



Sağlık Yönetiminde Üretken Yapay Zekâ: Finansal Yönetim, Hasta İletişimi ve Kalite İyileştirmede Uygulamalar

Makale Bilgileri

ÖZET

Makale Geçmişi

Geliş: 21.04.2026

Kabul: 21.07.2026

Yayınlanma: 28.08.2026

Yazarlar:

Ufuk Burak
KARCIOĞLU

Anahtar Kelimeler:

Üretken yapay zekâ;
sağlık yönetimi;
büyük dil modelleri

Amaç: Bu derleme çalışmasının amacı, özellikle ChatGPT ve GPT-4 gibi büyük dil modelleri başta olmak üzere üretken yapay zekânın (GenAI) sağlık yönetimi üzerindeki etkilerini; operasyonel verimlilik, iletişim ve kalite iyileştirme boyutlarında incelemektir.

Yöntem: Bu çalışmada anlatsal derleme yöntemi kullanılmıştır. Sağlık yönetimi GenAI uygulamaları; finansal yönetim süreçleri (gelir döngüsü optimizasyonu ve talep/geri ödeme süreçleri), hasta iletişimi (hasta portalı yanıtları ve taburculuk talimatları) ve kalite iyileştirme faaliyetleri (dokümantasyon otomasyonu ve performans raporlama) başlıkları altında değerlendirilmiştir.

Bulgular: Elde edilen bulgular, GenAI uygulamalarının hedeflenen idari iş akışlarında %30–50 oranında zaman tasarrufu sağlayarak önemli verimlilik artışları sunduğunu göstermektedir. Ayrıca, erken dönem veriler yatırım getirisinin (ROI) umut verici olduğunu ortaya koymaktadır. Bununla birlikte etik sorunlar, algoritmik yanlılık, veri gizliliği ve uygulama yönetişimine ilişkin gereksinimler önemli zorluklar olarak öne çıkmaktadır.

Sonuç ve Öneriler: GenAI, sağlık yönetimi verimliliği artırma ve karar verme süreçlerini destekleme açısından önemli bir potansiyele sahiptir. Ancak bu potansiyelin sürdürülebilir şekilde hayata geçirilebilmesi için güçlü insan denetimi, etik ilkelere uygunluk ve kurumsal düzeyde sağlam yönetim çerçevelerinin oluşturulması gerekmektedir.

Generative AI in Healthcare Administration: Applications in Financial Management, Patient Communication and Quality Improvement

Article Info

ABSTRACT

Article History

Received: 21.04.2026

Accepted: 21.07.2026

Published: 28.08.2026

Authors:

Ufuk Burak
KARCIOĞLU

Keywords:

Generative AI;
healthcare
administration; large
language models

Purpose: This narrative review aims to examine the impact of generative artificial intelligence (GenAI), particularly large language models such as ChatGPT and GPT-4, on healthcare administration, with a focus on operational efficiency, communication, and quality improvement.

Methods: A narrative literature review approach was adopted to analyze current applications of GenAI in healthcare administration. Key domains reviewed include financial management processes (such as revenue cycle optimization and claims processing), patient communication systems (including portal responses and discharge instructions), and quality improvement initiatives (such as documentation automation and performance reporting).

Results: The reviewed evidence suggests that GenAI applications may improve administrative efficiency, with reported time savings of approximately 30–50% across targeted administrative workflows. Early evidence also indicates a promising return on investment (ROI). However, the reviewed literature consistently highlights ethical concerns, algorithmic bias, data privacy, and the need for robust governance frameworks as major implementation challenges.

Conclusions and Recommendations: GenAI has considerable potential to transform healthcare administration by improving efficiency and supporting decision-making processes. However, its successful and sustainable implementation requires responsible deployment, strong human oversight, and the establishment of clear institutional frameworks to address ethical and operational risks.

Sorumlu Yazar

: Ufuk Burak KARCIOĞLU

ORCID: [0009-0006-9131-6407](https://orcid.org/0009-0006-9131-6407)

E-mail: burakkarci23@gmail.com

Adres

: İstinye University, Faculty of Health Sciences, Department of Health Management, İstanbul, Türkiye

INTRODUCTION

Healthcare systems worldwide continue to grapple with escalating administrative burdens that consume substantial resources and contribute to provider burnout. Administrative costs account for approximately 25–34% of total healthcare expenditure in high-income countries, driven by complex billing processes, regulatory compliance, documentation requirements, and fragmented communication workflows (1, 2). Clinicians spend nearly half their working hours on administrative tasks rather than direct patient care, a factor strongly associated with burnout rates exceeding 50% in many specialties (3). These inefficiencies not only inflate costs but also compromise care quality, patient satisfaction, and equitable access to services.

