

Research

AI-supported Digital *OpenNotes* in Primary Care Setting

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Abstract

In primary care, time constraints and communication challenges can hinder patient understanding and treatment adherence. *OpenNotes* promotes transparency and improves patient engagement, health literacy, and self-efficacy by allowing patients to access their clinical notes. Patients are increasingly using artificial intelligence (AI) — particularly large language models (LLM) — to help interpret these notes. Moreover, LLMs offer support for physicians by assisting with patient portal communication. However, there are risks of inappropriate or inconsistent responses. Therefore, further research is needed to explore the safe and effective application of AI in the primary care setting.

Keywords: *OpenNotes*, primary care, artificial intelligence, patient activation, patient safety

Challenges in Primary Care

Primary care is characterized by a high number of patients and time constraints. On average, physicians have only a few minutes per consultation (Irving et al., 2017). This limited timeframe poses particular challenges in ensuring patient comprehension and prescribing appropriate medication, especially in cases involving complex medical conditions or patients with specific support needs, such as individuals with a migration background or from socioeconomically disadvantaged groups

(Neprash et al., 2023). Knowledge gaps can be dangerous when it comes to medication-related side effects. They can lead not only to non-adherence but also to economic and personal costs (Sieling et al., 2025).

To ensure adherence to medical regimens, patients have to be able to recall treatment-related information provided during appointments. However, patients recall fewer than half of all recommendations made by healthcare professionals, while 15% of patients report having no recollection or incorrect memory of the information provided to them (Laws et al., 2018). Patients' level of education influences their ability to recall information accurately. Patients without a high school degree recalled only 38% of the information from their visits, while individuals with a college degree could recall 65% correctly (Laws et al., 2018). Furthermore, language barriers can contribute to miscommunication in clinical settings (Neprash et al., 2023).

OpenNotes: Digital Access to Clinical Notes

OpenNotes, i.e., the sharing of clinical notes with patients, has the potential to mitigate such risks (Esch et al., 2016). Since mid-January 2025, the electronic health record (ePA) has been introduced in selected model regions in Germany, allowing patients to access medication plans, laboratory results, and medical reports (BMG, 2025). However, clinical notes — such as documentation of anamnesis, treatment preferences, and

agreements made during consultations — are not included in the ePA (BMG, 2025). The sharing of precisely these types of notes is at the core of the *OpenNotes* concept, which originated in the United States. *OpenNotes* has been integrated into the medical care system in the U.S.; since 2021, as all healthcare institutions are now required to share clinical notes electronically and free of charge with their patients (Salmi et al., 2021). In Germany, a transparent handling of clinical notes has not yet been established (Esch, 2021).

Pilot project at University Outpatient Clinic for Integrative Health Care and Naturopathy Witten

Germany's first *OpenNotes* pilot project was launched in early 2019 under the leadership of Tobias Esch at the University Outpatient Clinic for Integrative Health Care and Naturopathy (UnIG) in Witten. At the clinic, treatment reports and clinical notes are shared fully, transparently, and in real time with patients via a digital patient portal. Patients can view and download their records online at any time (Esch, 2021; Grote-Westrick & Münch, 2020). Patients report that access to these notes facilitates their preparation for medical consultations, enables them to ask follow-up questions and request corrections, and provides them with a sense of informational self-determination. Many patients state that they feel so well informed through this approach that they no longer rely on internet searches or "Dr. Google" (Grote-Westrick & Münch, 2020).

Data on *OpenNotes*

Empirical studies on the use of *OpenNotes* show positive outcomes for patients, including increased adherence to treatment plans, improved understanding of personal health, enhanced self-efficacy, higher motivation to improve one's health, increased patient engagement and activation, and greater involvement in treatment decisions (Delbanco et al., 2012; Esch et al., 2016; Wright et al., 2015; Schwarz et al., 2024).

Physicians in Germany recognize the potential benefits of implementing *OpenNotes*. These include improved quality of documentation, enhanced patient involvement through increased health literacy, greater self-reflection among healthcare providers, and a reduction in the traditional power imbalance between doctors and patients (Schwarz et al., 2024). In a primary care setting, *OpenNotes* has the potential to empower patients through greater transparency, improve the physician–patient relationship and trust, reduce physicians' workload (Grote-Westrick & Münch, 2020), and enhance healthcare delivery and outcomes (Wright et al., 2015).

The increased transparency associated with *OpenNotes* can facilitate a more equal and collaborative relationship between healthcare providers and patients, with the latter being integrated as active participants in the care team (Esch, 2024). Furthermore, a correction of documentation and medication intake errors contributed to improvements in patient and treatment safety, as well as in clinical outcomes (Wright et al., 2015).

Patients with lower educational levels benefit from access to clinical notes, reporting improved medication adherence and more effective collaboration with their healthcare providers (Bell et al., 2021). Older adults with multiple chronic conditions have also reported improved understanding of their treatment plans and better medication adherence because of *OpenNotes* (DesRoches et al., 2021).

Artificial intelligence as a tool for patient–physician communication

Access to clinical notes can promote active involvement in health promotion and prevention efforts, while also enhancing self-efficacy and patient activation. As a result of *OpenNotes*, patients ask more informed questions; however, confusion from patients about the content and meaning of clinical notes still persists (Salmi et al., 2025). If clinical notes are not understood, patients may use large language models like ChatGPT, Claude or

Gemini to help interpret their medical information (Salmi et al., 2025). Physicians receive a growing number of messages through patient portals. Time constraints, combined with the inappropriate content of some messages, can negatively affect physicians' mental health (Salmi et al., 2025).

The documentation burden on physicians is already high and can contribute to physician burnout (Gunderman & Lynch, 2018). Messages from patients received through the platform further add to physicians' workload, thereby increasing the risk of burnout (Salmi et al., 2025). Moreover, studies have shown that physician stress and burnout can lead to medical errors (Gaffney et al., 2019; Werdecker/Esch, 2021; Yates et al., 2020). LLM chatbots can assist healthcare professionals in responding to patient portal messages and help reduce their workload and mental burden (Salmi et al., 2025).

Despite some benefits, there are risks and ethical questions involved when integrating AI use in treatment processes (Baxter et al., 2022; Hallowell et al., 2022). For example, one study showed that clinical recommendations provided by the AI differed from those given by physicians, were sometimes inconsistent, and

occasionally included potentially escalating advice — such as suggesting that patients report complaints to the medical board (Baxter et al., 2024). Moreover, the LLM occasionally provided medical advice, even though it was not intended to do so (Baxter et al., 2024). The quality of the LLM response depends also on the prompt and on the model. Therefore, AI is more feasible as an assistant than as an autonomous chatbot. To meet further challenges more research is needed.

Conclusion and Outlook

In addition to the promising *OpenNotes* approach, artificial intelligence (AI) offers potential solutions to challenges such as time constraints and difficulties in patient understanding. The use of artificial intelligence in healthcare — particularly in primary care — is an emerging field of research with many unanswered questions.

To address these questions, a research alliance was formed by Institute for Integrative Health Care and Health Promotion (IGVF) at University of Witten/Herdecke, Hasso Plattner Institute (HPI), Oncare GmbH, Sonia Solutions GmbH, and Institute for Consulting, Research and Development in Dentistry and Medicine.

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