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Universal Acceptance of Computerized Physician Order Entry: What Would It Take?

Self-check-in kiosks started to appear in airports in the late 1990s, and within a few years, they seem to have become ubiquitous in the airline industry. Today, almost 70% of business travelers use them, and other sectors of the travel industry are beginning to experiment with the technology.[1] Compared to this innovation in the airline industry, adoption of computerized physician order entry (CPOE) in U.S. hospitals, first pioneered in the early 1970s,[2,3] has taken a much more leisurely pace. Despite numerous studies documenting its benefits,[4–7] promotion by prominent national patient safety advocacy groups such as Leap-Frog,[8] and numerous guides on best adoption practices,[9–12] fewer than 10% of U.S. hospitals have fully adopted this technology.[13] Moreover, as Lindenauer et al.[14] pointed out, most hospitals that have successfully implemented CPOE are academic medical centers that rely on house staff to enter orders. With notable exceptions,[3] adoption of CPOE in community hospitals where attending physicians write most orders remains anemic.

Although an increasing number of scholarly articles has documented the reasons for this slow rate of adoption even in hospitals that have the resources to invest in this technology, much of that research is based on expert opinion and case studies.[11,15–19] In this context, Lindenauer et al.[14] should be commended for using empirical evidence to delineate the predictors of adoption. Lindenauer et al. found that physicians who trained in hospitals with CPOE were more likely to be frequent users of CPOE in their new environment. Although the analysis did not account for possible confounding such as employment status of the physician, this result does confirm the conventional wisdom that physicians-in-training are more malleable and that residency is an important opportunity to expose physicians to safety technologies. If this finding is borne out by further research, it would bode well for the adoption of CPOE, as many physicians are trained in academic institutions, which are more likely to have CPOE,[20] and almost all physicians spend part of their training in a VA hospital, which has uniformly adopted CPOE. Similarly, Lindenauer et al. found that physicians who use computers for personal purposes are more likely to be frequent users of CPOE. Given the increasingly ubiquitous use of computers in all spheres of life, time is on the side of increasing acceptance of CPOE.

However, a closer examination of the data presented by Lindenauer et al. raises several concerns. First, the substantial number of infrequent users across all demographic subgroups and clinical disciplines, even among users who were exposed to CPOE

during training or those who used computers regularly for personal purposes, highlights the absence of shortcuts to the universal acceptance of CPOE. Second, whereas 63% of surveyed physicians believed that CPOE would reduce the incidence of medication errors and 71% believed that CPOE would prevent aspects of care from "slipping through the cracks," only 42% of the surveyed physicians were frequent users of CPOE. This implies that even when physicians believe in the safety and quality benefits of CPOE, that belief alone may not be sufficient to convince all of them to adopt this technology wholeheartedly; other factors such as speed, ease of use, and training are likely important prerequisites. Third, although 66% of orders placed in person at the 2 study hospitals were entered through CPOE, acceptance of this technology, as measured by Lindenauer et al, was moderate at both institutions. This suggests that even when organizations have reached the 70% threshold set by Leapfrog as the proportion of orders placed in CPOE that qualifies as full implementation, they may continue to face resistance to full acceptance of the technology.

Compared to their academic counterparts, community hospitals face additional hurdles as they implement CPOE. Not only does their smaller size make it difficult to achieve economies of scale, they are also at a disadvantage because of the relationship the community hospital has with its physicians. Unlike physicians-in-training in academic medical centers, physicians in community hospitals function as largely autonomous agents over whom the hospital administration has little control. Although these physicians and their hospitals share the common goals of patient safety and quality, the financial incentives for the adoption of CPOE are often misaligned. For example, a recent cost benefit analysis[21] showed the enormous potential for hospitals to cut costs if physicians fully adopt a CPOE system with rich decision support features. However, those savings typically accrue to the hospital, not to the physicians who use the system. Assuming the typical learning curve that accompanies the use of any new technology, physicians in community hospitals may have little incentive to invest the time to learn to use the system efficiently.

So what can be done to overcome these seemingly formidable barriers to full adoption of CPOE? Emerging research, which has so far largely focused on CPOE implementation at academic hospitals, suggests there is no "silver bullet." Instead, it has taught us how the complex interplay among vendor capability, organizational behavior, clinician work flow, and implementation strategy determines the success or failure of adoption.[11,17,18,22] Although physician characteristics will play a role in determining whether an individual adopts this technology, local factors such as the presence of champions, governance model for the project, support for staff throughout the process, and relationship between administration and physicians are likely important determinants of success at both academic and community hospitals. In addition, organizations that embark on CPOE implementation need to understand the enormity of the task at hand and must devote not only sufficient financial but also human capital over time.[11,18] In the words of a chief medical information officer, "Implementing CPOE should not be thought of as an event, but a long-term commitment."

Beyond following proposed best practices for the implementation of CPOE, community hospitals may need to adopt additional strategies to address their unique challenges. Given the misalignment of incentives for physicians' use of CPOE, leadership in community hospitals must be particularly skilled at articulating the benefits of CPOE to physicians. These benefits include not only decreased professional liability from improved patient safety and better quality of care, but also fewer pharmacy callbacks, remote access, and rapid ordering through order sets. Hospitals may also want to elicit support from physicians early by empowering them to create order sets for their disciplines. Mechanisms for hospitals and physicians to engage in mutual cost-sharing arrangements may provide addition opportunities for hospitals to entice physicians to adopt the technology. Finally, and of particular interest to the readership of this journal, as hospitalists become more prevalent and take care of an increasing proportion of hospitalized patients,[23] they are often ideal candidates to lead the implementation of CPOE in community hospitals. Because hospitalists spend most of their time in the hospital, they are often in the best position to get fully trained on CPOE, to define their own order sets, and to redesign care processes in order to take full advantage of CPOE capabilities. In addition, as many hospitalists are directly employed or supported by the hospital, their goals for quality, safety, and efficiency are usually better aligned with those of the hospital.

The stakes involved in implementing CPOE are

high. Hospitals invest enormous sums of money in these systems, and many will not have the financial or political capital to attempt a second implementation after an initial failure. In addition, as recent research has pointed out,[24] inappropriate implementation strategies may lead to delays in essential care and direct patient harm. In many ways, the complex task of implementing CPOE is not unlike other endeavors in patient care, where optimal outcomes require sound knowledge and reliable processes and where disaster can strike for lack of attention to detail or common sense. If Hippocrates were alive today, he might have this to say about CPOE implementation: *Life is short, the art long, opportunity fleeting, experience treacherous, judgment difficult.*

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