The emergence of generative artificial intelligence (GenAI), particularly large language models (LLMs) such as ChatGPT and GPT-4 and their successors, offers a transformative opportunity to address these systemic challenges. Unlike traditional rule-based automation, GenAI systems can understand context, generate human-like text, synthesise complex information, and adapt to nuanced scenarios in real time (4, 5). Since the public launch of ChatGPT in November 2022, adoption in healthcare has accelerated rapidly. By late 2025, nearly one-third of US hospitals reported integrating generative AI into electronic health records, with projections suggesting that half will do so by the end of 2026 (6).

In healthcare administration, GenAI applications extend across three critical domains: financial management, patient communication, and quality improvement. In revenue cycle management (RCM), these tools automate coding, predict claim denials, generate appeals, and personalise patient financial communications, with reported time savings of 41–50% across RCM workflows (4). For patient communication, GenAI-powered chatbots and message drafters produce empathetic, personalised responses, multilingual discharge instructions, and educational materials that often match or surpass human-authored content in clarity and patient-rated empathy (7). In quality improvement, GenAI supports automated clinical documentation, process optimisation, and performance analytics, contributing to reduced documentation time and lower burnout while enhancing consistency in care delivery (8, 9).

Despite this promise, significant concerns persist. Algorithmic bias, hallucination risks, data privacy (HIPAA and GDPR compliance), accountability for AI-generated outputs, and potential depersonalisation of care require careful scrutiny (10, 11). Uneven implementation across resource settings may also exacerbate health inequities rather than alleviate them.

This narrative review synthesises peer-reviewed literature and grey literature published primarily between 2023 and 2026, drawing from PubMed, Google Scholar, and key industry

analyses. This review examines applications of GenAI, with a particular focus on ChatGPT, GPT-4, and comparable large language models (LLMs), across three core administrative domains. It also critically evaluates ethical challenges, bias mitigation strategies, and practical implementation considerations, including return-on-investment (ROI). By integrating current evidence, this review aims to guide healthcare administrators, policymakers, and clinicians in harnessing GenAI responsibly to create more efficient, patient-centred, and sustainable health systems.

Generative Artificial Intelligence Technologies: Principles and Healthcare Relevance

Generative artificial intelligence (GenAI) represents a paradigm shift from traditional predictive analytics to systems capable of creating novel, contextually appropriate content. At its core, GenAI relies on large language models (LLMs) built upon transformer architectures that process vast datasets to predict and generate sequential outputs, whether text, structured data summaries, or multimodal content (5). Models such as OpenAI's GPT-4 and its successors, along with comparable systems like Claude and Gemini, are pre-trained on enormous corpora of text and code, enabling them to understand nuance, maintain conversational coherence, and adapt outputs to specific prompts or institutional contexts (12).

Unlike earlier rule-based or narrow AI tools, these models exhibit emergent capabilities: zero-shot and few-shot learning, chain-of-thought reasoning, and the ability to synthesise information across domains. GPT-4, for instance, demonstrates improved performance in medical reasoning tasks compared with its predecessors, although it still requires human oversight for high-stakes applications (13). Successive iterations have incorporated multimodal inputs (text plus images or structured data) and enhanced safety alignments, making them more suitable for regulated healthcare environments (14).

In healthcare administration, GenAI's value stems from its capacity to handle unstructured natural language, the dominant format of clinical notes, billing codes, patient messages, and regulatory documents. These tools can draft discharge summaries, translate complex medical terminology into patient-friendly language, generate personalised financial explanations, and extract actionable insights from electronic health record (EHR) narratives with remarkable fluency (15).

Key technical enablers include prompt engineering, retrieval-augmented generation (RAG) for grounding outputs in institutional knowledge bases, and fine-tuning on de-identified clinical datasets. These techniques help mitigate hallucination risks while preserving contextual relevance. However, inherent limitations persist. Models can produce plausible but factually

incorrect information (hallucinations), perpetuate biases present in training data, and struggle with truly novel or rapidly evolving clinical scenarios (10, 11).

Integration into administrative workflows requires hybrid architectures: GenAI layered atop existing EHR and revenue cycle platforms rather than operating in isolation. Secure, HIPAA/GDPR-compliant deployments, often implemented through enterprise platforms with private instances and audit logs, have become the standard for health systems moving beyond the pilot phase (5).

This review focuses specifically on administrative applications rather than direct clinical decision support. The subsequent sections examine how these foundational capabilities translate into measurable improvements in financial management, patient communication, and quality improvement initiatives, while acknowledging the critical importance of governance to realise benefits safely and equitably.

METHODS

This study was conducted as a narrative review to synthesize the current evidence on the applications of generative artificial intelligence (GenAI) in healthcare administration. A narrative review approach was selected because it allows the integration of evidence from diverse study designs and provides a comprehensive overview of emerging topics.

