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The electronic medical record: Diving into a shallow pool?

**A call
to reassess
the possible
unintended
consequences
of the rush
to electronic
medical records**

THE RUSH TO ADOPT the electronic medical record (EMR) has accelerated since the signing of the Health Information Technology for Economic and Clinical Health (HI-TECH) Act, part of the American Recovery and Reinvestment (ie, the Stimulus) Act of 2009. The HITECH Act provides incentives for physicians to adopt EMRs. However, I fear that our mad rush to complete adoption of the hodgepodge of currently available EMR systems may have unforeseen and unintended consequences. A skeptical look at several unresolved issues is warranted.

■ SO FAR, ELECTRONIC SYSTEMS ARE NOT INTERCONNECTABLE

More than 300 EMR systems are available, but only about two dozen account for most systems in use.[1] So far, these systems are not interconnectable, ie, they are unable to share information, so patients seen by different physicians may still have a fragmented electronic record.

EMRs can also be inefficient to use. Many systems require logging on to a separate, password-protected system to view images. These problems are likely to go away over time with Internet-based solutions under development by Google and others, but the current lack of interconnectivity leaves much to be desired.

■ ELECTRONIC RECORDS ARE AT RISK

EMRs are at considerable security risk. About 13% of medical offices in the United States are using some form of EMR.[2] A 1995 Harris poll revealed that 70% of Americans were concerned about the security of EMR systems.[3] In 2007, the *New York Times* reported that more than 250,000 patients each year are victims of medical identity theft.[4] A New Zealand survey revealed that 73.3% of patients were "highly concerned" about security and privacy.[5] Even more troubling to physicians is the reported 13% incidence of patients withholding medical information because of security concerns. Furthermore, multiple breaches of electronic records have already been reported, including an extensive breach of the Veterans Administration system.[6]

■ DO ELECTRONIC RECORDS IMPROVE OR WORSEN THE QUALITY OF CARE?

Proponents have repeatedly touted that EMRs improve the quality of medical care, and these claims have been used to accelerate the adoption of the EMR. The contention that EMRs improve the accuracy of billing, coding, and administrative functions is supported by considerable data; however, the evidence of the effect of EMRs on quality of care is mixed, with some information suggesting quality may not improve.

In an analysis of 750,000 patient records for a 2-year period as part of the National Ambulatory Care Survey, Linder et al[7] found that the EMR was superior in one quality area, worse in another area, and the same as paper-based records in 14 other areas. They pointed out that previous studies showing improved outcomes were mainly from large institutions with internally developed EMR systems, and that outcomes reported from

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these "benchmark" institutions may not be broadly applicable.[7] Linder et al concluded that use of electronic records "was generally not associated with improved quality of ambulatory care,"[7] and that increased use of EMRs does not imply an automatic improvement in quality of care.[7]

Crosson et al[8] evaluated diabetes care in a cross-sectional analysis of 50 ambulatory care practices from 2003 and 2004 and reported that "after controlling for potential practice- and patient-level confounders and for the clustering of patients within practices, patients with diabetes in practices that did not have an EMR were significantly more likely to have received care that met the guidelines for processes of care, treatment, and intermediate outcomes."[8]

The Palo Alto Medical Foundation reported on the sources and types of discrepancies between EMR-listed medications and actual patient medications and found that 79.8% of the time the errors were generated by the EMR system.[9] And an outpatient study that videotaped medical encounters to evaluate the accuracy of EMR in an area in which accuracy would be expected (medication lists) found that fewer than one-fifth of exchanges "ended with clear conclusions by both parties regarding prescribed medication regimens."[10] Never mind the lingering questions regarding our ability to define quality: these data provide at least some cause for concern and caution in our rush to adopt innovation in health care without proper consideration of the possible unintended consequences.

WHAT EFFECT ON MEDICAL EDUCATION?

Almost no information is available on the effects of the EMR on the process of medical student education. One could postulate and hope that embedded diagnostic algorithms and drug interaction software would facilitate the education process.

