VIEWPOINT

Clinical Notes as Narratives: Implications for Large Language Models in Healthcare

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OpenAI's ChatGPT sparked tremendous excitement regarding potential healthcare applications of large language models (LLM). LLMs trained on electronic health record (EHR) notes could enrich the feature space for many tasks including risk prediction, data classification (e.g., identifying protected health information), augmented documentation, and patient communication. Crucially, LLMs will learn not only from objective clinical data, but also from patient *narratives*—subjective texts authored by human clinicians, who may be sources of bias. In recognizing clinical notes as clinical narratives, and clinicians as narrators, we gain important insights into potential downstream implications of training LLMs on EHRs. Here we argue that a richer understanding of notes' narrative elements, informed by principles from the field of narratology, could facilitate the development of LLMs that are more conscious of bias and enable the delivery of high-quality, human-centered care.

CLINICAL NOTES ARE NARRATIVES

Narratology—the study of narrative structure and function—defines a narrative as a sequence of events occurring over time, told from a particular point of view.[1] As such, clinical notes can be considered illness narratives following certain normative structures (i.e., Subjective Objective Assessment Plan). The past is chronicled in the past medical history, the present in the history of present illness, and the future in treatment plans. The patient is the note's subject and protagonist. The clinician is the note's author and narrator—observing and conveying events experienced by the patient protagonist. Narratologists recognize that stories are a primary mechanism by which humans comprehend and create meaning in the world.[1]

NARRATIVE BIASES AFFECT HUMANS AND MACHINES

LLMs learn linguistic patterns from large bodies of text. In the case of LLMs trained or fine-tuned on EHRs, these texts are clinical notes, written by fallible clinician narrators. Clinicians' differential use of stigmatizing and depersonalizing language in clinical notes is well-described.[2] Unsurprisingly, LLMs learn and manifest similar biases: LLM-powered chatbots provided weaker analgesia recommendations for Black versus White patients.[3] A fundamental premise of cognitive linguistics is that language shapes how we think and act. The ways in which language impacts clinicians' cognitive frameworks are incompletely understood, so it remains to be seen how clinicians' role as narrators will affect LLM outputs. For instance, much attention has been paid to ensuring that models are trained on representative patient data; however, less focus has been directed towards the individual, regional, and sociocultural factors that influence clinicians' documentation practices. Using clinical notes as LLM inputs introduces a component of human narratorial *subjectivity* to machine-based clinical reasoning that warrants closer consideration.

BUILDING ON THE RICH HISTORY OF LINGUISTIC ANALYSIS OF CLINICAL TEXTS

Scholars have applied linguistic and narrative theories to the patient-clinician interaction and medical record. This work has yielded important insights ranging from the role of language and dialectics in the creation of illness,[4] the healing power of narrative,[5] and use of ontological classification for computational analysis of big data in EHRs.[6] With LLMs increasingly deployed in healthcare contexts, humans and machines will begin *co-creating* clinical narratives. Whereas some of notes' normative elements (e.g., SOAP) are broadly recognized, the advent of LLMs creates a pressing need for a simple, accessible, and intuitive narrative framework.

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In classical narratology, a note's *story* represents the clinical events recounted, *narrating* is the clinical narrator's perspective and relationship to the patient, and *discourse* is the way those events are described.[2] Post-classical narratology extends these traditional narrative elements to incorporate the role of audience and sociocultural contexts in storytelling. We present a novel framework for clinical notes modeled along these lines (Fig. 1). Our framework builds on the existing body of literature[4–6] by highlighting clinicians' essential role as narrators of the texts on which LLMs will be trained. Our framework provides a foundation for incorporating emerging evidence regarding the impacts of language on clinical care[2] and LLMs.[3] It could direct future research in these arenas, guide LLM integration into clinical workflows, and facilitate their use by front-line clinicians.

HOW BIAS-CONSCIOUS LLMS COULD HELP DELIVER HIGHER-QUALITY, MORE HUMAN-CENTERED CARE

Consider a patient presenting with a chief concern of severe abdominal pain. There is a discordance between the patient protagonist's "subjective" symptom and the clinician narrator's "objective" assessment of their soft, non-distended abdomen. This could indicate that an emergent abdominal pathology is less likely. Yet there are numerous ways the clinician and their artificial intelligence (AI) clinical decision support tool could be influenced by narrative bias. Perhaps human and machine—the latter having been trained on and analyzing data produced by the former—are unduly reassured by the patient's chart history of "chronic abdominal pain" (i.e., story). Perhaps language, such as "substance abuser" or "sickler" (i.e., discourse), which may reflect the clinicians' personal biases (i.e., narrating), leads to not only weaker analgesia recommendations, but also a narrower differential diagnosis and less comprehensive work-up too. Conversely, if the clinician practices in a specialty or setting at a higher risk for malpractice litigation, they might employ defensive documentation, writing to clinical as well as medicolegal audiences. Defensive documentation, especially when used as an input for risk prediction models, encourages defensive medicine which can harm patients. Finally, this encounter will occur within a particular sociocultural context, influencing how the patient reports—and the clinician and LLM interpret—symptoms, diagnoses, and treatment plans.

