



The Turing Test and a Call to Action to Improve Electronic Health Record Documentation

Clinical informatics represents arguably the most significant advance in medicine since the deciphering of the human genome. In particular, as the “front end” of the clinical informatics revolution, the electronic health record has immense potential to transform modern healthcare. Demonstrated benefits of the electronic health record include decision support, adverse event tracking, and quality control.¹ An additional strength of the electronic health record is an inherent capacity to augment research, including embedded, randomized, controlled clinical trials.² However, whether electronic health record use can lead to actual improvements in quality of care or clinical outcomes remains unproven.³⁻⁵

The ability of the electronic health record to improve clinical documentation also is debated. Although it is known that the electronic health record can promote the legibility and completeness of clinical documents,⁶ the quality of notes generated in the electronic health record is often questioned.⁷ Many electronic health record systems now facilitate the generation of clinical documents (hereafter termed “electronic health record-facilitated documents”) by auto-populating information from the patient’s medical chart into the note (eg, with point-and-click options). Examples of clinical documents commonly containing automated narrative include discharge summaries, transfer summaries, and to a lesser extent clinic visit notes. However, physicians often report that electronic health record-facilitated documents commonly have a poor “signal-to-noise” ratio⁸ and fail to succinctly communicate the necessary clinical narrative.^{9,10}

Unfortunately, electronic health record vendors have mainly focused on the medico-legal, reimbursement, and regulatory requirements of the documents generated by their systems and have placed relatively little emphasis on improving the clinical quality of electronic health record-facilitated documents.¹¹ This not only impairs the acceptability of the electronic health record to physicians (many of

whom lament losing the worthy art of note-writing) but also may represent a hazard that could offset some of its potential health benefits.

The human mind is hardwired using a narrative framework derived from our evolution as a social species. Indeed, we are very sensitive to any deviation from our uniquely narrative syntax. It is no surprise then that physicians can easily detect the artificial cut-and-paste¹² or auto-populated “entries” often included in current electronic health record-facilitated documents. This may appear to be a triviality at first, a necessary evil worth tolerating given the financial incentives and purported advantages of the electronic health record.¹³ However, a more troubling problem could be lurking beneath the surface: information loss.

The mere existence of information in the electronic health record is not sufficient; this information also must be retrieved and processed by the actual end-user, in this case the reader of the clinical document. Indeed, most physicians are familiar with the mind’s reflexive instinct to search out those parts of the electronic health record-facilitated document that contain a sentient narrative interpreting the patient’s plan of care. The common criticism of many physicians is well summarized in a recent editorial, “*Beyond the problem with copying and pasting of earlier notes, paragraphs of unfiltered, often irrelevant or untimely lab and imaging reports are repeatedly inserted into multiple notes, while a clearly expressed impression and plan are often nowhere to be found.*”⁷ Physicians often find themselves scanning ahead to sections of the note that were generated de novo by another physician (dictated or typed verbatim). In the process, reams of additional information in the note are frequently left unread.¹⁴

How do we address these emerging electronic health record documentation problems? As always, physicians should ensure the quality of their own notes. However, the structure of the traditional medical note also may require significant adaptation in the electronic health record era. For example, it is possible that abandoning the pervasive skeuomorphism present in current electronic health record-facilitated documents and studying innovative clinical documentation designs could improve communication in the electronic health record.^{14,15}

In addition, as we look to the future of the electronic health record, we also may want to review our past. Indeed,

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pioneers in the field of computer science provide important insights regarding current electronic health record challenges. One such informatics pioneer was Alan Turing, a legendary figure and British war hero, who was unfortunately treated with cruel injustice because of his sexual orientation. Thankfully, widespread appreciation for his genius and indelible contributions to the field were recently rekindled after a posthumous Royal Pardon in his home country.¹⁶

What can Turing teach us about electronic health record documentation? I believe it behooves the electronic health record vendor, clinical informatics, and physician communities to hold electronic health record—facilitated documentation to the standard of Turing: an inability to tell the difference between the output of a person from that of, or facilitated by, a machine.¹⁷ For example, suppose that we have a medical note typed or dictated de novo by a person, an electronic health record—facilitated document, and a blinded interrogator. The Turing test asks the interrogator to determine which note is from the person and which is generated by the electronic health record “machine.” The machine passes if the interrogator cannot tell the difference.

It is increasingly apparent that electronic health record—facilitated documents should be designed to attain a minimal threshold of narrative comparability with medical notes created de novo by human writers. Thus, in addition to addressing other deficiencies,¹⁸ the physician community should demand that electronic health record vendors conduct and report such modified “Turing tests” on their document-generation algorithms. This also could represent a ripe source of investigation for the field of clinical informatics.

Ultimately, physicians should see the electronic health record as an effective tool that, despite current flaws, can facilitate communication if used correctly. They should take time to review the document they create within the electronic health record and be careful to minimize automated data entries that do not add helpful information, or even worse communicate inaccurate information. We all need to recognize that gone are the days when clinical notes were kept primarily as a physician’s own record and reference. Multidisciplinary collaborations and increasingly subspecialized and fractionated care mean that documentation in the electronic health record should be seen as a communal process. In many respects, as the users of this technology, physicians are best positioned to provide suggestions and feedback to clinical informatics and electronic health record vendor groups. In addition, physicians need to advocate more for electronic health record vendors and other informatics stakeholders to shift their focus from regulatory requirements and do more to develop innovative strategies, such as those described earlier, to improve the clinical quality of electronic health record—facilitated documents.

The electronic health record offers boundless potential, tempered by numerous limitations in need of novel solutions. It is apt that Turing’s own words still hold true today, “We can only see a short distance ahead, but we can see plenty there that needs to be done.”¹⁷

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