FROM THE FIELD

Benefits Of Interoperability: A Closer Look At The Estimates

The best argument for working toward better HIEI would combine the potential for savings with the potential for improved patient care.

by Laurence C. Baker

ABSTRACT: The paper by Jan Walker and colleagues provides an estimate of savings to be gained by increased health care information exchange and interoperability (HIEI). However, the assumptions on which their analysis was based seem very optimistic and could produce estimates that are not achievable. This commentary outlines some questions about their assumptions and suggests that less-aggressive assumptions could lead to more realistic expectations about the financial implications of achieving interoperability.

As the idea of electronic medical records gained momentum a decade ago, many looked to a not-too-far-off future of digitized health information at the fingertips of clinicians, dramatically improving the efficiency of health care delivery and patient outcomes. In the years since, tremendous progress has been made, and a great deal of knowledge about the use of computers in medicine has been gained. It is precisely this experience that puts us in a position to consider the benefits of improving the interoperability of systems used by different entities in the health care delivery system. Better interoperability seems the natural evolutionary path for a system that increasingly uses the power of electronic tools to improve practice.

At the same time, we still struggle to achieve the initial vision of widespread use of computerized tools and the accompanying benefits. The experience to date with developing and implementing electronic medical records (EMRs), computerized physician order entry (CPOE) systems, decision support, and related tools should raise a cautionary flag when we consider the economic benefits that can be expected to flow from efforts to achieve the kinds of widespread extensions and improvements in computerized systems that would be needed for advanced information interoperability, even over a ten-year period.

It is clear that there would be some savings from improvements in information sharing, though just how large those savings might be has been less clear. Jan Walker and colleagues present the results of an extensive process designed to provide estimates.[1] Their efforts are thorough, they incorporate advice from knowledgeable experts, and their estimates are worthy of serious discussion. To better understand how to interpret these estimates, though, we need to look at their underpinnings. Examining the underlying assumptions can shed light on the best way to interpret the conclusions.

■ **Questioning the assumptions.** The pa-

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per focuses on the savings that could be gained by achieving the highest possible degree of interoperability between systems for providers, labs, radiology centers, pharmacies, public health authorities, and payers. Level 4 health care information exchange and interoperability (HIEI) would provide for near-perfect communication of information between the computer systems of these various entities. To estimate the savings that would be achieved by achieving Level 4 HIEI, the paper incorporates information from published sources, authors' estimates, and expert opinion into an analytic framework.

Some of the values incorporated into the models seem to represent a very optimistic assessment. Take, for example, the estimate that achieving Level 4 HIEI between providers and labs would save society nearly $32 billion annually. One assumption embedded in this estimate is that for every lab test, the laboratory incurs $20.42 in administrative costs associated with communication—receiving the request for the test and sending back the result. Ninety-five percent of this, $19.40, is assumed to be recoverable with Level 4 HIEI. That is, since the average billed amount per lab test is said to be $40, nearly half of the bill for every lab test is assumed to stem from recoverable costs of the codification and transmission of information.

The paper does not specify the specific basis of this assumption, but it seems plausible that it would arise mainly from expected reductions in labor costs associated with information exchange. If it is correct that this represents mainly labor costs, then the assumption seems difficult to account for in light of current earnings data. According to the U.S. Bureau of Labor Statistics (BLS), median hourly earnings for office and administrative support personnel in medical and diagnostic laboratories—a category that includes employees from office supervisors to billing personnel to secretaries and clerks—were $12.18 in 2003.[2] Even assuming employee compensation of $15 per hour, which should allow for benefits, estimated recoverable administrative costs of $19.40 would imply that lab employees spend more than an hour and fifteen minutes per test processing paperwork that would be eliminated by Level 4 HIEI. At the provider's office, Walker and colleagues assume another $19.25 in administrative costs per test, of which 95 percent ($18.29) could be eliminated by Level 4 HIEI. BLS data suggest that office and administrative support staff in physician offices had median hourly earnings of $12.07 in 2003.[3] At $15 per hour total compensation, this implies another hour and fifteen minutes per test at the provider's office. All told, each test in the United States would require two and a half hours of administrative time solely for sending and receiving results. This seems very high.

Another assumption in the model is that there are approximately 785 million tests per year in the United States. If administrative lab personnel spend an hour and fifteen minutes per test, this would require more than a billion hours of effort. If the average full-time employee works 2,000 hours per year, this would require more than 500,000 administrative staff in labs simply for receiving orders and transmitting results. BLS data for 2003 report only about 180,000 people employed primarily in medical and diagnostic labs. Even assuming that some lab workers are in hospitals or other settings and thus not counted in this figure, and that some of the relevant administrative costs are nonlabor costs, it is hard to reconcile the assumed figures with even basic employment data. One could make similar arguments about the assumed administrative costs in providers' offices.

The model also assumes that about 14 percent of all tests are avoidable and that Level 4 HIEI would achieve a 95 percent reduction in the number of avoidable tests. There are many reasons why apparently avoidable tests get performed. In some cases, a lack of information about existing tests is the problem, and this might be remedied by better information interoperability. But hurried providers may also order tests without consulting available information to save time, or new tests may be ordered when old tests are available but circumstances unseen by analysts suggest that a

new test could be warranted. In many contexts, achieving even a 10 or 20 percent reduction in avoidable care would be a notable success. Achieving a 95 percent reduction seems most consistent with absolutely optimal performance not only of the clinical information systems, but also of providers, support personnel, and other aspects of the system.

Instead of the assumptions in the paper, if one makes what still feel like optimistic assumptions that Level 4 HIEI would eliminate thirty minutes of administrative time per test for a lab employee earning $15 per hour and another thirty minutes at the physician's office, and would generate a 50 percent reduction in avoidable tests, the estimated annual savings fall by more than half, from $31.8 billion to $14.2 billion.