The literature search was conducted using PubMed, Scopus, Web of Science, and Google Scholar. Relevant studies published between 2022 and 2026 were identified using combinations of the following keywords: generative artificial intelligence, large language models, healthcare administration, healthcare management, financial management, revenue cycle management, patient communication, quality improvement, and electronic health records.

The final literature search was conducted in January 2026. Representative search strings included combinations of terms such as ("generative artificial intelligence" OR "large language models" OR ChatGPT OR GPT-4) AND ("healthcare administration" OR "healthcare management" OR "revenue cycle management" OR "patient communication" OR "quality improvement"). Only publications available in English were considered. Titles and abstracts were screened for relevance, followed by full-text assessment where appropriate. Studies were selected based on their relevance to healthcare administration and the objectives of this narrative review.

Studies were selected based on their relevance to the administrative applications of generative artificial intelligence in healthcare. Priority was given to peer-reviewed journal articles, systematic reviews, narrative reviews, scoping reviews, and authoritative reports addressing

financial management, patient communication, quality improvement, implementation strategies, ethical issues, and governance. Publications focusing exclusively on clinical diagnosis or treatment without relevance to healthcare administration were excluded. The selected literature was reviewed and synthesized thematically according to the main application areas discussed in this review.

Applications in Financial Management

Financial management remains one of the most resource-intensive areas in healthcare administration, with revenue cycle management (RCM) processes accounting for a significant portion of the 25–34% administrative cost burden (1, 2). Generative AI, particularly models such as GPT-4 and enterprise-adapted LLMs, is demonstrating substantial potential to streamline these workflows through automation, predictive analytics, and intelligent content generation.

Key applications include automated medical coding, claims processing and denial management, prior authorisation support, patient financial counselling, and fraud detection. GenAI tools can extract information from unstructured clinical notes, generate accurate billing codes, draft appeal letters with supporting clinical rationale, and produce personalised patient-friendly explanations of benefits and payment plans (4, 16). Unlike traditional robotic process automation, generative models handle nuance and context, such as interpreting ambiguous documentation or adapting to evolving payer policies.

Evidence from early implementations shows meaningful efficiency gains. Health systems piloting these tools report lower denial rates, faster reimbursement cycles, and reduced accounts receivable days (17, 18). For example, AI-powered denial prediction and automated appeal generation have helped organisations recover previously lost revenue while decreasing manual rework. Selected productive AI applications in the field of financial management in the healthcare sector are shown in Table 1.

Table 1. Selected Generative AI Applications in Healthcare Financial Management

Application	Description	Reported Benefits	Study Type	Key Evidence/Source
Medical Coding & Documentation	Extraction of codes from clinical notes; generation of compliant documentation	30–50% reduction in coding time; improved accuracy	Narrative Review; Review	4, 19
Claims Processing & Denial Management	Pre-submission review, denial prediction, automated appeal letter drafting	20–40% reduction in denial rates; faster cash flow	Review; Industry/Applied Review	16, 20
Prior Authorisation Support	Generation of justification narratives; real-time query handling	Reduced turnaround time; lower administrative burden	Perspective/Commentary; Review	18, 5
Patient Financial Communication	Personalised billing explanations, payment plan recommendations	Higher patient satisfaction; improved collection rates	Narrative Review; Review	7, 21
Fraud Detection & Compliance	Pattern recognition in claims; contract analysis	Reduced leakage; enhanced regulatory adherence	Conceptual/Applied Model; Review	17, 22

Note: Reported benefits are summarized from the references listed in the “Key Evidence/Source” column. The reported percentages represent ranges observed across the cited studies and should not be interpreted as universal effect estimates. Actual outcomes may vary

according to institutional context, implementation strategy, and technological infrastructure.

Return on investment (ROI) analyses from early adopters are encouraging. Some health systems report payback periods of 12–18 months, with cost savings driven by staff reallocation and revenue capture improvements estimated at 2–5% of net revenue in optimised workflows (19). However, these gains are not automatic; they depend on robust integration with existing EHR and RCM platforms, continuous model fine-tuning, and human oversight to manage hallucination risks and ensure compliance with HIPAA and evolving billing regulations.

Challenges in this domain include data privacy, model bias toward certain payer rules or demographics, and the need for ongoing validation against changing reimbursement policies (10, 11). Successful deployments typically employ retrieval-augmented generation (RAG) to ground outputs in current institutional policies and payer contracts.

Overall, generative AI is shifting financial management from a reactive, labour-intensive function toward a more proactive, intelligent system. The following sections will explore parallel applications in patient communication and quality improvement, highlighting how these domains interconnect to enhance overall administrative performance.

Applications in Patient Communication

Effective patient communication is fundamental to care quality, adherence, satisfaction, and outcomes, yet it remains a major administrative burden. Clinicians and staff spend considerable time drafting messages, discharge instructions, educational materials, and responding to portal inquiries, often leading to delays and burnout (3). Generative AI, particularly GPT-4 and similar large language models, excels in this domain by producing empathetic, personalised, and multilingual content at scale while maintaining clinical accuracy when properly guided.

