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Abstract—To broadly examine the potential health and financial benefits of health information technology (HIT), this paper compares health care with the use of ICT in other industries. It estimates potential savings and costs of widespread adoption of electronic medical record (EMR) systems, models important health and safety benefits, and concludes that effective EMR implementation and networking could eventually save more than billions annually-by improving health care efficiency and safety-and that HIT-enabled prevention and management of chronic disease could eventually double those savings while increasing health and other social benefits. However, this is unlikely to be realized without related changes to the health care system.

Finally, we discuss the importance of collaboration between projects in the development of electronic medical record systems rather than reinventing systems in isolation, and the use of open standards and open source technology.

Keywords: e learning; EMR; EHR; Healthcare learning

I. INTRODUCTION

HIT has the potential to enable a dramatic transformation in the delivery of health care, making it safer, more effective, and more efficient. Some organizations have already realized major gains through the implementation of multifunctional, interoperable HIT systems built around an EHR. However, widespread implementation of HIT has been limited by a lack of generalizable knowledge about what types of HIT and implementation methods will improve care and manage costs for specific health organizations. The reporting of HIT development and implementation requires fuller descriptions of both the intervention and the organizational/economic environment in which it is implemented [1].

The use of health information technology (HIT) has been promoted as having tremendous promise in improving the efficiency, cost-effectiveness, quality, and safety of medical care delivery in our nation’s healthcare system. The realization of these benefits is especially important to increase in healthcare costs and increase in the numbers of adverse health events. Clinical HIT system may make a substantial impact on medical quality and safety by integrating relevant automated decision-making and knowledge acquisition tools into the practices of medical providers, thereby reducing errors of omission that result from gaps in provider knowledge or the failure to synthesize and apply that knowledge in clinical practice.

These systems, when integrated within larger HIT systems, may improve medical decision-making and appropriate use of diagnostic tests and therapeutic agents.

II. IMPACT OF ICTS ON THE HEALTHCARE INDUSTRY

The big stories in ICT development are not of particular breakthrough technologies, but rather those of rapid and continuous improvement in price-performance of both computing and communications[2]. Perhaps the most important development is the convergence of technologies, which is opening up new possibilities in a number of fields eg. Bioinformatics.

There is an enormous range of opportunities for significant cost reductions, service enhancements and behavioral change through what is often broadly referred to as ‘ehealth’.

• Payers: The major impact of ICTs on payers will be the ability to manage the system in order to better account for expenditures, to manage the flow of funds and contain costs.

• Providers: It is clear that the entire healthcare system could reap significant gains from an integrated approach to supply chain management that includes the entire range of hospital and medical supplies and linkages to other players in the healthcare system.

• Practitioners: From the perspective of individual medical practitioners, knowledge enrichment or education, practice administration, and clinical tools are among the most important ICT applications.

III. POTENTIAL HEALTH BENEFITS, SAVINGS, AND COSTS

Here we summarize the methodologies we used to estimate the current adoption of EMR systems and the potential savings, costs, and health and safety benefits.

A. Estimation of current HIT adoption and related factors

Healthcare Information and Management Systems Society (HIMSS) is our primary data source, To examine the factors related to differences in adoption, we merged additional data about the providers and then performed probit regression analysis. Our lower-bound estimate of HIT adoption assumed an integrated system that had an EMR. We adjusted the estimates according to the known under-representation of smaller providers in this survey.
B. Estimation of potential HIT efficiency savings.

We conducted a broad literature survey to capture evidence of HIT effects. Expert opinion was used to validate some of this evidence. In general, the currently useful evidence is not robust enough to make strong predictions and we describe our results only as “potential.”

C. Estimating the costs of adoption.

Here we have to include one-time implementation costs, such as provider downtime and hardware costs, and ongoing maintenance costs.

D. Estimating potential safety benefits.

Using medication error and adverse drug event rates from the literature, as well as limited evidence, we extrapolated these potential safety benefits to a future with broad national adoption and show the likely distribution of possible savings and adverse events avoided as a function of practice characteristics and size.