Similar assumptions about administrative time and potential reductions in redundant tests are made to arrive at the estimate of $26.2 billion in annual savings in radiology centers. If instead of the assumptions used in the paper one assumes that Level 4 HIEI would reduce the costs of sending and receiving information by thirty minutes for an employee at the provider's office earning $15 per hour and a similar reduction at the radiology center, and assuming that half of redundant tests could be avoided, the savings estimate is reduced to $15.7 billion per year.[4]

Seemingly optimistic assumptions are encountered in other places as well. It is assumed that with Level 4 HIEI, only 0.001 percent of prescriptions would require a follow-up phone call between the pharmacy and the physician. Computerized systems can catch many mistakes, and interoperability would reduce confusion, but even the best existing prescription systems still require some follow-up, since human errors persist. It is assumed that every referral from one provider to another carries with it more than $28.50 in recoverable labor costs, presumably associated with communicating medical information, which at current medical staff earnings rates would imply nearly two full hours per referral. There are assumed to be recoverable costs of $39.90 per occurrence to pull a chart, which, even assuming that some of these costs are for copier supplies and transportation, would seem to imply very large time expenditures for every chart pull. In many cases, the analysis assumes that current utilization levels are the correct baseline from which to work. But since some effective linkages already exist (for example, some larger provider groups and hospitals with their own labs already have effective internal linkages), at least some of the benefit of improved information flow seems likely to already be incorporated into the baseline.

■ **Result: lower savings estimates.** The net result of these assumptions is a set of savings estimates that seem best interpreted as (at least) best-case estimates. These kinds of projections can be useful in setting out goals and illustrating potential, but they should be taken as such. Those developing plans for further development in this area should also consider estimates of savings that derive from less aggressive assumptions. Such estimates seem likely to turn out lower than these, and it is not immediately clear how costs and benefits would compare if one were to also look at the potential costs of implementation in light of the experience with other computerized systems and their sometimes much-higher-than-expected costs. Less aggressive assumptions could help frame expectations, reducing the potential for disappointments and the resulting policy instability that can result from overly optimistic forecasts.

That the savings might not be as large as advertised need not—indeed, should not—imply that working toward a high level of interoperability would not be valuable. It seems possible, even likely, that benefits other than cost reductions could be achieved by better HIEI. Experiences with EMRs and other computer-based clinical support systems highlight the potential gains for patient care and outcomes that can accompany better electronic systems, and they hold out hope of further gains from integrating computer systems.[5] Perhaps the best argument for working toward better HIEI would combine the potential for some savings with the potential for improved patient care, which would seem compelling.

■ **How to lower costs and improve care?** How we get there then becomes an interesting question. One argument advanced by Walker and colleagues is that the most efficient path would involve undertaking a wholesale, one-step shift to Level 4 HIEI, instead of moving first to a set of different systems connecting different providers in Level 3. Some of the force of this argument is generated by only the embedded assumptions that Level 4 HIEI would have much higher payoffs than Level 3—for example, the assumption of a 27 percent reduction in unnecessary lab tests in Level 3 as opposed to the 95 percent reduction in Level 4—although it would be beneficial to avoid the duplicative cost of developing and installing systems that ultimately would be replaced.

This conclusion also seems to depend on the fact that only two options are being contrasted. Comparing only Levels 3 and 4 HIEI as characterized in the paper could leave out some important intermediate options that should also be considered. For example, beginning efforts to develop the standards and principles on which true Level 4 HIEI would be built, and then rolling them out in a limited set of entities, could be more effective than trying to go to Level 4 HIEI in one step and risking the ex post discovery of complications. Starting with just providers and labs, for example, might well provide valuable lessons that could make further steps—such as bringing in radiology centers—much more efficient.

I SUSPECT THAT there are many lessons to be learned and kinks to be worked out between now and optimal information interchange, and allowing ourselves to learn these lessons progressively may well minimize the costs of achieving the Level 4 HIEI benefits. Better integrating the data systems in medicine is something we should do, even something we must do, to improve health care delivery. The technology will present some challenges, not to mention privacy, information ownership, and other matters. We must address these in a realistic policy context. Attacking these issues on an efficient path with a realistic view of the economic benefits will ultimately create the most stable environment for achieving success.

NOTES

1. J. Walker et al., "The Value of Health Care Information Exchange and Interoperability," *Health Affairs*, 19 January 2005, content.healthaffairs.org/cgi/content/abstract/hlthaff.w5.10.
2. Earnings and employment data from the U.S. Department of Labor, Bureau of Labor Statistics, "Wages by Area and Occupation," www.bls.gov/bls/blswage.htm (21 December 2004). Data on medical and diagnostic laboratories specifically can be found at BLS, "November 2003 National Industry-Specific Occupational Employment and Wage Estimates, NAICS 621500—Medical and Diagnostic Laboratories," www.bls.gov/oes/current/naics4_621500.htm (21 December 2004).
3. BLS data on physician offices are from BLS, "November 2003 National Industry-Specific Occupational Employment and Wage Estimates, NAICS 621100—Offices of Physicians," www.bls.gov/oes/current/naics4_621100.htm (21 December 2004).
4. This is applied only to the administrative costs of sending and receiving information. The model also assumes administrative costs associated with film, which are not adjusted in this analysis.
5. For example, see D.L. Hunt et al., "Effects of Computer-based Clinical Decision Support Systems on Physician Performance and Patient Outcomes: A Systematic Review," *Journal of the American Medical Association* 280, no. 15 (1998): 1339–1346; and Institute of Medicine, *Crossing the Quality Chasm: A New Health System for the Twenty-first Century* (Washington: National Academies Press, 2001).