



EDITORIALS

When hospitals switch to electronic records

If nothing goes wrong, is everything all right?

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In a linked paper, Barnett and colleagues (doi:10.1136/bmj.i3835) studied the consequences of one of the most disruptive events a hospital can experience, short of mass casualty incidents or natural disasters—implementing a new electronic health record (EHR) system.¹ Reports of unintended consequences² and patient harms³ from these events have raised understandable concerns about how well we manage them. The investigators addressed these concerns by estimating changes in a set of outcome measures at several months before and after implementation of a new EHR in 17 US hospitals; they then compared those changes with changes in the same measures in 399 control hospitals over the same regions and dates. They included only “big bang” implementations, in which all clinical functions transition to the new system on a single “go live” date; these are likely more disruptive than gradual roll-outs. The primary outcomes were changes in 30 day mortality and readmissions; a secondary outcome was change in the patient safety indicator composite (PSI-90).⁴ The authors report no substantive differences in changes in any outcome between implementation and control hospitals, leading them to reassure hospitals contemplating EHR implementation that their study found, on average, little evidence of short term hazards.

While this is laudable, should it really be reassuring? One of the most vexing aspects of safety is that only its absence, not its presence, is detectable.⁵ A single incident is sufficient to prove lack of safety, but even long experience cannot logically establish its presence⁶: some potentially toxic combinations of factors might not have been experienced in the study’s short time frame; and the space of potentially hazardous contributors is exponentially large and constantly changing as the world itself changes. For example, Asiana Airlines had operated for 20 years without a passenger fatality, but that experience was uninformative about the hazards leading to the 2013 crash of Asiana 214 at San Francisco International.⁷

Secondly, the primary outcomes (mortality and readmissions) here are quite distal to EHR implementation and so are insensitive reflections of risk. Readmissions in particular are heavily dependent on the quality of outpatient follow-up,⁸ and so might be largely unaffected by an EHR change. The

secondary outcome (PSI-90) has been similarly criticised as insensitive, potentially missing up to 90% of adverse events.⁹

However, the biggest challenge to the usefulness of these results lies in the study’s design. The “difference-in-differences” design used here is generally considered strong but contains a hidden assumption—that hospitals can be treated like machines: mechanical, linear systems in which, when one component changes, all other components continue to operate as before. This is never the case for complex sociotechnical systems. In such systems, you can’t change only one thing¹⁰—any intervention sets in motion a tangled web of other changes, some intended some not, some compensatory, some not; the ramifying influences of these effects and their feedbacks are not easily predicted or well captured in a global average.

Neither the human nor the social components of these systems robotically continue their work as usual after an intervention. People and organisations dynamically create goals and anticipate problems; they adjust their activities to achieve those goals and manage those problems, based on their localised ability to sense opportunities and barriers, facilitators and constraints, and to monitor progress. Thus hospitals typically anticipate and attempt to compensate for disruptions from the deployment of a new EHR, as they do for hurricanes, winter storms, sporting events, and other predictable stressors. Similarly, frontline providers are sensitive and responsive to disruptions in their patients’ care trajectories and for the most part can compensate for them, producing the usual unremarkable success of everyday clinical work.¹¹ Ironically, their typical success in this obscures the evidence that their extra effort was even necessary.¹² Although that additional effort was unmeasured here, it may be important in understanding the widespread dissatisfaction with health information technology among frontline providers.¹³

For example, mortality and readmissions would likely not change much if some new intervention forced caregivers to do all their work standing on one leg. The lack of obvious failure in such a circumstance would not support a conclusion that the one leg policy was unproblematic; and it would not be surprising that frontline workers hated it, despite the lack of “evidence” of problems. The fact that people can continue to perform reasonably well using a new technology is not in itself an

endorsement of that technology. A study showing how, and at what cost in terms of effort, hospitals accomplished their successful implementations is a sorely needed next step.

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