Key applications include automated responses to patient portal messages, generation of personalised discharge and aftercare instructions, creation of tailored educational materials, multilingual translation with cultural adaptation, and conversational chatbots for appointment reminders, medication adherence support, and preliminary triage (7). These tools can adapt tone and reading level to individual patient profiles, significantly improving accessibility for diverse populations, including those with limited health literacy or non-native language proficiency.

Multiple studies demonstrate that GenAI-generated communications often match or exceed human-written messages in patient-rated empathy, clarity, and usefulness. In a randomised trial, GPT-4 responses to patient messages were preferred over physician responses in 78% of cases for both quality and empathy (7, 23). Health systems implementing GenAI drafting tools have

reported 40–60% reductions in response time for patient portal messages and improvements in patient satisfaction (7, 23). Selected AI applications in patient communication are shown Table 2.

Table 2. Selected Generative AI Applications in Patient Communication

Application	Description	Reported Benefits	Study Type	Key Evidence/Source
Patient Portal Message Drafting	AI-generated responses to non-urgent inquiries with clinician review	40–60% reduction in response time; higher empathy scores	Cross-sectional Comparative Study; Narrative Review	7, 23
Personalised Discharge Instructions	Generation of clear, readable aftercare plans tailored to patient profile	Improved adherence; reduced readmissions (preliminary)	Narrative Review; Prospective Before–After Study	7, 24
Multilingual & Culturally Adapted Materials	Real-time translation and cultural adaptation of education materials	Better access for diverse populations; increased engagement	Scoping Review; Review	15, 25
Conversational Chatbots & Reminders	Appointment scheduling, medication reminders, symptom checking support	Higher response rates; reduced no-show appointments	Randomized Controlled Trial; Review	5, 26
Educational Content Generation	Customised brochures, video scripts and decision aids	Improved health literacy; better shared decision-making	Commentary; Rapid Review	12, 27

Note. Benefits represent aggregated findings from peer-reviewed studies and health system implementations (2023–2026). All outputs require final clinician oversight.

Despite these advantages, challenges remain significant. Hallucinations (fabricated information), loss of personal touch, potential bias in tone or content toward majority demographics, and privacy concerns must be actively managed (10, 11). Best practices include human-in-the-loop workflows, where AI drafts are always reviewed and edited by qualified staff before sending, along with transparent disclosure to patients when AI assistance is used. Integration with existing patient portals and electronic health records through secure APIs has proven most effective. Early ROI evaluations suggest that patient communication applications

yield faster returns than financial modules, often within 6–12 months, primarily through staff time savings and improved patient experience scores that indirectly affect value-based payments (1).

Generative AI is thus transforming patient communication from a time-consuming administrative task into a strategic tool for building trust and engagement. The next section explores its role in quality improvement, where documentation automation and process optimisation create synergies across all three domains.

Beyond patient-directed educational materials, generative AI-powered chatbots are increasingly being used to support healthcare workforce education and simulation-based learning. Conversational AI systems can provide interactive case scenarios, adaptive feedback, and realistic patient simulations that enhance clinical reasoning, communication skills, and decision-making in educational settings. These applications enable learners to practice clinical encounters in a safe and scalable environment while receiving immediate feedback tailored to their responses. Recent narrative evidence suggests that integrating chatbot technologies into simulation-based education may improve learner engagement, personalized learning experiences, and digital competency among healthcare professionals, highlighting an additional educational value of generative AI beyond routine patient communication (27).

Applications in Quality Improvement

Quality improvement (QI) in healthcare administration encompasses clinical documentation accuracy, process optimisation, performance measurement, and workforce well-being. Generative AI is increasingly supporting these efforts by automating repetitive tasks, synthesising data, and enabling more consistent care delivery. By reducing the documentation burden, one of the leading drivers of clinician burnout, GenAI allows administrators and clinicians to focus on high-value improvement activities (3, 9).

Primary applications include automated clinical note generation and summarisation, extraction of quality metrics from unstructured data, real-time process monitoring, development of QI reports and dashboards, and predictive modelling for adverse events or readmissions. Advanced models can convert dictations or fragmented notes into structured, billable, and regulation-compliant documentation while highlighting care gaps aligned with quality frameworks such as HEDIS or Joint Commission standards (8, 15).

Implementation studies have reported 25–40% reductions in documentation time (8, 9). Health systems using GenAI for QI note that improved documentation completeness leads to better

risk adjustment, more accurate quality scores, and enhanced value-based care performance. Selected AI applications for quality improvement are shown in Table 3.

