

The road to implementation of the electronic health record

By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care.

—GEORGE W. BUSH,
State of the Union Address, January 2004 (1)

President Bush has suggested repeatedly that a key goal for health care is to computerize records and that there will be substantial benefits to doing so. While there is some controversy about this statement (2), on the whole, the evidence supports it (3). Furthermore, many developed countries have made much more progress in electronic health records (EHRs) than the United States, at least in the outpatient sector.

Making the transition to EHRs in this country has perhaps been more challenging than in other countries, in part because of peculiarities of our health care system. For example, as a society we have had security and privacy concerns about using a universal identifier, and without such a code it is hard to track patients in different settings. Also, approximately 500 vendors offer outpatient EHR systems, which makes it challenging for providers to select among them, especially because of concerns about which companies will remain in business. Furthermore, many vendors use proprietary data structures and do not represent data in standard ways, so that providers would have difficulty transferring their information if their vendor went out of business.

In the USA, integrated delivery systems are generally using EHRs at a much higher rate than small practices. For example, Kaiser, Group Health, Harvard Vanguard, and the Veterans Administration systems have all moved to nearly universal use of EHRs, while adoption rates among small groups are low, even though surveys suggest that providers in small practices would like to make the transition (3). The reasons for the lower implementation rate in small practices are largely financial. Groups that can realize more of the financial benefits can justify making the investment, while individual providers under fee-for-service reimbursement realize only about 11% of the financial benefits that accrue from EHRs (4).

Regardless of the size of the practice or practice group making the transition, implementation of an EHR is still difficult, and the consequences of a failed or suboptimal health information technology implementation can be severe. Furthermore, the requirements to achieve a successful transition are often underestimated by the administrative and clinical leadership. The Cedars-Sinai experience is often cited; its implementation of computerized physician order entry (CPOE) failed for a variety of reasons, and the application had to be withdrawn even though it was working (5). Cedars-Sinai failed despite having a very strong track record and deep experience in informatics, strong leadership, and substantial resources. There were several

reasons for this failure: many decision-support mechanisms were introduced at the outset, especially for drug-drug interactions; with the way the application was set up, alerts could not be overridden; and it was hard to achieve buy-in from the very large number of providers using the system.

The Cedars-Sinai experience caused provider frustration, lost time, and financial losses, but an even more important issue is that clinical outcomes could worsen during or after CPOE implementation. Of particular concern has been a study from the University of Pittsburgh Children's Hospital, which reported a 3.3-fold increase in the mortality rate for children transferred in for special care when it initially implemented a commercial CPOE application (6). The study had many methodological problems (7), yet it did appear that the organization broke many of the rules around implementation, which in turn may have resulted in substantial delays in providing urgently needed care for this very vulnerable population, and this in turn may have caused the higher mortality rate. Among a number of issues, the organization introduced CPOE within a week and did not have many order sets in place at the time of implementation, which increased the time required to enter orders. Another recent report, however, using the same vendor application found that after careful CPOE implementation in a pediatric hospital, the mortality rate did not increase and there was actually a trend toward a lower rate (8).

Fortunately, the stakes are not quite as high when implementing an ambulatory EHR, but they are still substantial. A number of "how-to" guides to CPOE implementation have recently been published (9–11), and they make some of the same points made by Fullerton et al (12) in their article describing the early experiences with ambulatory EHR implementation in the Baylor Health Care System. While the keys to inpatient CPOE implementation and outpatient EHR implementation overlap, many specifics are different, and Fullerton et al's piece represents a valuable contribution. Some of the most important ways to go wrong with ambulatory implementation include failure to obtain leadership support or clinical buy-in; the use of too many decision-support mechanisms early on; failure to provide sufficient hands-on support at the time of intervention; and early system crashes, which can erode the confidence of the skeptical. The North Garland system crash was especially unfortunate with respect to timing, and it is a credit to the implementers and the North Garland providers that this event did not scuttle the entire effort.

A recent systematic review from RAND evaluated the effects of health information technology on quality, efficiency, and costs. The authors found that a large proportion of the studies addressing these issues came from four large academic centers with "homegrown" systems and asked whether the benefits

would be similar if vendor-developed applications were introduced (2). As most providers will actually use vendor-developed applications, studies using these applications are clearly needed. I believe, however, that the results will eventually be similar if the vendor applications have adequate decision support, which they have not necessarily had to date. The studies have been done in the large academic centers for several reasons; among these are that that is where the investigators are, and it is much easier to do a study in one's own institution. It is also vastly easier to innovate with a homegrown application. The vendors have generally resisted innovations, and it is often hard to export data from their applications.

Fortunately, it should become progressively easier to travel the road toward EHR use as more providers move in that direction. First, the applications themselves will get better through iterative improvement as more people use them. Second, substantial work is being done with respect to standards, and increasingly data will be represented in standard ways. As a result, it will become much easier to exchange clinical data, and if an individual vendor goes out of business or underperforms, it should be easier for a provider group to take its data and move to the next provider. Third, EHRs are now undergoing certification by the Certification Commission for Healthcare Information Technology (13), and this process should increase the likelihood that providers will get an EHR that performs as expected if it is certified, as it will meet a large number of specifications.

Thus, there is light at the end of this particular tunnel. In the meantime, though, provider groups and hospitals must not underestimate the challenges and risks associated with implementation of health care information technology. They should recognize that the transition is especially demanding and that the potential consequences of poor implementation may be severe. The problems encountered in the North Garland pilot are more the norm than the exception. Organizations and providers should be alert to the likelihood that these system changes will have unintended consequences and should attempt to engineer them out of their systems.

But the benefits will be worth it if the right bases are touched. The conversion to EHRs is absolutely essential if we are to transform the care that is delivered and achieve the vision of delivering safer, higher-quality, lower-cost care.

—DAVID W. BATES, MD, MSc
Division of General Medicine, Department of Medicine,
Brigham and Women's Hospital;
Clinical and Quality Analysis, Information Systems,
Partners HealthCare System, Inc.;
and Harvard Medical School, Boston, Massachusetts

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