The time is now

Leveraging Generative *AI in Healthcare*: Advancing Evidence-Based Practice through *responsible use*

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Notes on this Paper

This paper is reflective of documented and anticipated ethical aspects of Generative Al as of 1 August, 2025. Due to the rapid pace of development, use, and harms of Generative Al, we want to acknowledge that this is an inherently dynamic paper, subject to changes in the future.

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Executive summary

The integration of Generative Artificial Intelligence (GAi) into clinical care holds transformative potential to enhance evidence-based practice (EBP) and improve patient outcomes. Building on the foundational work outlined in the recent white paper, Practical Guidelines for Ethical Implementation of Generative Al in Clinical Care, which emphasized the critical importance of ethical principles such as fairness, transparency, privacy, and accountability in deploying GAi within healthcare settings. This white paper extends that discussion by focusing specifically on how generative Al can augment the core methodologies of EBP-namely, the systematic use of the best available evidence to inform clinical decisions-while adhering to responsible Al practices. By analyzing vast bodies of scientific literature and generating novel insights, generative Al offers unprecedented opportunities to enhance guideline adherence, reduce variability in treatment, and support consistent, high-quality care.

At the same time, this paper addresses clinician concerns and ethical considerations, ensuring that Al integration aligns with the values and practical realities of healthcare delivery. Ultimately, this work aims to provide a comprehensive framework for harnessing the complementary strengths of generative Al and evidence-based practice to foster a more informed, efficient, and patient-centered healthcare system.

The true power of Generative AI in healthcare emerges when used responsibly-rooted in evidence-based practice, grounded in ethics, and built on safety, transparency, explainability, and accountability. Ultimately, combining GAI with evidence-based practice helps us deliver safe, effective, and compassionate care that respects the human side of medicine.

Introduction

Generative Al, a branch of artificial intelligence, focuses on producing new content-such as text, images, audio, and video-by identifying and learning from patterns in existing data (O'Connor & O'Reilly 2025).

In contrast, Evidence-Based Medicine (EBM) emphasizes the careful application of the best current evidence to inform clinical decisions, with the goal of enhancing the quality, efficiency, and cost-effectiveness of patient care (Xing et al. 2021).

Generative Artificial Intelligence: Capabilities and applications in healthcare Generative Al (GAi) refers to algorithms that can synthesize new content based on the data they have been trained on (Johnson et al., 2024). By utilizing sophisticated machine learning models that can produce human-like text, images, and data, Generative Al is opening up new opportunities in medical documentation, diagnostics, personalized care planning, and patient interaction. Amid growing pressures and limited resources in global healthcare systems, Gen Al offers valuable support for clinicians, helping to ease workload, prevent burnout, and enhance the delivery of timely, data-informed care.

Generative Artificial Intelligence: Capabilities and applications in healthcare

Main Themes	Sub-Themes (Applications)
Clinical Decision Support, Diagnosis and Treatment	Diagnosis and prediction of diseases
	Diagnosis and Treatment
	Conducting triage
	Formulating differential diagnoses
	Medical examination
	Medical examination
	Comparing responses to clinical guidelines and literature
Medical Education and Training	Offering insights and information on health conditions through answering questions
	Designing and evaluating questions for graduate medical exams
	Offering support for health concerns
	Education of medical students
	Educating patients on health status and decision-making
Producing Medical Articles and Research	Healthcare providers education
	Producing medical articles and research (ethically questionable but listed for completeness)
	Creating references for medical
	Aiding in finding appropriate clinical
	Summarizing medical articles
Clinical Documentation	Summarizing patient's problems
	Creating operative notes and discharge summaries
	Generating and quality-assessing healthcare-related text and reports
	Labeling radiography reports
	Image diagnosis with text report
Ethical and Communication Assessments	Addressing intricate medical ethical scenarios
	Assessing communication and ethics in medical testing
	Assessing communication, teamwork, patient safety, professionalism, and ethics in testing

Foundations of Evidence-Based Practice in Healthcare

Foundations of Evidence-Based Practice in Healthcare

According to Sackett (1997), evidence-based medicine is the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients". Gordon Guyatt, a former student and later colleague of Sackett at McMaster University in Hamilton, was the first to introduce the term "evidence-based medicine" in a 1991 publication.

