

Research Article

Empowering Clinicians as Citizen Developers: Leveraging Generative AI and Low-Code Platforms in Healthcare

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Abstract

The rising demand for scalable digital health solutions is reshaping how technology is built and delivered in healthcare. Low-code platforms have already accelerated application development, but many clinicians—those closest to patients—are left out of the design process because they lack coding expertise. Recent advances in generative AI open the door to a new possibility: turning clinicians into empowered “citizen developers” who can shape, customize, and deploy solutions with little to no technical background.

This paper explores how the convergence of generative AI and low-code platforms [1] can bridge the gap between technology and patient care. We highlight frameworks, practical use cases, and the risks involved in giving clinicians a more active role as technology creators. Alongside the promise of shorter development cycles, stronger clinician engagement, and better patient outcomes, we also address challenges such as governance, data privacy, model bias, and regulatory hurdles. To guide this transition, we propose a structured model for integrating generative AI copilots into low-code platforms—demonstrating how this shift could democratize healthcare innovation and move us closer to truly intelligent, clinician-driven solutions.

Keywords: Low-Code platforms, Generative AI, citizen developers, healthcare innovations.

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1. Introduction

Healthcare is at a crossroads. On one side, the demand for digital solutions is growing faster than traditional development methods can keep up. On the other, clinicians—the people who understand patients’ needs most intimately—are often sidelined in the design of these tools because of the technical barriers to software development. This gap has created a disconnect between the promise of digital health and the realities of clinical practice.

Low-code platforms have already begun to close part of this gap by simplifying application development and reducing reliance on large technical teams. Yet, even these tools require more technical expertise than most clinicians possess. At the same time, the rapid rise of generative AI has shown us a powerful new way to interact with technology: through natural language, creativity, and contextual understanding [1].

Bringing these two forces together—low-code platforms and generative AI—creates an exciting opportunity to reimagine the role of clinicians in digital innovation [6]. Instead of being passive users of technology, clinicians can become co-creators, customizing workflows, building patient-facing applications, and addressing local challenges in ways that were previously impossible. This shift has the potential not only to accelerate innovation but also to ensure that the solutions designed truly reflect the lived realities of patient care.

In this paper, we examine the convergence of generative AI and low-code platforms in healthcare. We outline the frameworks and practical applications that can empower clinicians as “citizen developers,” discuss the benefits and risks of this transformation, and propose a structured model for integrating AI copilots into low-code environments. Our goal is to highlight how this paradigm shift could democratize healthcare innovation and move us toward a future where intelligent, clinician-driven solutions directly improve patient outcomes [2].

2. From Users to Creators: Rethinking Clinician Roles

- **Current adoption of low-code in healthcare:** Low-code platforms have become increasingly popular in healthcare organizations for their ability to accelerate software development. They reduce time-to-market, lower costs, and allow IT teams to respond quickly to evolving patient and regulatory demands. Hospitals and clinics are leveraging these tools to create patient portals, streamline administrative workflows, and support care coordination—demonstrating the potential of low-code to transform healthcare delivery [1][6].
- **Barriers clinicians face in contributing directly:** Despite these benefits, clinicians, the individuals most attuned to patient needs—are rarely direct contributors in building solutions. Even with simplified interfaces, most low-code tools still require technical fluency beyond the scope of clinical training. As a result, clinicians often play advisory roles, giving feedback rather than shaping tools themselves. This creates a gap between what is built and what frontline care requires, leading to tools that may be functional but misaligned with clinical realities [2].
- **Why generative AI is the missing piece [1]:** Generative AI has the potential to close this gap by turning natural language into working prototypes, workflows, or code. Instead of learning the complexities of low-code environments, clinicians can simply describe what they need in plain language. The AI can then generate applications or configurations tailored to their requirements, lowering the barrier

to participation. This shift transforms clinicians from passive users into co-creators, aligning technology more closely with real-world clinical practice and accelerating the pace of innovation.

