PERSPECTIVE

Health Information Technology: One Step At A Time

If greater investment in health IT simply automates a broken health care system, vital opportunities for transformation will be missed.

by Mark E. Frisse

ABSTRACT: The development, implementation, and management of health care information technologies are prominent components of the American Recovery and Reinvestment Act of 2009. How these technologies will affect our health care system will depend on the collective choices made in the months ahead. Focusing on a limited set of near-term objectives will build trust, confer near-term benefit, and create the building blocks required to harness the altruistic and entrepreneurial motivations most likely to create future health care delivery systems. Decisionmakers must concentrate on putting in place the immediately important information technology foundations that will be essential for reaping long-term benefits. [*Health Affairs* 28, no. 2 (2009): w379–w384 (published online 9 March 2009; 10.1377/hlthaff.28.2.w379)]

THE AMERICAN RECOVERY and Reinvestment Act of 2009 could be viewed as an endorsement of current federal organizational structures, priorities, and processes for advancing the use of health information technology (IT). These include the Office of the National Coordinator for Health Information Technology (ONC) within the U.S. Department of Health and Human Services (HHS); the Certification Commission for Healthcare Information Technology (CCHIT), the public-private entity created to set standards for data transmission; the National eHealth Collaborative, the successor to the HHS American Health Information Community (to make health IT recommendations to the ONC); the Nationwide Health Information Network (NHIN); and other initiatives. If the legislation's intent is to hew to existing structures and strategies, then more funding for existing administrative policies, standard-setting activities, and certification bodies may have some positive impact. More investment in these activities will in all likelihood increase the adoption of health IT in clinical settings. What's more, additional funding expressly designed to encourage greater adoption of electronic health records (EHRs) would encourage systems that "talk to one another" and would allow providers "to improve quality and efficiency in the provision of health care services."[1]

But this is not a foregone conclusion. Simply spending more without improving the focus and operation of current initiatives will not guarantee greater societal benefit, improved provider efficiency, or better health outcomes. Extensive experience with health

Mark Frisse (Mark.Frisse@vanderbilt.edu) is the Accenture Professor of Medical Informatics at Vanderbilt University in Nashville, Tennessee.

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IT programs and implementations suggests that all too frequently, technology costs are emphasized at the expense of the commitment of time and money required for successful results. Local culture, regional policies, organizational commitment, care transformation objectives, and skilled personnel are greater determinants of success.

Even if widespread adoption efforts are successful, will successful deployment of current technologies in clinical settings necessarily improve care quality or efficiency? If our health care system is encumbered by some combination of unnecessary complexity, excessive fragmentation, undue reliance on data related to the administration of health care (who got what test, for example, as opposed to the actual test result), and failure to adapt technologies to clinicians' workflow, EHRs will not be the ideal platform for long-term change. The goal should not be limited to automating such tasks as supporting formularies, following prior authorization rules, and executing quality reports, as important as these activities are. If greater investment in health IT simply automates a broken health care system, vital opportunities for truly transforming health care will be missed.

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All too often, organizations underestimate the effort required for success in adopting health IT.[2] Experiences in implementing e-prescribing—both positive and negative—exemplify the complexity of integrating IT into clinical settings.[3] Technologies poorly applied will simply render our current delivery system "inefficient, faster."[4] Inadequate technologies introduced into irrational systems leave only cynicism as a lasting result.

The stimulus legislation enacted in February 2009 requires people to make decisions from a wide range of alternatives. At one extreme, the legislative language is consistent with an incremental series of health IT investments that begin with a simple "version 1.0" infrastructure model. These investments are relevant to the public and to mainstream providers; they focus on achieving a few "quick wins" of public consequence, such as the widespread secure availability of medication histories, laboratory data, and means of authenticating the identity of an individual requesting personal health information.[5] At the other extreme, the legislative language is consistent with building up the current array of bureaucracies that are likely to produce monolithic, overengineered approaches that work only if every device is tightly integrated with every other device. There are few intermediate "successes" in such an "all or none" approach. In attempting to satisfy every need, these would fail to satisfy any need sufficiently. Dissatisfied providers may be left with systems that do not improve the efficiency of their care; patients might not see measurable improvements in the quality of their health; and the costly complexity inherent in our fragmented health care system will become even more entrenched in the code of machines intended to support care.

