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Digital Health

# *Navigating the future: The impact of generative AI and large language models in healthcare*

The healthcare industry is on the verge of a technological transformation, driven by breakthroughs in generative Artificial Intelligence (AI) and Large Language Models (LLMs). These developments are poised to change patient care, research, and administrative effectiveness. Industry leaders are optimists on the technical progress of generative AI and its crucial role in reshaping healthcare delivery and management.

Gen-AI technology relies on deep-learning algorithms to create new content such as text, audio, code, and more. It can take unstructured data sets—information that has not been organized according to a preset model, making it difficult to analyze—and analyze them. This represents a potential breakthrough for healthcare operations, which are rich in unstructured data, such as clinical notes, diagnostic images, medical charts, and recordings. Just as humans depend on multiple senses to make decisions, multimodal AI combines various types of data and models to generate more precise, complete insights and predictions reflecting our complex way of interpreting the world.

## Benefits and Opportunities in Healthcare

The integration of Generative AI and LLMs into healthcare offers myriad benefits and opportunities:

### CLINICAL DECISION SUPPORT AND DIAGNOSTIC ACCURACY

Clinical decision support systems mainly rely on static rules and algorithms that may not account for the complex and unique characteristics of each patient. Generative Healthcare AI can help clinicians make more informed decisions by providing real-time recommendations based on patient data, clinical guidelines, and best practices. This can improve the accuracy of diagnoses, reduce medical errors, and enhance patient outcomes.

A recent study, published in the Journal of Medical Internet Research, found that ChatGPT was approximately 72% accurate in clinical decision-making, including diagnosis and care management, across all medical specialties in both primary and emergency care settings. The research assessed ChatGPT's utility from initial patient interaction through the entire care process, highlighting its potential as an augmenting tool in medicine. The study involved analyzing ChatGPT's responses to 36 standardized clinical vignettes, examining its capability in differential diagnosis, diagnostic testing, final diagnosis, and management. While ChatGPT showed high accuracy in final diagnoses (77%), it was less accurate in differential diagnoses (60%) and clinical management decisions (68%). The study also noted ChatGPT's consistent performance across various care settings and its lack of gender bias in responses.

## STREAMLINED CLINICAL OPERATIONS AND DOCUMENTATION

Generative AI has the potential to streamline clinical operations significantly, reducing the administrative burden on healthcare professionals. For instance, Gen AI has the potential to automate the generation of discharge summaries, care coordination notes, and clinical orders in real time, thus improving efficiency and reducing the potential for human error.

UNC Health, in partnership with Epic and Microsoft, has implemented a generative AI-powered tool named DAX Copilot into Epic's electronic health record software, automating clinical notetaking during patient exams. This integration, due to Nuance Communications products that Microsoft's has acquired, will try to reduce clinicians' clerical workloads. In a pilot study, with a select group of clinicians, the tool has demonstrated various potential benefits, including a significant reduction in documentation time by 50%, a decrease in cognitive burden by 70%, and an increase in the number of patients seen per day.

As this study was considered a success, this AI-based scribe technology will be expanded. This is noted as being an industry-first integration, allowing enhanced conversational, ambient, and generative AI solutions for healthcare documentation.

## PERSONALIZED PATIENT CARE AND DIGITAL TWINS

LLMs can help create healthcare plans that suit each patient by considering their specific medical histories, genetic information, and lifestyle factors. By aggregating data from diverse sources, it provides a more comprehensive view of a patient's health, leading to better informed decision-making. Generative AI can also help optimize patient pathways by identifying the most efficient path to a desired outcome. For example, if a patient has a specific condition, generative AI can analyze the best practices for treating that condition and suggest a series of actions that are most likely to lead to a positive outcome. This can include everything from specific medications to lifestyle changes.

I have been using a Playground called Healthinov Digital Twin since ChatGPT 4.0 came out. It uses generative AI models to combine and analyze my clinical information, such as clinical notes, clinical results, data from wearable devices, and complete genetic test report with raw data. With it I got a complete picture of my health profile that, through an interactive model, can help me learn more about my health conditions, the effects of treatments, and their possible outcomes.

While it's essential to model the digital twin based on the patient's data, generative AI can also produce synthetic data that can be used in simulating various scenarios or conditions, broadening the scope of analysis.

And, just as the patient's health condition changes over time, the digital twin should evolve by integrating the most recent clinical information from wearables and health providers using FHIR. Generative AI can adjust and generate new data in real-time, keeping the twin updated. Through Generative AI, multiple health scenarios, from reactions to medications to the progress of a disease, can be simulated, giving insights into potential outcomes, and allowing preemptive actions

Digital Twins also opens a world of possibilities for health insurance plans, pharma, and health systems. Health insurance plans can use digital twins to develop more comprehensive and cost-effective plans. Pharma and life sciences can use the digital twins to test and develop new treatments and medications quicker and more efficiently. And health systems can use it to better understand the needs of their patients, provide better

care, and predict potential issues before they become a problem.

## REVENUE CYCLE MANAGEMENT (RCM) EFFICIENCY AND REDUCED ADMINISTRATIVE BURDEN

According to the study The Potential Impact of Artificial Intelligence on Healthcare Spending study, deploying analytics and automation effectively in the US healthcare systems can lead to significant cost savings estimated from $200 billion to $360 billion. Also, these savings are not just limited to RCM but also extend to non-clinical operations, like documentation, claims, billing, scheduling, etc. Clearly, leveraging technologies like generative AI in healthcare prospects a promising future.

