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Electronic health records: We need to find needles, not stack more hay

IN THIS EDITION of the *Cleveland Clinic Journal of Medicine*, Dr. Jamie Stoller raises the issue of “electronic silos,” an unintended consequence of using an electronic health record (EHR) system. Dr. Stoller observes that ever since we began using EHRs, clinicians have been talking to each other less.

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As a hospitalist, I would agree. I only need to go to the nursing station on any given morning to confirm this. Working in the hospital, a clinician has two hubs of activity, the patient and the chart. With the advent of the EHR, the chart is now virtual and I no longer need to be physically present in the nursing station.

Our environment has changed, and the EHR provides us a new world in which we must interact as providers. Understanding these challenges will begin to shift our approach to this new world. In addition to this, and to Dr. Stoller’s observations, I would add that we also need to expect more from our EHR. We need an EHR that works for us, one that extends our abilities and improves the care we give. I believe the best is yet to come.

■ **WE GOT WHAT WE ASKED FOR**

Clinical communication is the cornerstone of patient safety. In a seminal report, the Institutes of Medicine estimated that 98,000 people die in any given year from medical errors, and most of the errors are from poor communication.¹ Findings such as this gave

momentum to the movement to convert from a paper-based health delivery system to an electronic one.²

However, a requirement in designing these systems was to mimic paper-based tasks. We asked for the EHR to look like paper, and we got it, and that has truly affected the way we practice, interact, and use electronic health information. Although Dr. Stoller and others want to improve communication and workflow through the EHR, there has been little research into the cognitive requirements or workflow paths needed to make this a reality. A National Research Council report states that current EHRs are not designed on the basis of human-computer interaction, human factors, or ergonomic design principles, and these design failures contribute to their inefficient use and to the potential propagation of error.³

■ **‘HUMAN FACTORS ENGINEERING’
COULD IMPROVE EHR DESIGN**

In industries other than health care, the effect of technology on the workplace has been studied in a discipline called *human factors engineering*. Studies show significant lags between the adoption of workplace automation and the redesign of the workplace to accommodate the new technology and workforce needs.⁴

In health care, even computerized physician order entry, one of the central drivers of EHR adoption to promote patient safety, is fallible as a result of poor human factors engineering. Poor design can introduce new errors into the care delivery system if the technology and the environment in which it is deployed are not well understood.⁵

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We must mitigate this risk of poor design and error by applying the principles of human factors engineering to health care. Three areas need to be taken into account to prevent failure: the user, the device, and the environment in which the device is used. For example, a glucometer with a small display would be difficult to use for patients with impaired vision from diabetic retinopathy—the user needs to be taken into account. We have all had experience with devices that are too complicated to use, with an unfriendly user interface or too much irrelevant material in the display. And in the noisy environment of an operating room full of beeping machines, yet another beep may not be a good way to alert the user. The outcomes of these domains together yield either a safe and effective experience or an ineffective experience that promotes error and puts patient safety at risk.

We can start to achieve good design in health care by first applying the techniques of human factors engineering that have been well honed outside of medicine. Information about the patient should be displayed on a “dashboard” in a way that is intuitive and easy to understand, making for more efficient use of the clinician’s brain cells. Visionaries such as Edward Tufte are investigating how to compile discrete data into a cohesive visual experience.⁶ Application of analytics and predictive modeling can pull together information in a way that tells the provider not only about what has happened, but also about what might happen.

Second, the EHR should include tools for effectively sharing information. I agree with Dr. Stoller about the idea of embedding virtual care teams in the record. I can see when my friends are online with social networking tools—why not extend this feature to the record? Beyond enabling simple physician-to-physician exchanges, the EHR affords new powerful care opportunities that paper never could: the wisdom of the cohort. Virtual care of a population is a promising way to manage patients who share attributes. Beyond improved clinical outcomes, digital collaborative care has the additional benefit of allowing input from nonclinical teams. Combining clinical, operational, and financial data can help make sure we achieve the best quality of care,

at the best cost, with the best outcome. That is the value proposition of health care reform.

■ FINDING THE NEEDLE, NOT STORING MORE HAY

Beyond poor design, another problem with current EHR systems is that they overload us with information, so that our time is spent sifting through data rather than synthesizing it. We are seeing an unprecedented proliferation of both clinical data in the EHR and supporting research data. This combination has not helped the physician find the “needle.” Rather, it has managed to just store more hay.

All health care providers need to know how to read a chart quickly and efficiently to ascertain the story. In medical school, we teach new doctors about what makes for a good consult: synthesize the data and ask for an opinion. While a first-year medical school student would say, “I need a GI consult: the hemoglobin is 6, platelets are low, and there is blood in the stool,” a resident would say, “I need a GI consult for upper endoscopy, as I suspect this patient has alcoholic cirrhosis and likely portal hypertension: I am worried about variceal bleeding.” We should expect the same from our EHR.

Our relationship with health technology needs to shift. We need not view the EHR merely as a record, as something to physically hold data, but rather as a system that digests data to produce knowledge. The EHR needs to be viewed as a mentor and a colleague, a place that not only records data, but that also ascertains data incongruities, displays information that is relevant, and gives providers rapid, at-a-glance knowledge of the patient’s condition. The silo Dr. Stoller describes is not just the physical separation of providers, it is also the separation of providers and knowledge. We are still hunters and gatherers of information. Let the EHR work for the clinician. Tell me that I have not addressed my patient’s hyperkalemia. Tell me that my gastroenterology consultant is online and has just completed a consult note. Tell me that my patient is having uncontrolled pain now, rather than my having to discover this 9 hours later. We should expect our EHR to deliver the right information to the right person at the right time in the right format.

Current EHRs have design failures that contribute to their inefficient use and potential propagation of error

The *electronic health colleague* might be a more apt term.

■ MAKING THE EHR WORK FOR US

So, has the EHR destroyed clinician collaboration? Certainly not. It has just changed the environment and the way we interact with the medical system. In fact, I argue that it could actually make it better, if we shift our expectations of our EHR systems. The future state of collaboration may not be in the tradi-

tional form of speaking to a colleague next to you, but rather in having a system that supports real-time access and sharing of digested knowledge about the patient. This knowledge can then be shared with other providers, finance systems, national health exchanges, predictive models, and even the patient, breaking the silos.

Someday the EHR might give back time to the provider, and we might say, "I just finished my patient panel early—let's go get a cup of coffee and catch up." ■

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