When AI Scribes Join the Team: The Effects of Ambient and Generative Documentation in the Clinical Learning Environment

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As most physicians envisioned their careers, few imagined spending hours hunched over a computer. The patient is in a room down the hall while the physician stares at a dual monitor, clicking through boxes and pop-ups on their screen. A medical student sits nearby, eager to learn the art of medicine and experience the human side of health care, yet much of their day is spent watching others type rather than learning at the patient's bedside.

Scenes like this have become increasingly familiar in modern clinical practice, largely due to the growth of electronic medical records (EMRs). EMRs became more prevalent in the United States after the 2009 American Recovery and Reinvestment Act[1] incentivized their adoption; by the late 2010s, most large hospitals and outpatient practices had transitioned to them. EMRs have had many positive effects, improving the accessibility of medical records and enabling data collection and research. However, the administrative demands of EMRs have been linked to decreased face-to-face time with patients[2] and higher rates of physician burnout.[3]

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As documentation demands increased, many health care systems turned to human scribes. Studies across multiple specialties show that scribes generally improve productivity metrics,[4-6] physician satisfaction,[4,5] burnout,[6] and patient satisfaction.[5,6] However, human scribe programs carry financial and operational costs, including wages and administrative resources required to manage recruitment, training, and frequent turnover.

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More recently, AI scribes have been incorporated into clinical practice. AI scribes are ambient, generative artificial intelligence tools that can listen to patient-clinician conversations and generate draft documentation nearly instantaneously. Promoted as tools that could replace human scribes, they may reduce the costs and variability associated with traditional human scribe programs. Thus far, most research has focused on the impact of AI scribes on clinical care and workflow – specifically documentation time, physician workload, and burnout. Studies show mixed results; while clinician experience and perceived burnout often improve, there is often minimal change in actual documentation time.[7,8] This may reflect the time required for editing, as AI-generated notes can be excessively long, redundant, or contain errors and hallucinations.[9] Even so, the promise of AI scribes may be less about time saved and more about changing how documentation occurs. AI scribes allow physicians to engage with patients without documentation becoming a separate, screen-based task. This recalls earlier eras when simpler documentation occurred less obtrusively at the bedside, often alongside patients, learners, nurses, and other members of the care team. AI scribes may offer an opportunity to help physicians step away from screens and recenter the human elements of medicine.

In many settings, however, the practice of medicine is intertwined with teaching and learning. Medical students and residents will inevitably interact with AI scribes in the clinical environment, yet far fewer studies have examined the educational impact of these tools. AI scribes introduce both opportunities and potential threats to medical education. For educators, understanding how these tools impact clinical learning is essential.

The educational impact of AI scribes may begin even before students enter medical school. If AI scribes replace human scribes, a common premedical experience may be lost. In 2020, Hewlett et al found that one-third of medical students at their institution had scribe experience before matriculation.[10] While this

experience is not a direct factor in medical school acceptance, schools value experiences that demonstrate an applicants' exposure to clinical care. Unlike shadowing, scribing is a paid, longitudinal role that integrates students into the care team and provides exposure to what physicians encounter daily. Scribing can be particularly valuable for premedical students who cannot afford to pursue unpaid experiences and might otherwise lack access to hands-on clinical experience or physician mentorship. Qualitative studies have shown that scribing can strengthen a student's commitment to medicine, spark specialty interest, and foster early clinical skills.[11,12]

Once aspiring physicians enter medical school, note writing is more than a clerical task. Writing makes a student's thought process visible to educators and allows for the identification of knowledge gaps. Documenting a patient's history, exam, assessment, and plan teaches students how to prioritize information, synthesize data, and develop clinical reasoning. If AI scribes reproduce a patient's words verbatim or, more concerningly, actively perform synthesis for students, learners may bypass the cognitive work that note writing can cultivate. When AI supplants the learner's role as reporter and interpreter, it raises questions about how the learner will develop the skills necessary to become an effective manager and educator.

These skills remain relevant as students transition to residency. In most academic centers, residents perform a large proportion of documentation. While residents are developing reporter and interpreter skills, a complex EMR can anchor them to administrative tasks. Reducing this burden could have meaningful benefits, allowing more time for face-to-face patient care. A recent study found that while residents using AI scribes reported a lower documentation burden, there was no reduction in actual time spent documenting.[13]

Much like their underlying algorithms, the mechanisms by which AI scribes reduce this documentation burden remain a "black box." Viewed through the lens of cognitive load theory, AI scribes likely change the timing and method of physician documentation. Clinicians in both hospital and ambulatory settings often face a trade-off between frequent task-switching and the limits of working memory. To avoid forgetting details, many try to document in real time, which increases task switching, fragments attention, and adds extraneous cognitive load. The alternative – deferred documentation – requires remembering a large amount of complex information later. By capturing the encounter in real time, AI scribes reduce the need to navigate this trade-off, and the time spent editing AI-generated notes post-shift may feel more manageable and cognitively less demanding.

Yet even if AI scribes eventually create real time savings for physicians, how will they use this extra time? They may face pressure to see more patients and increase clinical productivity. Alternatively, AI scribes could reduce after-hours documentation or lead to more "pockets" of downtime. Ideally, however, time gained would benefit patient care and enhance education. Evidence from traditional scribe programs supports this; in one academic emergency department, attending physicians – rather than residents – were assigned scribes, yet residents still reported improved educational experiences and more face-to-face teaching.[14]

AI tools also inevitably introduce new educational responsibilities. Educators must guide students and residents in using AI technologies effectively and responsibly. In a recent article, Abdulnour et al emphasized that educators must both teach and assess the use of AI in the clinical space while simultaneously developing these skills themselves.[15] The authors suggest using the DEFT-AI framework[16] centered on learner-centered supervision, in which learners (1) describe how they used AI, (2) evaluate the evidence supporting their approach, (3) receive feedback, (4) receive teaching points to deepen understanding, and (5) are given recommendations for responsible and effective AI use.

The use of AI in the clinical space, both for documentation and clinical reasoning, should be explicit and intentional. This is particularly important when clinicians utilize AI to generate differential diagnoses or draft assessments and plans. While these generative outputs can appear reasonable, they often oversimplify the complexity of clinical reasoning. For example, an AI scribe might generate the phrase, "the ECG does not show a heart attack," when the actual evaluation of the ECG for acute coronary syndrome is more nuanced. Educators must guide learners to question AI and realize its limitations while also appreciating its potential in the clinical space. AI tools can prompt alternative diagnoses, draw attention to important details, and help learners and clinicians manage the volume of data within the EMR. Learners who engage with, question, and expand upon AI outputs can develop critical appraisal skills and build a foundation for higher-order thinking.

AI scribes represent a promising innovation, yet their adoption introduces important educational trade-offs. The replacement of human scribes may lead to the loss of a formative entry point into medicine for premedical students. For medical students and residents, AI scribes could supplant the foundational skills of synthesizing a patient's story and developing clinical reasoning. For educators, these tools create the added responsibility of preparing learners to use AI effectively and responsibly. Yet even with these concerns, the task is not necessarily to resist technological advancement, but to carefully navigate its costs and benefits. Used intentionally, AI scribes could allow clinicians to spend less time in front of a computer screen and more time at the bedside, focusing more on patient care, clinical education, and the human relationships that drew them to medicine. With thoughtful integration, AI scribes could help create a new picture of medicine in which people return to the center, even as new technology becomes part of the team.

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