Increased Federal IT Investment: Reasons For Optimism

On the other hand, there are reasons for optimism as we contemplate stepped-up federal investments in health IT.

■ **Technology as a means to transform care.** First and foremost, both proponents and skeptics agree that technology adoption is not an end goal but instead is a means to transform care.[6] The needs of people, and not the motivations of technologists, should be paramount. The primary goal is to improve the safety and quality of care and not simply to automate systems for the sake of automation. The former approach focuses first on demonstrating that each step in the EHR adoption process contributes to improved coordination and care; the latter approach focuses first on hooking systems together and demonstrating that whatever is communicated is done by digital means. In the latter approach, the patient's

well-being is an afterthought.

■ **Potential for incremental change.** Second, the legislative framework for planning and coordination allows for a shift in emphasis from a diffuse set of priorities to fewer foundational activities that can be introduced incrementally. The result of these efforts would not be to count the number of individuals and organizations who automate their practices but instead to assess the extent to which traditionally competitive care delivery organizations, pharmacies, health plans, and clinical laboratories work together to ensure that all data are available in every care setting and to compete over the quality of services rather than the possession of data. The need for an even more focused federal strategy is acute.[7]

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■ **Common priorities.** Third, common priorities have emerged through several years of national and local discussion. However, if the past is prelude to the future, a diffuse array of use cases, committee structures, and funded initiatives may obscure achieving the important priorities by trying to do everything at once. Making available essential data elements such as laboratory and prescription drug history data at the point of care is an urgent priority, and yet after four years of discussion our nation still does not have a secure, affordable, and effective means of providing these vital health care delivery "building blocks" in all care settings.[8] Technical standards for laboratory and pharmacy data are in use widely, but business practices and pricing strategies remain major impediments to assuring that patients' data are available when needed for care. Neither clinical laboratories nor coalitions of pharmacies and pharmacy benefit managers (PBMs) have announced comprehensive data-sharing agreements to assure that information is available securely and inexpensively wherever such information is needed for care provision. Many national and regional clinical laboratories have created nonstandard systems for ordering tests and communicating results, but comprehensive and open approaches have been delayed by both competitive concerns and interpretations of the federal Clinical Laboratory Improvement Amendments (CLIA).[9] Similarly, retail pharmacies, PBM mail-order pharmacies, and pharmacy claims managers have created an infrastructure to present formulary rules and medication histories when prescription drugs are ordered through e-prescribing systems, but affordable means of obtaining such histories for other reasons are not widespread, and the pricing of these services is not fixed.[10]

■ **Shift in incentive strategies.** Fourth, the legislation affords a shift in incentive strategies away from practitioner use and toward meaningful patient outcomes. Future Medicare e-prescribing incentives could make use of a real-time prescription drug history and provide patients and clinicians with more efficient ways of ensuring adherence to medications. If both pharmacists and physicians were provided with alerts for needed refills, these health care professionals—and not third-party case managers—could receive incentives to ensure that patients refilled their prescriptions, and they could demonstrate widespread improvements in compliance through health information exchanges that can report results across many settings.

■ **Focus on functional components.** Fifth, new technologies based on the latest technical approaches suggest that functional components—not products—should be the focus of certification efforts. Useful systems are increasingly created by assembling reliable software functions and components to meet specific aims. Individual components must deliver their promised technical performance, and these components must interact reliably with each other. Certification of functional components should assure that identities cannot be stolen and used to access personal health information, that data are transmitted

and presented reliably, that communications are secure, and that transactions are inexpensively audited.

This approach is consistent with the original intent of certification: to "reduce the risk of product implementation failure" by assessing the risk associated with adopting EHRs "and even specific components."[11] A component-based approach to certification would also provide innovators with a greater opportunity to develop products suited to specific clinical needs. To certify personal health records (PHRs) or other products whose structure and use will change seems less productive than assuring that the building blocks used to allow these products to communicate with one another are reliable.

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■ **Funding for states.** Sixth, the legislation appropriates funding that states need to improve health IT infrastructure. Medicaid financing, in particular, allows states the opportunity to migrate toward a common technology architecture. Although many aspects of Medicaid plans differ among states, infrastructure requirements are common and should be developed in a collaborative way.[12] Funding does not seem tied to measures forcing simplification, interstate collaboration, and substantive change.

