Anderson et al. adopt a useful approach to assessing the costs and benefits of an integrated medication ordering and delivery system. However, the data used as input for their model substantially overestimate the impact of the various technologies involved. For instance, they assumed that bar-coding would reduce administration errors by 60%. It is unclear where such a high estimate could have come from. One of the few studies examining the impact of bar coding on errors or adverse drug events (as opposed to inventory management) reported routine patient ID scanning was easily circumvented and the actual error rate was not provided, nor were error rates provided in the several other descriptive studies of bar-coding’s application to medication safety. Interestingly, the same issue of JAMIA as that reporting the analysis by Anderson et al. contained a report of multiple new opportunities for error with implementation of a bar-coding medication administration system, further undermining claim for such a substantial net benefit from bar-coding in terms of error reduction.

Possibly Anderson et al. based some of the assumed 60% reduction from bar-coding to automated drug dispensing machines. Here, too, the data is very scant as to any benefit, let alone such a substantial reduction as 60% in errors in administration. The implementation of automated dispensing reduces personnel time for medication administration and improves billing efficiency, but reductions in medication errors have not been uniformly realized, and some studies have even reported increased errors.

Anderson et al. also attribute an amazingly high impact to unit dosing, with an assumed reduction of 80% for dispensing errors. Although unit dose systems are accepted as standard practice in the United States, only a handful of studies have compared unit dose to conventional ward stock systems in the context of measuring error rates (and none measure actual adverse drug events). Anderson et al. chose to base their estimate on the one study with largest effect, but the other studies showed much less impact and one found the ward stock system to be superior. This study suffers from important methodologic limitations, but so do all of these studies, making any estimate of their net benefit suspect, even ones more conservative than the 80% reduction in errors assumed in the simulation analysis.

The crucial issue though, as acknowledged by Anderson et al., is the extent to which errors translate into adverse drug events (ADEs). For their sensitivity analysis, they regard the rate at which errors turn into ADEs as ranging from a low of 8% to a high of 26%, though they do not reference the source of these boundary values. Given that the model’s estimates were most sensitive to the assumption concerning the percentage of errors that result in ADEs, the choice of this range is paramount. The difficulty in demonstrating impacts of CPOE on ADEs as opposed to the substantial impact on medication errors suggests that 8% is more likely to lie closer...
to the upper bound of the range in question rather than the lower bound.

Even putting aside all of these issues, the authors generated a cost-savings of no more than $1.4 million per year for a large hospital, and this maximal benefit reflected the impact of all of the technologies they discussed. Considering that the upfront cost of commercial CPOE systems alone are in the range of $20–40 million, a hospital could hardly consider this annual savings an adequate return on investment.

References