A narrative framework which recognizes and leverages clinicians' inherent narratorial subjectivity will allow the healthcare community to better develop, interpret, and use generative AI. LLMs could deliver behavioral nudges in a fashion similar to extant computer-assisted physician documentation tools. This would encourage clinicians to modify language in order to minimize stigma and disempowerment (e.g., changing "substance abuser" to "person with substance use disorder" or "sickler" to "patient with sickle cell disease"), thereby enhancing patient-clinician rapport. These changes would also have positive effects on note writers'

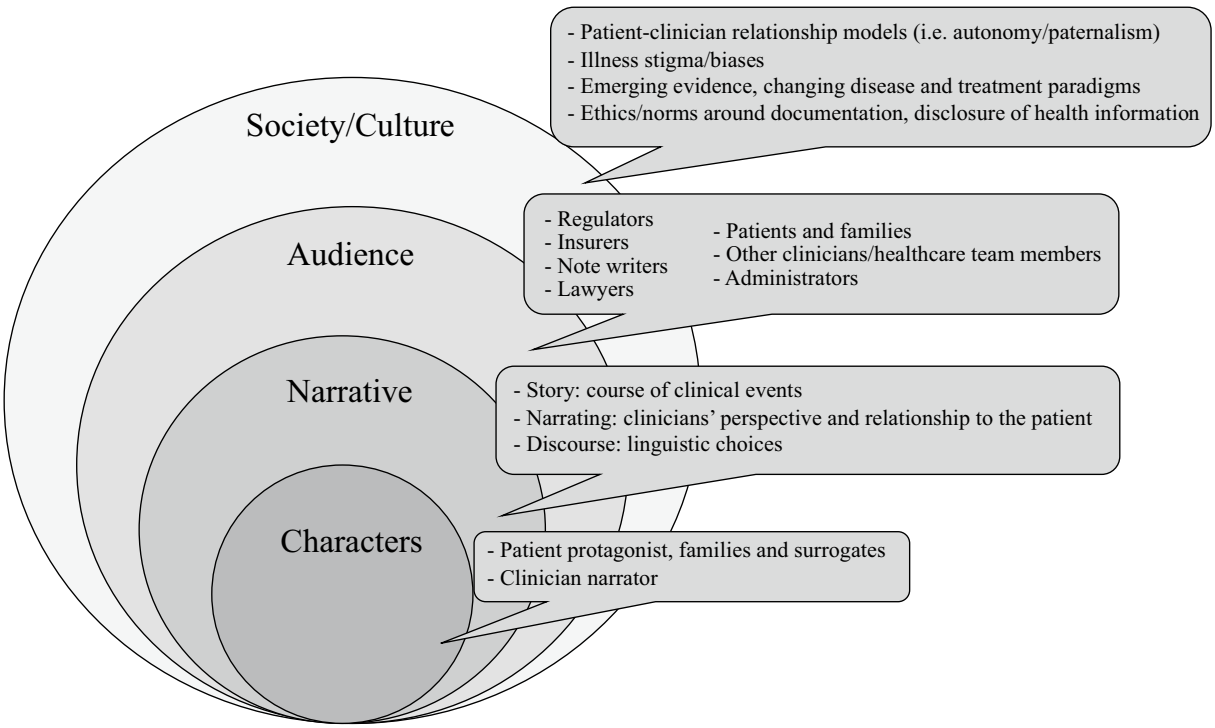

Figure 1 A narrative framework for clinical notes. This framework centers the note's primary agents (patients, families, surrogates, and clinicians) and incorporates elements from classical (story, narrating, and discourse) and post-classical narratology (audience and society/culture) along with selected definitions or examples.

own cognitive frameworks, as well as those of colleagues who read their notes. LLMs embedded in the EHR would learn from individual clinician's prior notes to identify potential errors (e.g., cognitive biases such as framing, anchoring, or confirmation bias) and provide personalized correctives. Clinical decision support models that run multiple predictions will show users how changes in language and the manner in which information is presented affect diagnostic and therapeutic recommendations. Trainees receive little formal documentation education, instead relying on direct observation and feedback from clinician educators. Further, LLMs may give higher quality and more empathetic answers to patient queries.[7] Chatbots are already being incorporated into patient messaging workflows; together LLMs and educators could facilitate the dissemination of best rhetorical practices at scale. Yet subjectivity is not synonymous with bias. LLMs trained on large, multilingual datasets could bridge gaps related to differing sociocultural understandings of health and disease, enabling clinicians to practice higher-quality, socially conscious medicine.

CONCLUSION

In recognizing clinical notes are narratives, we can appreciate the importance of narrative subjectivity. LLMs change clinicians' relationships with their patients, colleagues, and, recursively, themselves. Without a deep understanding of note writers' mental models and biases, incorporating LLMs trained or fine-tuned on EHRs into clinical workflows should be done judiciously. However, eliminating human subjectivity is neither feasible nor desirable. Subjectivity can be a feature as well as a bug. A narrative framework would inform the development of LLMs that are more bias conscious and empower clinicians to deliver excellent human-centered care.

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