible conditions and medical guidance. The app also tracks your symptoms as they progress.

## Image Analysis and the Early Detection of Diseases

AI has been making a mark in this area for a little while, but GenAI will significantly enhance the analysis of medical images. As such, we'll increasingly see GenAI tools being used to help radiologists identify and diagnose diseases from X-rays, MRIs, and CT scans with greater accuracy and speed.

But can an AI really be as effective as a human doctor when it comes to detecting and diagnosing issues from images? Absolutely. Numerous studies have shown that AI tools deliver comparable accuracy to human doctors – if not higher accuracy.

**Detecting issues in chest radiographs**

One study explored the use of AI to interpret chest radiographs and generate radiograph reports in the emergency department. Since many emergency departments don't have 24/7 access to dedicated radiology services, images are often interpreted by a remote radiologist (known as “teleradiology”) or even by ER doctors. The study found that the AI tool generated rapid radiograph interpretations and reports with comparable levels of quality and accuracy as radiologist reports – and to a higher quality than teleradiology reports.2 In one of the cases, the AI performed even better than a human radiologist, detecting an issue that the radiologist failed to report. And in another case, the human radiologist reported that opacities in a patient's lungs appeared consistent, while the AI detected that the opacities had worsened – a finding that could be significant in that patient's case.

The authors of the study suggest that the short processing time and high accuracy of AI diagnostics could help to streamline the processing of patients in emergency departments. This shows that not only can AI help radiologists perform their work more quickly and effectively – it can also help clinicians in other departments interpret medical images and accelerate the processing of patients.

**Helping patients self-examine**

GenAI is rapidly emerging as a viable tool in medical diagnostics. But it can also help patients identify issues and seek early medical intervention. That's the idea behind SkinVision, the AI-powered app for early detection of skin cancer. SkinVision is a regulated medical service that teaches people how to self-examine their skin and determine when they need to take action. And while SkinVision is quick to say its service is not a medical diagnosis, the idea is to help people quickly detect signs of the most common kinds of skin cancer, so that they can seek a formal diagnosis where needed. Research has shown that the app can detect skin cancer with 95% accuracy.3

## Providing Personalized and Improved Treatment for Patients

GenAI can help doctors enhance patient treatment – by analyzing vast patient datasets to recommend personalized treatment plans, optimizing medication dosages, and predicting potential adverse reactions, all based on the individual. Plus, it can assist in the creation of tailored rehabilitation exercises and therapy programs, enabling more precise and effective care for individual patients.

GenAI can also help to enhance preventive medicine. For example, clinics and hospitals could employ GenAI to create personalized health plans based on a patient's unique genetic makeup, health history, and lifestyle. This sort of AI-driven approach could not only help people lead healthier lives and, in turn, prevent illness – it would also help patients feel more understood and cared for as an individual.

**Supplementing patient–doctor conversations**

Imagine a scenario where a patient consults with a doctor, and a GenAI system operates in the background, listening, taking notes, and formulating potential questions for the doctor to ask – based on the patient's history and symptoms. Like a cross between a medical chatbot and a diagnostic tool, but designed to be used in sessions with patients to inform conversations and help the doctor uncover symptoms and diagnoses.

This sort of AI-augmented approach could help doctors get the most out of patient appointments (which can be as brief as 10 minutes), while tailoring their care to the individual in front of them. Plus, it could prove particularly valuable in the diagnosis of rare or difficult-to-diagnose conditions, such as endometriosis, which affects 1 in 10 women but has symptoms which are often dismissed or misdiagnosed.

**Helping busy doctors provide precision care**

A good example comes from GenAI experts RhythmX AI, who have created a precision care platform that helps doctors deliver hyper-personalized care. In essence, the system uses GenAI and predictive AI algorithms to provide patient-specific prescriptive actions and recommendations. Doctors can then drill into the recommendations via the natural language interface – an AI co-pilot for doctors, if you will. As Dr Gregg Meyer, part of the clinical advisory board at RhythmX put it, “Physicians are now considering clinical experience, social determinants, lifestyle factors, and mental health factors to deliver hyper-personalized interventions … There is a critical need in the industry for a platform that can aid physicians to solve these issues.”4

## Healthcare Research and the Development of New Drugs

The implications of GenAI for healthcare research and drug discovery are huge. GenAI can help researchers understand disease markers more easily, and find optimal combinations of chemicals (and even invent entirely new combinations) to create new pharmaceutical treatments. As such, GenAI will revolutionize drug discovery and development by generating novel molecular structures, swiftly screening compounds, predicting drug interactions, repurposing existing drugs for new applications, optimizing clinical trials, and enhancing drug formulations. Not only will this help clinicians treat diseases better in future, it will also make treatment more personalized – because drugs can, in theory, be tailored based on individual patient data.