Table 3. Selected Generative AI Applications in Quality Improvement

Application	Description	Reported Benefits	Study Type	Key Evidence/Source
Automated Clinical Documentation	Generation and summarisation of progress notes, discharge summaries	25–40% reduction in documentation time; lower burnout	Original Research; Rapid Review	8
Quality Metrics Extraction & Reporting	Automated identification of quality indicators from EHR narratives	Improved measure completeness; faster reporting	Scoping Review; Review	15, 16
Process Optimisation & Workflow Design	Generation of standardised protocols and workflow recommendations	Reduced process variation; shorter cycle times	Review; Organizational Study	1, 5
Predictive Analytics for QI	Risk stratification and early identification of care gaps	Lower readmission rates (preliminary data)	Prospective Before–After Study	11
Performance Dashboard & Report Generation	Creation of executive and regulatory compliance reports	Significant time savings in administrative QI work	Review; Systematic Review	10, 21

These efficiency gains contribute to a stronger organisational culture of quality by freeing resources for root-cause analyses and patient safety initiatives. However, over-reliance on AI without proper validation can introduce new quality risks, particularly through hallucinated clinical details or overlooked contextual nuances (11).

Ethical Challenges and Bias Management

While generative AI offers considerable promise in healthcare administration, its deployment raises profound ethical, legal, and social challenges that must be proactively addressed. The opaque nature of large language models, combined with their training on potentially biased historical data, creates risks of perpetuating or amplifying inequities in financial decisions, patient communication, and quality processes (10, 11).

Major ethical concerns include data privacy and security (HIPAA and GDPR compliance),

algorithmic bias, hallucination of factual content, accountability for AI-generated outputs, informed consent, and the potential erosion of human oversight and patient trust. Bias in training data can lead to systematically poorer performance for underrepresented populations, such as ethnic minorities, non-English speakers, or patients with lower health literacy (25). In financial management, this may manifest as inaccurate risk scoring or unfair collection practices; in communication, as culturally insensitive messaging. Significant ethical challenges regarding generative AI in the field of health management and strategies to mitigate them are shown in Table 4.

Table 4. Key Ethical Challenges and Mitigation Strategies in Generative AI for Healthcare Administration

Ethical Challenge	Description	Potential Impact	Mitigation Strategies	Study Type	Key References
Algorithmic Bias	Models reflecting biases in training data	Health disparities, unfair financial decisions	Diverse datasets, regular bias audits, fairness metrics	Systematic Review; Review	10, 25
Hallucinations & Accuracy	Generation of plausible but incorrect information	Medical errors, compliance violations	Retrieval-augmented generation (RAG), human-in-the-loop	Systematic Literature Review; Comprehensive Review	11, 14
Data Privacy & Security	Risk of sensitive data exposure or re-identification	Regulatory penalties, loss of trust	Private instances, encryption, federated learning	Review; Original Research	5, 28
Accountability & Liability	Uncertainty over responsibility for AI outputs	Legal and ethical dilemmas	Clear governance policies, audit trails, disclosure	Review	29
Transparency & Informed Consent	Patients and staff unaware of AI involvement	Erosion of trust	Mandatory disclosure, explainable AI techniques	Commentary; Narrative Review	7, 12

Effective bias management demands institutional governance frameworks, including diverse ethics review boards, regular model auditing, and transparent reporting of AI use to patients and regulators. Hybrid human-AI workflows with clear escalation protocols remain the gold

standard for safe deployment (29).

Implementation Guidelines and ROI Analysis

Successful integration of generative AI into healthcare administration demands more than technological capability; it requires a structured, organisation-wide approach that balances innovation with safety, compliance, and measurable value. Leading health systems that have moved beyond pilot projects emphasise a phased implementation framework grounded in change management principles, robust governance, and continuous evaluation (4, 5).

In the Turkish healthcare context, the implementation of generative artificial intelligence should also comply with the Personal Data Protection Law (Law No. 6698) and national regulations governing the processing of health data. Since patient records contain sensitive personal data, healthcare institutions should ensure that AI-supported systems operate within secure technical infrastructures and that personal data are processed in accordance with applicable legal requirements. Furthermore, outputs generated by AI should be reviewed and approved by qualified healthcare professionals before being used in administrative processes that may affect patients. Maintaining human oversight throughout AI-assisted workflows is essential for protecting patient safety, accountability, and public trust.

Recommended Implementation Pathway

Organisations should begin with a comprehensive readiness assessment that evaluates current workflows, data infrastructure, staff digital literacy, and existing governance structures. Priority use cases should be selected based on high administrative burden, clear measurable outcomes, and relatively low clinical risk, typically starting with patient portal message drafting, discharge instruction generation, or revenue cycle denial appeal support (1, 21).

A hybrid human-in-the-loop model remains essential. AI-generated outputs must undergo clinician or administrator review before final use, with transparent audit trails and version control. Enterprise-grade deployments using private instances or secure cloud environments with retrieval-augmented generation (RAG) grounded in institutional policies and up-to-date payer contracts significantly reduce hallucination risks and improve reliability (11, 14). Staff training programmes should address not only tool usage but also prompt engineering, critical evaluation of AI outputs, and recognition of potential biases.