Evidence-based practice involves using professional judgment to integrate the best available evidence with client and contextual variables when selecting interventions (Wilczynski 2024).

David L. Sackett, a Canadian physician and clinical epidemiologist, is recognized as a pioneer of Evidence-Based Medicine (EBM), promoting the integration of research evidence, clinical expertise, and patient values in medical practice. Gordon Guyatt, a former student and later colleague of Sackett at McMaster University in Hamilton, was the first to introduce the term "evidence-based medicine" in a 1991 publication.

Evidence-Based Practice (EBP) is now fundamental to contemporary healthcare, focusing on enhancing patient outcomes by combining up-to-date scientific research with clinical experience and individual patient values. This approach ensures healthcare decisions are informed, tailored, and impactful. EBP involves a patient-centered problem-solving approach that systematically searches for, appraises, and applies relevant evidence to clinical questions.

The three fundamental components of EBP are:

- *Best available scientific research evidence*
- *Clinical expertise of the healthcare provider*
- *Patient values and preferences*

Harnessing the Best Available Evidence

The integration of the best available evidence into clinical practice significantly elevates the standard of healthcare delivery by enabling clinicians to make informed, effective decisions grounded in the latest and most reliable research.

By relying on rigorously gathered and critically appraised research, clinicians are equipped to make well-informed decisions that are not only scientifically valid but also tailored to the specific needs of individual patients. For instance, the use of low-dose aspirin for secondary prevention of cardiovascular events, tight glycemic control in diabetes management, and antibiotic stewardship programs are all grounded in strong evidence and have been shown to improve outcomes while minimizing harm.

This evidence-based approach improves patient outcomes and safety, standardizes care to reduce variability, and eliminates ineffective interventions, thereby optimizing resource use and reducing healthcare costs In addition to improving clinical outcomes, this approach supports the ongoing education and professional development of healthcare providers. This continuous engagement with the latest evidence not only sharpens clinical skills but also enhances job satisfaction and professional confidence.

The Convergence of GAI and EBP

By combining GAi's ability to rapidly analyze and synthesize vast datasets with EBP's rigorous, data-driven approach to clinical decision-making, this integration empowers healthcare professionals to deliver more precise, personalized, and effective care. This synergy holds the potential to redefine patient outcomes and reshape the healthcare landscape for the better. The following are some critical domains influenced by this integration:

Enhanced Clinical Decision Making: Generative Al rapidly processes and synthesizes vast amounts of medical literature to pinpoint the most credible evidence for sound clinical decision-making. Scientific studies, comprising peer-reviewed, data-driven insights, play a critical role in the development and continuous refinement of clinical guidelines, thereby promoting consistent, evidence-based, and high-quality care.

Additionally, research incorporating social determinants of health further strengthens the foundation of evidence-based practice.

Personalized Patient Care: GAi driven insights facilitate the development of individualized treatment plans enabling clinicians to move beyond one-size-fits-all approaches and deliver care that is precisely aligned with each patient's unique clinical needs and personal preferences. By incorporating patient-reported outcomes and social determinants of health, GAi also supports shared decision-making and enhances patient engagement.

Enhancing Efficiency and Reducing Burnout: Gai enhances clinical efficiency by automating time-consuming tasks such as information retrieval and data entry. This reduces the administrative burden on healthcare professionals, enabling them to focus more on direct patient care, critical thinking, and collaborative decision-making. GAi not only improves productivity but also addresses key contributors to clinician burnout-such as cognitive overload and time pressure-ultimately fostering a more sustainable and satisfying work environment.