3. Generative Ai and Low-Code Synergy

- **Role of LLMs as copilots in development:** Large Language Models (LLMs) are no longer just tools that generate text; they are evolving into copilots that guide and accelerate the software development process. In a low-code environment, an LLM can act as an intelligent partner, helping clinicians and developers alike move from vague ideas to working solutions. For a clinician, this could mean asking, “*Can you create a simple app to track post-surgery pain scores?*” and having the AI generate a prototype within minutes. Rather than replacing human creativity, these copilots amplify handling the technical details while leaving room for human judgment and empathy [7].
- **How AI can convert natural language into workflows, APIs, and data models:** One of the most powerful capabilities of generative AI is its ability to translate plain language into functional code and system components. What once required knowledge of syntax and integration frameworks can now be expressed conversationally: “Create a workflow to notify me when lab results are abnormal,” or “Build a dashboard pulling patient vitals from the EHR.” The AI can generate workflows, APIs, and data models automatically, which can then be fine-tuned with just a few clicks. This ability dramatically lowers the barrier for clinicians to take an active role in designing digital tools that directly support patient care [8].
- **Reducing the gap between intent and execution:** Traditional development often suffers from “translation loss”—where clinicians explain their needs to IT teams, who then interpret and build a solution that may or may not match the original vision. With AI copilots, that gap shrinks. Clinicians can express their intent in their own words and see it brought to life immediately, reducing miscommunication, wasted cycles, and frustration on both sides.
- **A partnership, not a replacement:** It’s important to emphasize that generative AI does not replace human expertise. Rather, it creates space for clinicians to focus on what they do best: applying medical knowledge, exercising judgment, and caring for patients. AI handles the repetitive, technical scaffolding—allowing clinicians to become active co-designers of the tools that shape their practice without requiring them to become full-time programmers [4].

4. Use Cases in Healthcare

- **Clinical decision support tools:** Clinicians often face information overload—guidelines, lab results, imaging, and patient histories all arriving at once. AI-powered low-code platforms can help by building decision support tools that synthesize this complexity in real time. Instead of navigating multiple systems, a doctor might receive a single, AI-curated dashboard suggesting potential

diagnoses or next steps. These tools don't replace clinical judgment; they sharpen it, giving providers a clearer picture at the moment it matters most [6].

- **Automating prior authorization workflows:** Prior authorization remains one of the most frustrating bottlenecks in healthcare. Hours are lost to paperwork, phone calls, and back-and-forth with insurers. Generative AI can streamline this process by automating form generation, cross-checking requirements, and flagging missing information. Imagine a nurse simply asking, "Submit an authorization request for this MRI," and within minutes, the system assembles and routes the documentation. That reclaimed time can go back to what matters—patient care [5] [6].
- **Personalized patient care apps:** Every patient's journey is unique, yet most digital tools feel one-size-fits-all. With generative AI layered onto low-code, clinicians can quickly create apps tailored to individual needs—like a diabetes management app that adjusts meal plans based on a patient's preferences, or a recovery tracker that accounts for cultural lifestyle factors. When technology reflects the individuality of patients, it strengthens trust and adherence, leading to better outcomes[5].
- **Rapid prototyping in emergency situations:** Emergencies don't wait for long development cycles. During a public health crisis, like an outbreak or natural disaster, speed is everything. AI-assisted low-code platforms could allow clinicians to spin up triage tools, symptom checkers, or supply-tracking dashboards in hours instead of weeks. This kind of agility could mean the difference between a system that buckles under pressure and one that saves lives [5].
- **Streamlining clinical research** Clinical trials require enormous amounts of data collection and coordination. AI copilots can generate research apps that track participants, integrate consent forms, and flag anomalies in near real time. Researchers gain efficiency, while patients benefit from more responsive and transparent studies.
- **Enhancing patient communication** : Sometimes the simplest need—clear communication—has the biggest impact. Clinicians could use AI+low-code to instantly create multilingual chatbots, post-visit instruction apps, or reminder systems that text patients in their preferred language. Meeting patients where they are reduces confusion, improves adherence, and fosters a sense of partnership in care [3].