States play many other vital roles. All too often, information vital to states for decision making is costly to accrue and arrives too late to address public health needs or monitor the prescription of controlled substances. The technology stimulus can help states migrate from "batch-based" database systems to real-time systems that would make this information available with more timeliness and accuracy. All too often, it is difficult for care providers and other authorized people to know where and when someone has received care. State-level record locator services linked to systems that record registration information could be developed along common federal guidelines. States can also foster community-based medication management and e-prescribing initiatives that would encourage collaboration among the public, prescribers, pharmacies, and primary payers. This same collaborative, community-based approach could be taken to incrementally realize adoption of more extensive EHR capabilities when providers and communities are ready. Finally, states can improve the health IT infrastructure by supporting training in trade schools, junior colleges, and universities. The computer technician replacing a disk in an EHR, for example, must know the responsibilities involved when working with protected health information.

The stimulus package earmarks payouts for health IT over seven years, with the vast majority coming from 2011 on. States, communities, and care delivery organizations will have to share the responsibility of ensuring that health IT systems can be sustained after this federal funding is exhausted. If states do not direct their funding toward the achievement of key health and performance metrics, their investments may be squandered. States must ensure that adoption efforts encompass reengineering care workflows and other means of improving effectiveness and efficiency. Recipients of state-controlled funds should emphasize care transformation and show how their efforts may improve practices and outcomes. Where outcomes are concerned, we should initially favor simple, ubiquitous, "quick win" metrics—such as access to medication histories, to common laboratory tests, and to information from competing hospitals that have agreed to make their data available through a health information exchange. Such access does not require a fully operational EHR, and such incremental efforts that can expand over time may be more likely to garner continued collaboration and trust. Metrics could eventually include additional common laboratory tests; immunization records; and adherence rates for medications used to treat diabetes, hypertension, and elevated

cholesterol. Health IT policy committees and other advisory groups established by this legislation should strongly consider a policy of restrained incrementalism.

■ **Emphasis on ongoing research, including comparative effectiveness.** Finally, the legislative language emphasizes ongoing research in informatics and technology, along with comparative effectiveness. Perhaps the primary lesson of the past decade is that we know relatively little about what works best in health care; how to get people to do the right things, such as adhering to prescribed drug regimes; and how to make the technologies supporting care more consistent with the diversity of settings in which care is delivered.[13] The Agency for Healthcare Research and Quality (AHRQ) and the National Institutes of Health (NIH) have the opportunity to coordinate with other agencies and focus on data representation and other necessary components of an infrastructure to support advances in both informatics and comparative-effectiveness research. To ensure that future systems are based on knowledge and are not merely effective transaction processors, the NIH should consider stronger support of the National Library of Medicine's efforts to associate transaction code sets such as the *International Classification of Diseases,* Ninth Revision (ICD-9), with coding systems that represent underlying clinical knowledge and term relationships. The RxNorm vocabulary is but one example. RxNorm is an open, standardized vocabulary that was partially evaluated in the e-prescribing pilots mandated by the Centers for Medicare and Medicaid Services (CMS). It links commercial drug vocabularies with normalized clinical drug names and representations.[14] In short, RxNorm is a standardized way of representing that two pills are of the same class; this is important because it helps providers compare therapeutic options and develop more-effective outcomes research efforts. Widespread use of such a vocabulary would simplify the detection of adverse drug interactions, would provide better decision-making resources for drug substitution, and perhaps would lower overall health care operational costs.

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Concluding Comments

A reexamination of our national approach to health IT priorities and processes is not a refutation of all that has come before. Public reflection is not retreat from improved health; rather, it assures cautious and deliberate progress toward a more promising future. Individuals and organizations who have made major investments in national, regional, and organizational health IT initiatives have the opportunity to engage in an honest debate about what has worked well and what has not. Those charged with policy-making responsibilities must choose among realistic, incremental efforts and paradigms that are noble in aspiration but unrealistic in practice. All must weigh the implications of succumbing to monolithic "magical thinking" when a steady, incremental, and evolutionary course can realize the same ends with greater near-term success and less overall risk.