Addressing Knowledge Gaps: Generative Al supports evidence-based practice by helping clinicians and researchers formulate precise, structured clinical questions. By analyzing extensive datasets and contextual inputs, Al can identify existing knowledge gaps and suggest relevant variables, thereby refining questions to target areas of uncertainty or limited evidence. This ensures that the inquiry process begins with clear, actionable objectives, ultimately enhancing the relevance and impact of subsequent research.

Challenges in the integration of Generative AI with EBP

While it holds substantial potential for revolutionizing healthcare delivery and research, this convergence also presents considerable challenges. Addressing these issues effectively is essential to fully harness the potential of this convergence in enhancing patient outcomes and advancing scientific understanding. The key challenges associated with this integration are outlined below:

Resource Constraints: Financial constraints, inadequate infrastructure, and workforce shortages hinder investment in advanced Al tools, infrastructure upgrades, and maintenance. Resistance to change, limited collaboration, and insufficient digital literacy among staff slow adoption. Establishing ethical oversight, regulatory compliance, and monitoring mechanisms is resource-intensive, creating barriers to leveraging

Gaps in Workforce Readiness: Existing staff may lack digital literacy or time for training due to high patient loads and administrative responsibilities. Without adequate digital and data literacy, employees struggle to adopt GAi tools or apply evidence effectively, leading to poor decision-making and ethical risks. Misalignment between evolving job roles and existing skills further slows innovation and reduces the impact of both GAi and EBP, ultimately impeding organizational progress and adaptability.

Lack of Strategic Alignment: Resistance to change-driven by cultural inertia, fear of disruption, or lack of leadership buy-in-slows adoption and undermines trust in new technologies and methodologies. When strategic priorities do not align with innovation or data-driven decision-making, investments in Al and evidence-based approaches are often underfunded or deprioritized. This disconnect limits scalability, reduces impact, and stalls progress toward more intelligent, efficient, and accountable operations.

Technical Infrastructure Gaps: Many healthcare institutions may lack the digital infrastructure (e.g., robust IT systems, secure data lakes, cloud platforms) required to support GAi tools. Limited bandwidth, outdated hardware, or incompatible systems can hinder real-time integration into clinical workflows. Many institutions lack robust IT systems, secure data platforms, and compatible hardware to support Gai implementation. Poor data quality, fragmented records, and limited access to structured clinical literature reduce Al-driven insights' reliability.

Data Quality Assurance: Poor data quality undermines EBP by introducing inaccuracies, biases, and inconsistencies that compromise decision-making and model performance. In Gai, low-quality data can lead to unreliable outputs, hallucinations, or ethical risks, while in EBP, flawed or incomplete data weakens the validity of evidence and its applicability. Without clean, relevant, and well-structured data, both Al systems and evidence-based frameworks struggle to deliver accurate, trustworthy, and actionable insights.

Evaluating the Impact of Generative AI and EBP

Assessing the integration of GAi with EBP is crucial to ensure that technological innovations lead to tangible improvements in clinical outcomes. This evaluation enables stakeholders to track enhancements in decision-making precision, and the overall quality of care. Ongoing assessment also helps uncover shortcomings, supports ethical deployment, and ensures that AI models stay aligned with current clinical evidence and patient expectations. In order to effectively evaluate this integration, it is imperative to consider the following fundamental factors:

Adherence to Evidence-Based Standards: Studies assessing generative AI outputs, such as those from advanced large language models (LLMs) like ChatGPT and Google Gemini, reveal mixed adherence to evidence-based health communication guidelines. For example, AI-generated content on health screening tests often deviates from best-practice criteria in communicating benefits, harms, and quality of evidence, highlighting the need for rigorous evaluation frameworks to verify AI outputs against established EBP standards.

Enhancement of Clinical Research and Decision-Making: Generative AI can automate documentation, improve participant engagement, and increase trial accuracy and efficiency. However, challenges such as technical limitations, ethical dilemmas, and regulatory uncertainties must be addressed through collaboration among academia, industry, and regulators. Establishing stringent data management, transparency, and continuous monitoring protocols is essential to harness AI's benefits while maintaining trust and integrity in clinical research.