5. Risk And Governance

- **Bias in generative models:** Generative AI models learn from the data they are trained on. If that data reflects existing healthcare inequities—such as underrepresentation of certain populations, the models can unintentionally reinforce those biases. For example, a decision-support tool might perform better

for one demographic group than another. In practice, this could mean a patient not receiving the same quality of recommendations simply because the system wasn't trained on people like them. Addressing bias isn't just a technical issue, it's a moral one, tied directly to patient trust and safety [4].

- **Data privacy (HIPAA/GDPR concerns):** Patient data is deeply personal, and even small lapses in handling it can have major consequences. While low-code platforms and AI copilots make building applications faster, they also create new points of vulnerability if data governance isn't tightly controlled. Any system that processes protected health information must adhere to HIPAA in the U.S. and GDPR in Europe, among others. If clinicians are empowered as "citizen developers," they need clear guardrails, so they don't accidentally expose sensitive patient information while trying to build solutions in good faith [8].
- **Security of clinician-developed apps:** Empowering clinicians to design apps brings agility, but it also introduces risks. A tool developed without proper oversight could unintentionally contain security loopholes—such as weak authentication or improper data storage. In healthcare, where breaches can erode trust and cause real harm, security has to be woven in from the start. This means clinicians shouldn't be left on their own; they need accessible security templates, automated checks, and support from IT teams [8].
- **Need for approval workflows / oversight:** The balance between empowerment and accountability is delicate. While clinicians should have the freedom to design tools, every new app or workflow must pass through structured oversight before going live. This ensures compliance with regulations, alignment with organizational standards, and protection against unintended consequences. Oversight doesn't have to be a barrier—it can be framed as a safeguard, giving clinicians confidence that their innovations are both safe and sustainable.
- **Transparency and explainability:** For clinicians to trust AI-generated workflows, they need to understand *why* the system made certain suggestions. A "black box" approach is dangerous in healthcare, where every decision can affect lives. AI copilots must offer transparency—explaining not just what they built, but why, and where the data came from. This helps clinicians validate the output and maintain accountability [6].
- **Sustainability and maintenance:** Even the most well-intentioned clinician-developed apps can become liabilities if they are not maintained. Without clear ownership, updates, and lifecycle management, apps risk becoming outdated or incompatible with newer systems. Governance must address not just how apps are created, but how they are supported over time—so that innovation doesn't turn into digital clutter or technical debt [8].

6. Proposed Framework

- **AI-assisted design layer:** At the foundation is an AI-driven design layer that acts as a true copilot. Clinicians describe their needs in natural language— *“I want an app that tracks wound healing photos and sends alerts when healing slows”*—and the AI instantly generates a prototype. Instead of wrestling with technical syntax, clinicians can focus on the *intent* of the solution. This lowers the barrier to entry, making innovation accessible to those closest to patient care [7].
- **Human-in-the-loop validation:** No matter how powerful AI becomes; healthcare requires human judgment. Every workflow, data integration, or recommendation generated by the system should pass through clinician review before being deployed. This validation step ensures that technology reflects not just functional correctness, but also clinical common sense, empathy, and ethical responsibility. In other words, the AI provides scaffolding, but clinicians remain the architects [7].
- **Governance and compliance checkpoints:** To keep innovation safe and sustainable, automated checkpoints should be embedded throughout the process. These checkpoints might verify HIPAA/GDPR compliance, scan for security vulnerabilities, and ensure that workflows align with organizational policies. By integrating compliance into the development cycle itself, clinicians are free to innovate without carrying the burden of becoming regulatory experts [7].
- **Feedback and continuous learning loops:** Innovation doesn’t end when an app goes live. Clinicians and patients should be able to share feedback easily—what worked, what didn’t, what needs to change. This feedback can flow back into the AI, improving future prototypes and ensuring solutions evolve with clinical practice. Continuous learning makes the framework dynamic rather than static [3].
- **Shared responsibility model:** To prevent burnout or undue risk, responsibility must be clearly distributed. Clinicians contribute their domain expertise, AI copilots generate and refine technical scaffolding, and IT/governance teams oversee compliance and long-term maintenance. This shared responsibility model ensures that no single group carries the full weight, while keeping patients’ well-being at the center [7].