We cannot predict how legislative intent will translate into meaningful outcomes. We can only commit to learning from the past so that the investments made will result in a future consistent with high expectations for essential, transformative improvements in our health care system.

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NOTES

1. D. Blumenthal, "The Federal Role in Promoting Health Information Technology," 26 January 2009, http://www.commonwealthfund.org/publications/publications_show.htm?doc_id=792771 (accessed 12 February 2009).
2. J.P. Kotter, "Why Transformation Efforts Fail," *Harvard Business Review* 73, no. 2 (1995): 59–67.
3. Agency for Healthcare Research and Quality, "Findings from the Evaluation of E-Prescribing Pilot Sites," Pub. no. 07-0047-EF, April 2007, http://healthit.ahrq.gov/images/apr07norcerxreport/erxinterimevaluationreport.html (accessed 12 February 2009).
4. C.C. Diamond and C. Shirky, "Health Information Technology: A Few Years of Magical Thinking?" *Health Affairs* 27, no. 5 (2008): w383–w390 (published online 19 August 2008; 10.1377/hlthaff.27.5.w383).
5. P. Bredesen, "Remarks: Bredesen Addresses National HIMSS Conference," 27 February 2007, http://www.tennesseeanytime.org/governor/viewArticleContent.do?id=981 (accessed 12 February 2008).
6. Diamond and Shirky, "Health Information Technology"; and R.M. Kolodner, S.P. Cohn, and C.P. Friedman, "Health Information Technology: Strategic Initiatives, Real Progress," *Health Affairs* 27, no. 5 (2008): w391–w395 (published online 19 August 2008; 10.1377/hlthaff.27.5.w391).
7. U.S. Department of Health and Human Services, "The ONC-Coordinated Federal Health IT Strategic Plan: 2008–2012," 3 June 2008, http://www.hhs.gov/healthit/resources/HITStrategicPlan.pdf (accessed 12 February 2009); Institute of Medicine, "Opportunities for Coordination and Clarity to Advance the National Health Information Agenda: A Brief Assessment of the Office of the National Coordinator for Health Information Technology: Letter Report" (Washington: National Academies Press, 19 October 2007); and V.C. Melvin, "Health Information Technology: HHS Is Pursuing Efforts to Advance Nationwide Implementation, but Has Not Yet Completed a National Strategy," 14 February 2008, http://budget.senate.gov/democratic/testimony/2008/MelvinGAOHealthIT021408.pdf (accessed 12 February 2009).
8. Commission on Systemic Interoperability, "Ending the Document Game," 5 October 2005, http://endingthedocumentgame.gov/report.html (accessed 12 February 2009); and S.L. Penfield et al., "Toward Health Information Liquidity: Realization of Better, More Efficient Care from the Free Flow of Health Information," January 2009, http://www.boozallen.com/media/file/health-information-liquidity.pdf (accessed 12 February 2009).
9. DHHS, "Clinical Laboratory Improvement Amendments (CLIA)," 2009, http://www.cms.hhs.gov/clia (accessed 8 February 2009).
10. SureScripts-RxHub, "SureScripts Services," 2009, http://www.surescripts.com/services.aspx?ptype=HealthSystem (accessed 8 February 2009).
11. T.G. Thompson and D.J. Brailer, "The Decade of Health Information Technology: Delivering Consumer-Centric and Information-Rich Health Care, Framework for Strategic Action," 21 July 2004, http://www.hhs.gov/healthit/documents/hitframework.pdf (accessed 12 February 2009).
12. R.H. Friedman, "Medicaid Information Technology Architecture: An Overview," *Health Care Financing Review* 28, no. 2 (2006): 1–9.
13. Institute of Medicine, "Workshop Themes: Roundtable on Evidence-Based Medicine: Meetings/Workshops: Initial Workshop," 2008, http://www.iom.edu/Object.File/Master/37/454/themes.pdf (accessed 12 February 2009); and W.W. Stead and H.S. Lin, eds., *Computational Technology for Effective Health Care: Intermediate Steps and Strategic Directions* (Washington: National Research Council, 2009).
14. National Library of Medicine, "Unified Medical Language System: RxNorm," 2008, http://www.nlm.nih.gov/research/umls/rxnorm (accessed 8 February 2009).