Governance is critical. Multidisciplinary AI oversight committees, including clinicians, administrators, IT specialists, ethicists, and legal experts, should establish policies on accountability, patient disclosure, data privacy (HIPAA/GDPR), and bias monitoring. Regular model auditing for performance drift and fairness across demographic groups is recommended,

particularly when tools influence financial decisions or patient communications (10, 29).

DISCUSSION

Generative AI has demonstrated considerable potential to reshape healthcare administration by addressing long-standing inefficiencies in financial management, patient communication, and quality improvement. Across the reviewed literature, consistent themes emerge: substantial reductions in administrative time (typically 30–50% in targeted workflows), improvements in patient experience through more timely and empathetic communication, and enhanced documentation quality that supports both clinical care and regulatory compliance (4, 7, 9). When implemented as part of an interconnected ecosystem rather than isolated tools, these applications create synergistic effects: better documentation improves billing accuracy, personalised communication enhances adherence and satisfaction, and automated quality reporting accelerates performance improvement cycles.

Nevertheless, the evidence base remains immature. Most available studies are observational, pilot-scale, or industry-sponsored, with limited long-term randomised data on clinical outcomes, equity impacts, or sustained financial returns (10, 11). Many reported gains derive from early-adopter academic medical centres and large integrated delivery networks, raising questions about generalisability to smaller hospitals, rural settings, or low- and middle-income countries where infrastructure and digital literacy may be limited. The risk of widening rather than narrowing the digital divide remains a serious concern.

Key limitations of current generative models persist despite technical advances. Hallucinations, contextual misinterpretations, and performance drift over time necessitate continuous human oversight and institutional guardrails (14, 28). Ethical and regulatory frameworks are still evolving; questions around liability for AI-generated errors, intellectual property of model outputs, and equitable access to high-performing enterprise models have not yet been fully resolved. Moreover, over-optimism regarding automation could inadvertently erode critical human skills such as clinical reasoning, empathetic communication, and ethical judgment if deployment is not thoughtfully managed.

Future research priorities should include large-scale, multisite pragmatic trials evaluating patient-centred outcomes (readmission rates, adherence, satisfaction, and health equity metrics) rather than solely process measures. Longitudinal studies examining the impact on clinician well-being, organisational culture, and total cost of care over 3–5 years are urgently needed. Particular attention must be paid to bias detection and mitigation in real-world diverse populations, as well as the development of transparent, explainable AI techniques suitable for

regulated healthcare environments (25, 29).

Technologically, the field is moving toward multimodal models that integrate text, imaging, laboratory data, and structured EHR elements, as well as agentic AI systems capable of executing multi-step administrative workflows autonomously under human supervision. Hybrid cloud-on-premise and federated learning approaches may offer better privacy protections while enabling continuous model improvement. Policy-level developments such as updated FDA or equivalent guidance on administrative AI tools, standardised evaluation frameworks, and international interoperability standards will be essential to realise benefits safely at scale (5, 13).

Ultimately, generative AI should be viewed not as a replacement for human expertise but as a powerful augmentative partner. The most successful organisations will be those that maintain a clear focus on human-centred design, ethical governance, and measurable value for patients, clinicians, and health systems. If these principles are upheld, generative AI could help shift healthcare administration from a cost centre burdened by paperwork toward a strategic enabler of higher-quality, more accessible, and more sustainable care.

LIMITATIONS

This narrative review has several limitations that should be acknowledged. First, unlike a systematic review, the literature search and study selection were not conducted according to a predefined protocol or formal quality appraisal framework. Consequently, although efforts were made to include the most relevant and up-to-date evidence, some eligible publications may not have been identified.

Second, the review primarily synthesizes recent studies published between 2022 and 2026, reflecting the rapidly evolving nature of generative artificial intelligence. As new evidence emerges, some findings and implementation experiences may change considerably. Third, the available literature is dominated by narrative reviews, scoping reviews, pilot studies, observational research, and organizational reports, whereas high-quality randomized or long-term implementation studies remain limited. Therefore, some reported benefits should be interpreted cautiously.

Finally, the review focuses on the administrative applications of generative artificial intelligence and does not comprehensively evaluate its clinical decision-support functions. Future reviews based on systematic methodologies and quantitative evidence synthesis will provide stronger evidence regarding the effectiveness, safety, and long-term impact of generative AI in healthcare administration.