7. Future Directions

- **Real-time clinical applications:** The future of AI-assisted low-code isn’t just about building apps faster—it’s about enabling care in the moment. Imagine an ER physician receiving real-time decision support while treating a patient with chest pain: the system automatically pulls vitals, recent labs, and imaging, then generates tailored recommendations in seconds. As healthcare moves toward value-based models, real-time applications will become essential for improving outcomes while reducing the burden on clinicians.

- **Multi-modal integration (EHRs, wearables, imaging data):** Patients are more than the data in their electronic health record. They also generate a constant stream of information from wearable devices, home monitoring tools, and imaging systems. The future lies in integrating these diverse data sources into a unified view. With AI copilots, a clinician could simply ask, *“Show me how this patient’s glucose patterns from their wearable correlate with their lab results and MRI findings,”* and receive an integrated summary. Multi-modal integration promises a more holistic, human-centered approach to care[4].
- **Sustainable, scalable citizen development:** Empowering clinicians as citizen developers is exciting—but it must also be sustainable. That means creating structures where solutions don’t just spring up and disappear, but are maintained, shared, and scaled across departments and organizations. Hospitals could establish libraries of reusable, AI-generated components that clinicians can adapt, much like sharing templates. This not only reduces duplication but also builds a culture of continuous improvement and collaboration.
- **Collaborative ecosystems** The next frontier isn’t limited to single institutions. We can imagine networks of clinicians across hospitals, regions, or even countries, co-creating and sharing AI-assisted low-code applications. This global exchange of tools—tailored for local contexts but grounded in shared principles—could democratize innovation on a scale never seen before in healthcare [3] [5].
- **Human-AI partnerships redefined:** The most promising future direction is not about technology taking over, but about redefining what partnership looks like between humans and AI. As these systems grow more capable, the clinician’s role will evolve from being a passive user of technology to being a conductor—guiding AI, ensuring ethical use, and weaving technology into the art of medicine. The future is less about machines replacing us, and more about machines amplifying our capacity to heal.

8. Conclusion

The convergence of generative AI and low-code platforms signals a turning point in healthcare innovation. What once required months of development and layers of translation between clinicians and IT teams can now be reimagined as a collaborative, near-instant process. Clinicians, who best understand the realities of patient care, are no longer limited to the role of end users, they can become co-creators of the very tools they rely on [2].

Yet, this shift is not without its challenges. Bias, data privacy, and governance must be addressed with rigor and transparency to ensure that technology enhances equity rather than eroding trust. Responsible frameworks—anchored in human-in-the-loop validation, compliance checkpoints, and shared accountability—will be critical to sustaining progress.

The opportunities, however, are profound. From personalized care apps to real-time decision support, from streamlining prior authorizations to accelerating emergency response, generative AI and low code can create solutions that are faster, more intuitive, and more aligned with patient needs. By lowering the barriers to innovation, we invite clinicians to bring their expertise directly into the design of digital health—turning vision into practice, and practice into better outcomes.

Ultimately, this is not just about technology. It is about re-centering healthcare on the people it serves clinicians who want to spend more time caring and less time coding, and patients who deserve solutions tailored to their unique journeys. If adopted with care and foresight, this synergy has the power to democratize healthcare innovation, build more resilient systems, and accelerate our path toward a future where technology truly amplifies human healing.

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