IV. WHAT CAN WE LEARN FROM OTHER INDUSTRIES

Healthcare is the most information-intensive industry in the economy and it uses information technology the least of any industry in the economy. So if we think about where do we need information the most, it’s going to be healthcare. And yet, we still do things by paper and pencil, storing things in huge stacks where you can’t retrieve them and they’re not there when you need them. Health care is amongst the lowest productivity industries in the economy. If we look at the well performing industries, they tend to have three features: First, they use information technology a lot. They know who’s doing what, why they’re doing it, how rapidly they’re doing it, what the outcome is, how to improve it. They’re always thinking about that, they use information technology a lot, in healthcare we don’t.

V. WHAT KEY CHANGES CAN INNOVATION BRING TO THE HEALTHCARE SYSTEM

For people to think that healthcare reform is going to involve stifling innovation is just absolutely wrong. If we do it right, we’re going to open the possibilities for an enormous amount of innovation. With innovation we’ll be able to figure out how to tailor what you get to what you need, in addition to all the other things we’re talking about, so, we’ll actually have a medical care system that is customized for people, not just for something generic. We need a lot of innovation. Healthcare reform has to encourage innovation across the board or else it’s not going to succeed.

VI. THE POWER OF COLLABORATION

In the current environment, the medical and public health sectors are becoming increasingly dependent on one another—in achieving the missions, in addressing health problems, and in responding to economic and performance pressures. By engaging in various types of collaborative activities, some professionals and organizations in medicine and public health have identified powerful strategies for dealing with the problems they face. Although each of their collaborations is designed to deal with a particular situation, a set of common, and generally applicable, strategies emerge from analyzing their collaborations as a whole.

The Collaborative Imperative lays out a context for thinking about the relationship between medicine and public health. It begins with an analysis of the historical relationship between the two sectors, exploring their early connections and the factors that led to their progressive isolation. It reassesses the relationship between medicine and public health in the context of today’s environment, identifying factors that are making the two health sectors increasingly dependent on one another, and new incentives that are making it advantageous for professionals and organizations in medicine and public health to work more closely together.

The ways that professionals and organizations in medicine and public health—and often other partners in the community as well—combine their resources and skills, and the benefits that can be achieved by doing so are:

- Improve health care by coordinating services for individuals.
- Improve the quality and cost-effectiveness of care by applying a population perspective to medical practice.
- Use clinical practice to identify and address community health problems.
- Shape the future direction of the health system by collaborating around policy, training, and research.

VII. USE OF AND OPEN SOURCE TECHNOLOGY IN HEALTHCARE

Everywhere we turn these days, it seems that global health is going digital. New terms like eHealth, mHealth, and telehealth have sprung into common usage in meetings, email lists, communities of practice and journals alike. A concept frequently used, misused and generally debated in all of these forums is Open Source. Open Source is most clearly defined as a kind of license governing how software, once created, can be shared, adapted and reused.

Software in Open Source can be:

- Shared: Distributed without cost or restriction.
- Adapted: Easily and legally modified by other developers.
- Reused: new works may be built from it, in whole or in part.

Here are just a few examples of the open source software for electronic health record:

- The Open Source Medical Records System, OpenMRS, is pioneering a unique multi-institutional and multi-country community of developers and implementers building and adapting a tool for managing and tracking clinical encounters. OpenMRS is being implemented by a diverse team in more than 14 sites in 10 countries.
- The District Health Information System developed by the Health Information Systems Programme is an early and growing effort to help countries develop disease surveillance and service statistic monitoring system built on Open Source technology.
The OpenROSA Consortium is working to reduce duplication of effort in mHealth (mobile health applications), fostering Open Source, standards-based tools for mobile data collection, aggregation, analysis and reporting. Their JavaROSA Open Source platform is being developed for a wide range of uses ranging from disease surveillance to supporting community health workers.

VIII. CONCLUSION

The use of EMR exerts both positive and negative impacts on physician–patient relationships. The negative impacts can be overcome by some simple means as well as better designs of EMR systems and medical education interventions. Physicians’ everyday practices of integrating EMR use into the clinical encounter as well as better design of EMR systems and EMR and communication training may facilitate PDC (Patient, Doctor, and Communication) in computerized settings.

REFERENCES