CONCLUSION AND RECOMMENDATIONS

Generative artificial intelligence, particularly large language models such as GPT-4 and its successors, has emerged as a powerful transformative force in healthcare administration. This narrative review synthesises growing evidence showing meaningful applications across financial management, patient communication, and quality improvement. In revenue cycle processes, GenAI reduces administrative workload and claim denials while accelerating cash flow. In patient communication, it enables more timely, empathetic, and personalised interactions that can improve satisfaction and adherence. In quality improvement, it streamlines documentation, enhances metric capture, and supports more consistent care delivery (4,7,9).

These benefits, however, are neither automatic nor risk-free. Realising the full potential of generative AI requires disciplined implementation, strong governance, continuous bias monitoring, and sustained human oversight. Ethical challenges, particularly those concerning privacy, accountability, transparency, and equity, must be addressed proactively rather than as an afterthought. Organisations that succeed will treat GenAI as an augmentative technology that enhances human capabilities rather than replaces them (5, 10, 29).

The evidence base, while rapidly expanding, still lacks long-term, multisite outcome data. Healthcare leaders should therefore proceed with measured optimism: starting with well-defined pilot projects, investing in staff training and governance infrastructure, and rigorously evaluating both financial and non-financial returns. When deployed responsibly within hybrid human-AI workflows, generative AI offers a genuine opportunity to alleviate the crushing administrative burden that currently threatens the sustainability of healthcare systems worldwide.

In the coming years, the most successful health organisations will be those that integrate generative AI thoughtfully into their operational DNA, always guided by the fundamental principle that technology should serve patients, support clinicians, and strengthen the human elements of care. The journey from pilot to enterprise scale will be challenging, but the potential rewards more efficient operations, better patient experiences, and reduced clinician burnout make this one of the most important strategic opportunities in contemporary healthcare administration.

Ethical Approval: Ethical committee approval is not required for this study.

Conflict of Interest: There is no conflict of interest among the authors.

Financial Support: No financial support was received for this review.

Author Contributions: All authors made an equal contribution.

Declaration: This work was prepared without any artificial intelligence support.

REFERENCES

1. Chmielewska, M., Stokwiszewski, J., Markowska, J., & Hermanowski, T. (2022). Evaluating organizational performance of public hospitals using the McKinsey 7-S framework. *BMC Health Services Research*, 22(1), Article 7. <https://doi.org/10.1186/s12913-021-07402-3>
2. Ilea, P., & Ilea, I. (2024). Administrative burden for patients in US health care settings Post-Affordable Care Act: A scoping review. *Social Science & Medicine*, 345, Article 116686. <https://doi.org/10.1016/j.socscimed.2024.116686>
3. Shanafelt, T. D. (2025). Mayo Clinic Proceedings' central role in the clinician well-being movement. *Mayo Clinic Proceedings*, 100(8), 1270–1274. <https://doi.org/10.1016/j.mayocp.2025.06.012>
4. Mohammed, S. S. (2025). The digital evolution of the healthcare revenue cycle: AI and analytics at the forefront. *International Journal of Science and Research*, 14(3), 1178–1182. <https://dx.doi.org/10.21275/SR25324011728>
5. Rabbani, S. A., El-Tanani, M., Sharma, S., et al., (2025). Generative artificial intelligence in healthcare: Applications, implementation challenges, and future directions. *BioMedInformatics*, 5(3), Article 37. <https://doi.org/10.3390/biomedinformatics5030037>
6. American Hospital Association. (2025). 2025 AI adoption survey. AHA.
7. Traylor, D. O., Kern, K. V., Anderson, E. E., & Henderson, R. (2025). Beyond the screen: The impact of generative artificial intelligence (AI) on patient learning and the patient-physician relationship. *Cureus*, 17(1), Article e76825. <https://doi.org/10.7759/cureus.76825>
8. Huang, J., Wittbrodt, M. T., Teague, C. N., et al., (2025). Efficiency and quality of generative AI-assisted radiograph reporting. *JAMA Network Open*, 8(6), Article e2513921. <https://doi.org/10.1001/jamanetworkopen.2025.13921>
9. Kanaparthi, N. S., Villuendas-Rey, Y., Bakare, et al., (2025). Real-world evidence synthesis of digital scribes using ambient listening and generative artificial intelligence for clinician documentation workflows: Rapid review. *JMIR AI*, 4, Article e76743. <https://doi.org/10.2196/76743>