In a paper in *Academic Psychiatry*, Keenan et al noted that research on EMRs for education is in its infancy.[11] A 2008 study of the effects of EMR on third-year medical students' clinical experience found that students reported significant concerns about the potential impact of EMRs on their ability to conduct the

doctor-patient encounter.[12] Furthermore, 48% reported spending less time with patients face to face because of the EMR, and 34% reported less time talking to patients.[12] In today's world of off-site rotations and with nearly two dozen EMR systems in outpatient use alone, it is likely that a considerable amount of medical students' time and effort is expended learning how to use different systems, which may detract from their actual medical experience.

Lastly, a survey of Canadian and US medical schools[13] found that only 44% of schools had a policy regarding medical students' documentation of progress notes in the EMR during ambulatory internal medicine clerkships. In an era when the medical student has been relegated to an observer in the education process,[14] the EMR has introduced yet another poorly understood variable in student education, which clearly begs for a thorough evaluation as the use of EMRs becomes more widespread. How can we maximize rather than dilute student education through the vehicle of electronic records?

ACCURACY VS COPYING AND PASTING

A recent Veterans Adminstration study found that 99% of progress notes in EMRs that were examined contained copied or duplicated text.[15] Ten percent of 98,753 examined records contained an instance of what was considered "high-risk copying." Weir et al[16] manually reviewed a set of 60 inpatient charts at the Salt Lake City VA Health Care System and found an average of one factual error introduced into the electronic record per episode of copying.[16] The clinical accuracy of the EMR is therefore questionable. Physicians pressed for time are more likely to introduce errors in the EMR, and the information put into the EMR is unlikely to be questioned—and may well be perpetuated by copy-and-paste methodology.

A THIRD PARTY IN THE EXAMINATION ROOM

Considerable information is available about the effect of the EMR on doctor-patient interaction. Margalit et al[17] studied videotapes of physician encounters and noted that physicians spent an average of 25% (in some cases

Nearly half of students reported spending less time face to face with patients because of electronic records

as much as 42%) of each visit gazing at the computer screen. They also noted that screen-gazing seemed to be particularly disruptive to psychological and emotional exchange.

Ventres et al[18] reported that in the examination room the EMR is "much like a third party to a conversation"[18] and contended that the widespread use of EMRs would have intended and unintended consquences on the cognitive and social dimensions of the physician-patient encounter. They concluded that these issues demand thoughtful consideration as the use of the EMR proliferates, "not only to forestall problems but to maximize the effectiveness of this burgeoning medical technology."[18]

DEVOID OF REAL MEDICAL THOUGHT

Notwithstanding data errors and the cutting and pasting of prior notes in the EMR, we still know very little about how the EMR affects how doctors express their thoughts and communicate with one another. My particular concern is with menu-driven or template-driven notes: they produce reams of important data, and they help ensure that coding requirements are met. But this way of writing notes about a patient is devoid of real medical thought. To describe a patient in template-driven fashion as "an 88-year-old white male" pales next to a personalized description such as "an 88-year-old World War II B-17 bomber pilot shot down three times over Europe."

A colleague of mine recently lamented, "I can no longer make use of my partners' templated notes, as they convey no real information." I do believe we should be concerned

We should recognize the gaps in our understanding of the effects of EMRs on medicine

about the undesirable effects that such changes in record-keeping may produce.

LET'S CHECK THE WATER BEFORE DIVING IN

What should we do as we face these issues?

First, we should be aware that governmental and financial pressures and the availability of new technology are pushing us rapidly into new, poorly understood territory. This awareness is critical, as it at least permits a more open mind and allows the potential for honest dialogue, rather than just following directives from above.

Second, we should recognize the gaps in our understanding of the overall effects of the EMR on medicine as a profession and begin to more critically study these effects: ie, we need to be proactive rather than reactive. Denying that we lack answers to key questions about EMRs is clearly counterproductive.