A recent study by Change Healthcare showed that by the end of 2023, nearly all healthcare leaders expect to use some form of AI in RCM. Healthcare facilities that already use AI in the Healthcare Revenue Cycle are aiming to enhance the whole revenue cycle management from medical coding to payer payments and cash flow. They are focusing on certain processes to automate, such as eligibility verification (72%), patient payment estimation (64%), prior authorization (68%), payment amount/timing estimation (62%), and denials management (61%).

According to the report, healthcare leaders' satisfaction with the use of AI in RCM varies significantly by role. RCM decision-makers are the most satisfied, with 78% reporting satisfaction. However, only 25% of corporate leaders and 46% of IT leaders are satisfied with AI in the Healthcare Revenue Cycle.

Gen AI-powered systems can analyze vast amounts of data with unparalleled precision, minimizing coding errors and ensuring accurate billing. By automating coding processes and flagging potential discrepancies, these technologies facilitate improved compliance with regulatory standards, reducing the risk of claim denials and delays in reimbursement. These solutions expedite the submission of claims, enable real-time eligibility verification, and offer insights into potential reimbursement issues, thereby accelerating the revenue cycle and enhancing cash flow for healthcare providers.

Through AI-driven analytics, healthcare organizations can tailor financial interactions and payment plans to meet the specific needs of patients. Gen AI tools can assess patient financial data, predict potential payment issues, and offer personalized financial guidance, enhancing patient satisfaction and reducing the likelihood of payment defaults.

By harnessing the power of predictive analytics, Gen AI assists healthcare providers in forecasting revenue patterns, identifying potential financial challenges, and optimizing revenue streams. These insights enable proactive decision-making, allowing organizations to implement strategies that maximize revenue generation and minimize revenue leakage.

With its ability to enhance accuracy, streamline processes, and provide valuable insights, Gen AI is poised to play a pivotal role in shaping the future of healthcare finance, fostering a more sustainable and resilient healthcare ecosystem for both providers and patients alike.

### ADVANCEMENTS IN RESEARCH AND DRUG DEVELOPMENT

One of the most promising applications of GenAI in pharmaceutical drug development is the generation of new drug candidates. Because these AI models can be trained on large, scientist-curated datasets of existing drug molecules and biological data, they can learn the patterns and relationships that underlie drug discovery and development and use them to hasten the process of getting a safe, effective therapy to market.

Generative AI in the pharmaceutical industry is transitioning from hype to practical application, promising to revolutionize drug discovery, clinical trials, regulatory approvals, and marketing. According to the McKinsey Global Institute (MGI), this technology could generate $60 billion to $110 billion annually for the sector. Pharma companies are already leveraging AI for disease understanding, with tools like AlphaFold2 making significant strides in protein structure prediction. The integration of generative AI across the value chain can significantly speed up the R&D process, enhance clinical development, and improve marketing strategies. However, realizing its full potential requires overcoming industry-specific challenges, such as scaling AI solutions and ensuring responsible use. The success of generative AI in pharma, akin to the transformative impact of electricity, hinges on strategic implementation and addressing operational hurdles.

## Preparing for Integration

Generative AI represents a significant step forward in healthcare technology. As these tools continue to evolve, their integration into healthcare systems worldwide is expected to further improve efficiency, accuracy, and patient care. The partnerships between healthcare organizations and tech giants like Microsoft, Google, and others are crucial in driving these innovations, demonstrating the potential of AI to transform healthcare for the better.

However, the integration of Generative AI and LLMs into healthcare requires careful preparation in terms of technical readiness, governance, and risk management. Organizations should invest in upskilling their workforce to understand and work alongside AI technologies. This includes training on data management, privacy concerns, and the ethical use of AI. Additionally, upgrading IT infrastructure to support the computational demands of LLMs is crucial.

Establishing robust governance frameworks is essential to ensure that the use of Generative AI in healthcare complies with regulatory standards and ethical principles. This involves creating policies on data privacy, patient consent, and the transparency of AI-driven decisions.

Identifying and mitigating risks associated with Generative AI is critical. This includes addressing potential biases in AI algorithms, ensuring the security of patient data, and developing contingency plans for AI system failures.

## Conclusion

The healthcare industry is on the brink of a major transformation with the advent of generative AI and Large Language Models (LLMs), poised to significantly impact patient care, research, and operational efficiency. This technological leap promises enhanced diagnostic accuracy, personalized patient care, streamlined operations, and improved revenue cycle management (RCM), indicating a future where healthcare is more efficient and tailored to individual needs.

The integration of these AI technologies into healthcare systems necessitates careful planning, focusing on technical readiness, governance, and risk management. It's essential for organizations to upskill their workforce, establish governance frameworks that comply with regulatory standards, and identify and mitigate potential risks associated with AI.

Embracing generative AI and LLMs heralds a new era in healthcare, promising innovation while upholding ethical standards and patient trust. As we navigate this journey, a collaborative effort from all stakeholders is crucial to leverage AI's potential fully, ensuring a technologically advanced yet accessible healthcare future.

**BRUNO CAMPOS**
Co-Chair of the HIMSS Iberian Community Committee

Prepared by
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