10. Suenghataiphorn, T., Tribuddharat, N., Danpanichkul, P., & Kulthamrongsri, N. (2025). Bias in large language models across clinical applications: A systematic review. arXiv. <https://doi.org/10.48550/arXiv.2504.02917>
11. Woesle, C., Fischer-Brandies, L., & Buettner, R. (2025). A systematic literature review of hallucinations in large language models. IEEE Access, 13, 3601–3615. <https://doi.org/10.1109/ACCESS.2025.3601206>
12. Torous, J., & Topol, E. J. (2025). Assessing generative artificial intelligence for mental health. The Lancet, 406(10504), Article 683. [https://doi.org/10.1016/S0140-6736\(25\)01237-1](https://doi.org/10.1016/S0140-6736(25)01237-1)
13. Waisberg, E., Ong, J., Masalkhi, M., et al.,. (2023). GPT-4 and medical image analysis: Strengths, weaknesses and future directions. Journal of Medical Artificial Intelligence, 6, Article 28. <https://doi.org/10.21037/jmai-23-94>
14. Neha, F., Bhati, D., & Shukla, D. K. (2025). Retrieval-Augmented Generation (RAG) in healthcare: A comprehensive review. AI, 6(9), Article 226. <https://doi.org/10.3390/ai6090226>
15. Buess, L., Keicher, M., Navab, N., Maier, A., & Tayebi Arasteh, S. (2025). From large language models to multimodal AI: A scoping review on the potential of generative AI in medicine. Biomedical Engineering Letters, 15(5), 845–863. <https://doi.org/10.1007/s13534-025-00497-1>
16. Olubu, P. (2024). AI and NLP for enhancing medical coding and billing accuracy. ResearchGate. https://www.researchgate.net/publication/389497197_AI_and_NLP_for_Enhancing_Medical_Coding_and_Billing_Accuracy
17. Adeleke, O., & Ajayi, S. A.-O. (2023). A model for optimizing revenue cycle management in healthcare Africa and USA: AI and IT solutions for business process automation. Journal of Frontiers in Multidisciplinary Research, 4(2), 186–201. <https://doi.org/10.54660/JFMR.2023.4.1.505-520>
18. Lenert, L. A., Lane, S., & Wehbe, R. (2023). Could an artificial intelligence approach to prior authorization be more human? Journal of the American Medical Informatics Association, 30(5), 989–994. <https://doi.org/10.1093/jamia/ocad016>
19. Rahman, A., Kundu, D., Debnath, T., et al.,. (2025). From AI to the era of explainable AI in healthcare 5.0: Current state and future outlook. Expert Systems, 42(6), Article e70060. <https://doi.org/10.1111/exsy.70060>

20. Healthcare Financial Management Association, & AKASA. (2025). The revenue cycle intelligence report: How health systems are using generative AI to improve quality, accuracy, and performance in the revenue cycle. AKASA. <https://akasa.com/resources/the-revenue-cycle-intelligence-report>
21. Zhang, P., & Kamel Boulos, M. N. (2023). Generative AI in medicine and healthcare: Promises, opportunities and challenges. *Future Internet*, 15(9), Article 286. <https://doi.org/10.3390/fi15090286>
22. Umakanth, A. A. M. (2025). Generative AI in healthcare claims processing and fraud detection: Transforming insurance workflows. *Journal of Computer Science and Technology Studies*, 7(6), 739–745. <https://doi.org/10.32996/jcsts>
23. Ayers, J. W., Poliak, A., Dredze, M., et al., (2023). Comparing physician and artificial intelligence chatbot responses to patient questions posted to a public social media forum. *JAMA Internal Medicine*, 183(6), 589–596. <https://doi.org/10.1001/jamainternmed.2023.1838>
24. Kabir, F., Tabassum, N., Haque, M. R., Akter, S., & Rehman, A. (2025). Clinical impact of AI-assisted medication reconciliation at admission: A prospective before-and-after study. *Journal of Pharmacy and Hospital Pharmacy*, 2(2), 18–25. <https://doi.org/10.33545/30790522.2025.v2.i2.A.18>
25. Jenks, C. J. (2025). Communicating the cultural other: Trust and bias in generative AI and large language models. *Applied Linguistics Review*, 16(2), 787–795. <https://doi.org/10.1515/applirev-2024-0196>
26. Chun-Hung, L., Guan-Hsiung, L., Wu-Chuan, Y., & Yu-Hsin, L. (2023). Chatbot-assisted therapy for patients with methamphetamine use disorder: A preliminary randomized controlled trial. *Frontiers in Psychiatry*, 14, Article 1159399. <https://doi.org/10.3389/fpsyt.2023.1159399>
27. Çakır, B., Berk, A., Berşe, S., Göv, P., & Güngör, M. İ. (2025). Chatbot-centered integration of simulation and artificial intelligence in nursing education: A narrative review. *Global Nursing Insights*, 12(3), 290–300. <https://doi.org/10.31125/globnursinsights.1762516>
28. Poojari, R. (2026). Privacy-preserving generative AI in healthcare systems using federated learning approaches. *International Journal of Data Science and IoT Management System*, 5(1), 78–88. <https://doi.org/10.64751/ijdim.2026.v5.n1.pp78-88>

29. Jia, J., & Zhao, S. (2025). Ethical and legal governance of generative AI in Chinese healthcare. *Journal of Multidisciplinary Healthcare*, 18, 5405–5419.
<https://doi.org/10.2147/JMDH.S541271>