## Delivering Administrative and Operational Improvements

GenAI can help to reduce the administrative burden in healthcare by automating tasks such as medical coding, billing, routine enquiries, and notetaking. If we think about the tasks that GenAI is capable of – writing, listening, and interpreting human speech and text – it's clear that GenAI can add a lot of value behind the scenes in clinical settings. Even just a few minutes saved on each patient encounter with automated notetaking could add up to considerable operational improvements – freeing up healthcare professionals to spend more time with patients and less time on admin tasks.

**Conversational AI for answering routine calls and messages**

Hyro is a HIPAA-compliant “conversational AI” designed to help clinics automate common interactions, overcome staffing shortages, and enhance patient engagement. Using natural language text and speech, Hyro helps healthcare teams automate straightforward tasks and requests from patients, including appointment scheduling and prescription refills – meanwhile, more complex cases are routed to the appropriate department. Hyro says its AI assistants can resolve around 85% of calls.5

**Using GenAI for notetaking and clinical documentation**

Another good example comes from NextGen Healthcare and its Ambient Assist notetaking tool, which listens to conversations between patients and clinicians, then provides summary notes. Notes are available for the clinician to review within just 30 seconds of completing the patient encounter, with the tool documenting appointments with over 90% accuracy.6

A 2017 study found that primary care doctors spend nearly half their working day on electronic health record and admin tasks, and just 27% of their time with patients – with admin burden being cited as a leading cause of clinician burnout.7 Tools like NextGen help clinicians cut down on admin tasks without compromising clinical records.

In another example, Baptist Health, a South Florida health system comprising 11 hospitals, is also using GenAI to reduce the time spent on clinical documentation. It is implementing a GenAI-powered documentation app that blends medical transcription technology with AI language models – meaning the system can transcribe patient conversations and quickly generate clinical notes from the conversations. The automation is expected to reduce documentation time down to around two minutes post-visit, giving clinicians more time to attend to patients.8

**Helping clinicians search information more easily**

GenAI isn't just about generating content for clinicians; it can also help clinicians access and digest information more easily. That's the idea behind Google Cloud's Vertex AI Search platform, which has now been tailored specifically for healthcare and life-sciences organizations. Using the tool, clinicians can search for information across data sources – not just electronic health records, but potentially the organization's entire data ecosystem, including raw unstructured data. Among the companies integrating Google Cloud's GenAI search capabilities is care.ai. The AI company says its ‘Smart Care Facility Platform’ will use Google's GenAI technology to enable new ways to analyze data, generate insights, and enhance care delivery.9

**Predicting outbreaks to optimize resources**

Another way that AI may streamline healthcare provision is in forecasting disease outbreaks, or predicting how viruses may change. An exciting example comes from an AI tool called “EVEscape,” developed by researchers at Harvard Medical School and the University of Oxford. EVEscape uses generative models to predict how a virus could evolve to escape the immune system, thereby predicting new mutations of viruses. (The tool successfully predicted the most concerning new variants of COVID-19.10) Not only could this help global health systems prepare for and manage pandemics, it could also inform the development of vaccines and therapies for rapidly changing viruses.

## Could Generative AI Help to Solve the Healthcare Crisis?

Around the world, healthcare systems are coming under enormous strain. In many regions, there is a critical shortage of doctors and healthcare professionals. The World Health Organization (WHO) estimates a projected shortfall of 10 million healthcare professionals by 2030, primarily affecting low- and lower-middle-income countries.11 Even in a rich country like the US, the Association of American Medical Colleges is predicting a shortage of up to 139 000 physicians by 2033.12

What's more, healthcare systems are plagued by rising waiting times. At the time of writing, the waiting list for planned treatment in England's National Health Service hit another record high of 7.75 million patients, with thousands waiting more than 18 months to start treatment.13 And that's the situation in a country with universal healthcare – something that many people aren't fortunate enough to enjoy. Shockingly, WHO figures from 2021 indicate that around 4.5 billion people around the world are not fully covered by essential health services.14

**The promise of GenAI**

There's no substitute for receiving amazing care from human doctors and other healthcare professionals. But it's clear that GenAI offers solutions that can help to bridge the gap between growing healthcare needs and apparently dwindling healthcare resources. We needn't be afraid of this. GenAI tools have demonstrated remarkable medical knowledge – to the extent that some are competent enough to pass medical certification exams.15 And as we've seen in this chapter, they can even outperform human doctors when it comes to diagnosing issues. So a future where clinicians and GenAIs work together – where human intuition and expertise combines with machine precision – is enticing. As healthcare systems become more stretched, combining human and machine expertise will likely be the best way to diagnose patients and provide appropriate treatment.

What's more, GenAI tools can empower individuals to take charge of their own healthcare, by engaging in discussions with healthcare chatbots about potential diagnoses and treatment options, and seeking medical help when needed. Think of it as the new version of Googling your symptoms, only much more advanced and precise! And when a patient does interact with a doctor, GenAI can add value in the background, generating medical notes and helping doctors search information.