We live in the electronic age. EMRs will continue to proliferate, and they have the potential to be cost-effective, care-enhancing, and time-saving. Obviously, there is no turning back the clock. However, the issues I have raised here—and other issues such as additional physician time,[1] potential "billing creep," and the opportunity for outright fraud (rarely discussed in physician circles), not to mention cost—are deeply concerning and worthy of notice and careful consideration.

My thoughts here are meant to serve as a call to reassess the possible unintended consequences of the federally mandated rush toward an as-yet poorly integrated system of EMRs. Perhaps we should check the water first, lest we find we are diving into a shallow pool. ■

REFERENCES

1. **Prosser K**. Sonoma County Medical Association. The true costs of EMRs. Sonoma Medicine. Spring 2009. http://www.scma.org/magazine/articles/?articleid=398. Accessed April 13, 2010.
2. **DesRoches CM, Campbell EG, Rao SR, et al**. Electronic health records in ambulatory care—a national survey of physicians. N Engl J Med 2008; 359:50–60.
3. **Cummings J**. The benefits of electronic medical records sound good, but privacy could become a difficult issue. Harris Interactive. Feb 8, 2007. http://news.harrisinteractive.com/profiles/investor/fullpage.asp?f=1&BzID=1963&to=cp&Nav=0&LangID=1&s=0&ID=11259. Accessed May 31, 2010.
4. **Konrad W**. Medical problems could include identity theft. The New York Times. June 12, 2009.
5. **Chhanabhi P, Holt A**. Consumers are ready to accept the transition to online and electronic records if they can be assured of the security measures. MedGenMed 2007; 9:8.
6. **Lemos R**. Veterans Affairs warns of massive privacy breach. SecurityFocus 2006 (May 22). http://www.securityfocus.com/news/11393. Accessed May 31, 2010.
7. **Linder JA, Ma J, Bates DW, Middleton B, Stafford RS**. Electronic health record use and the quality of ambulatory care in the United States. Arch Intern Med 2007; 167:1400–1405.
8. **Crosson JC, Ohman-Strickland PA, Hahn KA, et al**. Electronic medical records and diabetes quality of care: results from a sample of family medicine practices. Ann Fam Med 2007; 5:209–215.
9. **Orrico KB**. Sources and types of discrepancies between electronic medical records and actual outpatient medi-

cation use. J Manag Care Pharm 2008; 14:626–631.

10. **Arar NH, Wen L, McGrath J, Steinbach R, Pugh JA**. Communicating about medications during primary care outpatient visits: the role of electronic medical records. Inform Prim Care 2005; 13:13–22.

11. **Keenan CR, Nguyen HH, Srinivasan M**. Electronic medical records and their impact on resident and medical student education. Acad Psychiatry 2006; 30:522–527.

12. **Rouf E, Chumley HS, Dobbie AE**. Electronic health records in outpatient clinics: perspectives of third year medical students. BMC Med Educ 2008; 8:13.

13. **Mintz M, Narvarte HJ, O'Brien KE, Papp KK, Thomas M, Durning SJ**. Use of electronic medical records by physicians and students in academic internal medicine settings. Acad Med 2009; 84:1698–1704.

14. **Alpert JS, Mandell BF**. Back to the future: medical students can matter again. Am J Med 2009; 122:971–972.

15. **Hammond KW, Helbig ST, Benson CC, Brathwaite-Sketoe BM**. Are electronic medical records trustworthy? Observations on copying, pasting and duplication. AMIA Annu Symp Proc 2003:269–273.

16. **Weir CR, Hurdle JF, Felgar MA, Hoffman JM, Roth B, Nebeker JR**. Direct text entry in electronic progress notes. An evaluation of input errors. Methods Inf Med 2003; 42:61–67.

17. **Margalit RS, Roter D, Dunevant MA, Larson S, Reis S**. Electronic medical record use and physician-patient communication: an observational study of Israeli primary care encounters. Patient Educ Couns 2006; 61:134–141.

18. **Ventres W, Kooienga S, Vuckovic N, Marlin R, Nygren P, Stewart V**. Physicians, patients, and the electronic health record: an ethnographic analysis. Ann Fam Med 2006; 4:124–131.

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