

Commentary

Hiding in plain sight: What Koppel et al. tell us about healthcare IT

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We agree with the point that Dr. Koppel and co-authors make in their JAMA paper “The Role of Computerized Physician Order Entry Systems in Facilitating Medication Errors.” There really *is* a problem with healthcare IT and the problem is not an artifact of the particular system that the paper’s research covered. It is intriguing that this is considered news. Heeks et al. [1] have contended that “many—even most—health care information systems are failures.” Moll van Charante et al. [2] pointed out similar issues 12 years ago. The research that our lab has conducted over the past decade indicates that this is the way healthcare IT systems work. With no changes to how IT systems are developed, this is the way they will continue to work in the future. *That* a problem exists is not an issue. *What* the problem is and *why* it exists beg more discussion.

Safety culture attitude surveys are currently popular, but produce only shifting sands that offer little traction when it comes to making progress in patient safety. The Koppel et al. article offers a firm foothold. But where do we take the next step? The problem is not “human error.” If it exists, error is a *consequence* of interaction with IT systems rather than a cause of adverse outcomes [3]. The core issue is to understand healthcare work and workers. On the surface, healthcare work seems to flow smoothly. That is because the clinicians who provide healthcare service make it so. Just beneath the apparently smooth-running operations is a complex, poorly bounded, conflicted, highly variable, uncertain, and high-tempo work domain. The technical work [4] that clinicians perform resolves these complex and conflicting elements into a productive work domain. Occa-

sional visitors to this setting see the smooth surface that clinicians have created and remain unaware of the conflicts that lie beneath it. The technical work that clinicians perform is *hiding in plain sight*. Those who know how to do research in this domain can see through the smooth surface and understand its complex and challenging reality. Occasional visitors cannot fathom this demanding work, much less create IT systems to support it.

Progress in healthcare IT systems relies on scientific data on the *actual*, not the perceived, nature of day-to-day operations. These data are produced by research activities that are unfamiliar to the field of healthcare. Cognitive engineering methods [5] such as cognitive task analysis can be used in conjunction with observation to map the distributed cognition processes that are related to daily work activity. Research professionals who perform this type of work describe the use of methods that include observation, artifact analysis, workplace studies, schemata analysis, and mental model analysis to understand practitioner cognition at the sharp (operator) end [6]. Insights that flow from these messy, but essential, details will guide new IT development in ways that move beyond presumptive fantasies over the potential benefits of technology, and surprise over its unforeseen circumstances [7]. These and related methods, which have been developed over 20 years by the social sciences, offer healthcare and IT a way out of the failure that Koppel and his colleagues describe.

The workers that Koppel et al. studied recognize that their CPOE system is not a team player [8]. This kind of failure is not limited to clinical healthcare IT. IT has not been a good team player in other work sectors either, despite enormous investments of time and effort. Klein et al. [9] contend that any participants in joint activity, including automation components, must:

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Enter into a basic compact—Agree that participants intend to work together.

Be mutually predictable—Enable others to know what to expect through shared knowledge and idiosyncratic coordination based on long experience or by substituting explicit procedures and expectations.

Be mutually directable—Able to deliberately assess and modify others' actions as conditions and priorities change and respond to the influence of others as activities unfold.

Maintain common ground—Take action to preserve the pertinent knowledge, beliefs, and assumptions that involved parties share.

With no understanding of the healthcare team or its work, IT cannot fill any of these requirements. Until they do, how should we view these new IT systems that garner such enthusiasm? They are, in a word, *experiments*. Healthcare IT systems that are developed without a deep understanding of the healthcare work domain can only reflect a guess of how such systems should be configured. Koppel et al. remind us that IT experiments such as the CPOE installation they studied are not yet ready “for prime time” as operational systems. Authentic knowledge of healthcare sharp end work and its workers, incorporated throughout their development, will make it possible to develop IT systems that perform as team players [9]. The prudent healthcare manager will ensure that this research is done before installing such a system, or risk being the subject of a future study that de-

scribes another multi-million dollar failure and continued threat to patient safety.

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