Impact on Task Performance and Productivity: Experimental evidence in public sector contexts shows that generative AI can improve the quality of document understanding tasks by about 17% and reduce task completion time by 34%. However, its impact on data analysis tasks may be variable, sometimes leading to reduced quality scores. This underscores the importance of task-specific evaluation to understand where AI integration adds value and where it may require further refinement.

Augmentation of Evidence Generation and Implementation: GAi supports multiple components of EBP by accelerating research processes such as systematic reviews, data synthesis, and trial design. It can enhance drug discovery, toxicity prediction, patient recruitment, and monitoring during clinical trials, potentially reducing costs and increasing trial success rates. Such augmentation can lead to a new phase of EBP ("EBP 2.0") where AI complements human expertise to improve healthcare outcomes. Ensuring Reliability and Ethical Use in Clinical

Decision-Making: The integration of generative AI into clinical decision-making demands verification paradigms to ensure AI-generated insights are evidence-based, reliable, and clinically explainable. Models emphasizing clinician-, expert-, and patient-in-the-loop approaches advocate for AI as an augmentative tool that enhances rather than replaces clinician judgment. Transparency, fairness, and ethical grounding are critical to maintaining high standards of patient care.

"As AI becomes more powerful in healthcare, sticking to evidence-based practice is more important than ever. AI can quickly sort through large amounts of medical data and offer helpful insights, but we need to make sure these are backed by solid evidence. The real value of AI is when it works alongside doctors, supporting their clinical judgment rather than replacing it. This partnership helps deliver faster, more accurate, and personalised care, raising the overall standard of treatment."

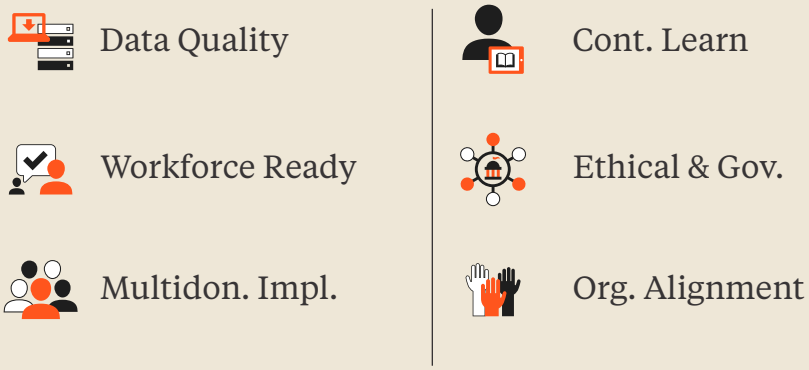
Dr Devi Shetty

Conclusion

The successful adoption of Generative Al and Evidence-Based Practice hinges on a multidimensional integration that transcends technology alone. Aligning strategy, culture, skills, and infrastructure is essential to unlock their full potential. Workforce readiness emerges as a critical enabler, as gaps in digital literacy, Al fluency, and evidence interpretation can significantly impede implementation efforts. At the core of reliable Al outputs and credible evidence-based decisions lies high-quality, structured, and unbiased data, underscoring the foundational importance of data quality. Organizational alignment plays a pivotal role in driving impact; overcoming resistance to change and ensuring leadership commitment with clear strategic focus are vital to sustaining momentum. Furthermore, embedding ethics and governance frameworks is indispensable for responsible use, fostering transparency, accountability, and ethical oversight throughout the process. Finally, continuous learning through ongoing training, feedback mechanisms, and adaptive systems is necessary to keep pace with rapidly evolving technologies and evidence, ensuring long-term sustainability and success.

Together, these interconnected factors form the blueprint for organizations aiming to harness Gai and EBP effectively, delivering transformative value while upholding integrity and resilience.

Key Factors for GAI & EBP Adoption



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