**But there are challenges**

When a GenAI tool generates inaccurate or “hallucinated” content in a sector like marketing, it's probably rather embarrassing for the company using that content. But if a healthcare GenAI generates inaccurate or incoherent responses, that's a whole other story. So while large language models and other GenAI models hold great promise for solving problems in healthcare, providers obviously need to ensure the accuracy and reliability of responses.

Are there challenges to deploying GenAI in healthcare? Absolutely. But given the current state of healthcare provision and access around the world, I believe GenAI promises more solutions than obstacles.

## Key Takeaways

Through more intelligent, responsive chatbots, GenAI can be used to deliver personalized advice to patients, allowing them to discuss concerns, get potential diagnoses, and understand when they may need treatment. New tools are already emerging to meet this demand for more immediate access to healthcare advice.

When it comes to the early detection of diseases, AI has already proven itself to be as capable and reliable as human doctors at interpreting medical images and generating reports based on those images. Not only can this help radiologists in their work, it can also help doctors in other departments (such as the ER) to quickly diagnose issues and accelerate patient treatment.

Personalized treatment is a particularly hot area in medicine, but one that's challenging to deliver given each patient has a different medical history, different needs, and a different lifestyle. GenAI can help clinicians overcome this challenge by acting as a medical “co-pilot” – suggesting potential treatments and next steps.

Behind the scenes, GenAI can also deliver huge operational improvements – particularly when it comes to streamlining medical notetaking, dealing with routine calls and enquiries at clinics, and more. This could improve the patient experience and help to reduce clinician burnout.

Healthcare systems around the world are struggling and waiting times can be frustratingly long. GenAI can help to solve some of the biggest challenges facing global healthcare systems and make healthcare much more accessible and efficient.

## Notes

1. About Ada; Ada; https://ada.com/about/

2. Is generative AI the future of rapid and accurate chest radiograph interpretation in the ER?; News Medical Life Sciences; https://www.news-medical.net/news/20231008/Is-generative-AI-the-future-of-rapid-and-accurate-chest-radiograph-interpretation-in-the-ER.aspx

3. Accuracy of a smartphone application for triage of skin lesions based on machine learning algorithms; Journal of the European Academy of Dermatology & Venereology; https://onlinelibrary.wiley.com/doi/10.1111/jdv.15935

4. New Generative AI-Native Health Company RhythmX AI Announces Precision Care Platform For Doctors to Deliver Hyper-Personalized Care to the Right Patient at the Right Time; PR Newswire; https://www.prnewswire.com/news-releases/new-generative-ai-native-health-company-rhythmx-ai-announces-precision-care-platform-for-doctors-to-deliver-hyper-personalized-care-to-the-right-patient-at-the-right-time-301947898.html

5. Conversational AI for healthcare; Hyro; https://www.hyro.ai/healthcare/

6. NextGen Healthcare reveals AI notetaking product; Healthcare Dive; https://www.healthcaredive.com/news/nextgen-healthcare-generative-ai-clinical-documentation-ambient-assist/696029/

7. Yet another study highlights EHR burden on physicians; Healthcare Dive; https://www.healthcaredive.com/news/another-study-highlights-ehr-burden-on-physicians/504805/

8. In pilot, generative AI expected to reduce clinical documentation time at Baptist Health; Healthcare IT news; https://www.healthcareitnews.com/news/generative-ai-reduces-clinical-documentation-time-baptist-health

9. Google Cloud Launches New Generative AI Capabilities for Healthcare; Forbes; https://www.forbes.com/sites/saibala/2023/10/09/google-cloud-launches-new-healthcare-generative-ai-features/?sh=3de773ac7e5b

10. An AI Tool That Can Help Forecast Viral Outbreaks; Harvard Medical School; https://hms.harvard.edu/news/ai-tool-can-help-forecast-viral-outbreaks

11. Health Workforce; World Health Organization; https://www.who.int/health-topics/health-workforce#tab=tab\_1

12. New AAMC Report Reinforces Mounting Physician Shortage; AAMC; https://www.aamc.org/news/press-releases/new-aamc-report-confirms-growing-physician-shortage#:~:text=According%20to%20new%20data%20published,and%20specialty%20care%2C%20by%202033

13. NHS waiting list in England rises to record 7.75 million; BBC News; https://www.bbc.com/news/health-67087906

14. Universal health coverage; World Health Organization; <https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)>

15. Generative AI in Medicine and Healthcare; Promises, Opportunities, and Challenges Future Internet; <https://www.mdpi.com/1999-5903/15/9/286>

# Acknowledge

The case study is taken from the below book:

Bernard Marr, “Generative AI in Practice”, 2024