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Transforming Healthcare with GenAI

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A comprehensive analysis of the frontiers before implementing GenAI in healthcare to ensure robust and reliable clinical outcomes



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Artificial intelligence (AI) has become part of the lexicon for a rising majority of the global population. As we approach 2025, AI will continue to play a critical role in transforming our industries, especially with the proliferation of emerging technologies such as Generative AI (GenAI). AI and GenAI will create new and unprecedented opportunities to increase productivity, operational efficiency, and accuracy across industries including healthcare. In fact, Singapore's Ministry of Health announced in October 2024 that it will be investing S$200 million over the next five years to implement new AI technologies across itsnational health system.

The healthcare sector is evolving rapidly to further digitalise its capabilities, systems, and processes, while still adhering to strict constraints for data privacy, and security. One example is the introduction of GenAI-enabled Electronic Health Records (EHR) which will enable clinicians to be better equipped to provide care with data-driven insights and intelligence. Clinicians will be able to read summaries of voluminous EHR data, assess the presented key facts, and choose to pursue the suggested potential avenues for clinical discussion and exploration. Building on a decade of prior related research, recent trials have also shown great promise with AI applied to diagnostic imaging, and it is likely that GenAI will have equally beneficial impact. Another use case for GenAI may be assisting researchers to extract community-level insights from previously inaccessible data, stored in textual clinical notes, reports and diagnostic images.

New possibilities for healthcare with GenAI

The integration of GenAI with EHRs presents significant opportunities for both clinicians and researchers to potentially reshape the healthcare landscape. GenAI could serve as a powerful tool for clinicians diagnosing and treating patients; it could be used to analyse patient history, lab results, imaging data, and support the diagnostic process with suggestions and supporting evidence.

At the research level, GenAI has the potential to transform how we understand health at population scale by analysing large volumes of anonymised health data from EHRs. This could help researchers to identify trends and patterns for disease and treatment outcomes leading to the generation of new hypotheses for research, design, and analysis of clinical trials, ultimately, accelerating medical discovery.

However, providing access to larger amounts of data, introduces new challenges. For example, will a busy general practitioner have the time to review the more complete and voluminous patient records that EHR technology typically provides? How will this impact their available time, their liabilities, and their practice of medicine while maintaining their compassionate connection with their patients?

Understanding the risks is key to unlocking AI's real value

As with any powerful new technology there will be risks which need to be identified, mitigated, and managed; at the forefront of this is reliability and privacy. The goal of achieving total accuracy is neither practical nor realistic as both humans and AI can make mistakes. Health organisations need to have processes and controls in place to manage GenAI performance, continuously assessing, improving, and publishing the long-term patient outcomes.

The management and protection of patient privacy and its data remains a significant concern for individuals and a risk for organisations. Patient records contain significant amounts of personal sensitive information. In a critical sector such as healthcare, a growing reliance on AI will heighten risk of AI model tampering and increase data breaches. There is a need for organisations to examine the end-to-end processes ensuring that systems safeguard this data and protect patient privacy.

Ultimately patient safety is paramount, and at this nascent stage, recommendations generated by GenAI still need to be reviewed and validated by experienced clinicians. GenAI must be used with caution and supported by rigorous clinical trials.

AI will continue to play a critical role

Looking to the future, we can expect GenAI systems to continuously learn from new clinical data and research findings, offering increasingly sophisticated analysis and recommendations. This could pave the way for more advanced predictive health models, both at individual and population levels. The potential impact of these developments is substantial. We may see enhanced precision and efficiency in patient care, accelerated medical research, and more personalised, data-driven healthcare approaches.

It is crucial to approach these new frontiers with careful consideration, the implementation of GenAI in healthcare must be introduced and used ethically, with robust human oversight. There needs to be ongoing validation of AI generated suggestions against clinical outcomes to ensure accuracy, reliability, and safety. Additionally, as we deal with sensitive health information, ensuring patient privacy and data security will remain paramount.