IBM Institute for Business Value

IT-enabled personalized healthcare

Improving the science of health promotion and care delivery

Overview

To succeed in transforming healthcare, many countries will need to move to more personalized healthcare (PHC). Successful migration must encourage innovation, provide access to more complete patient information and incorporate advanced clinical knowledge into clinical decision making. Therefore, PHC will require a much more open, robust health information technology (HIT) environment than exists today. We have identified five major HIT-related challenges, as well as recommendations to foster HIT-enabled PHC.

The need for PHC

Healthcare systems around the world are making great strides in technological, scientific and clinical innovations. Even so, many countries are struggling to address increasing costs, poor or inconsistent quality and inaccessibility to timely care. Many believe that fundamental transformation is required for what are becoming increasingly unsustainable healthcare systems.[1]

Three factors contribute to the unsustainability of healthcare: fragmentation, waste and inadequate science for health promotion and care delivery. Issues with fragmentation and waste are indeed daunting; they are a key focus of current U.S. health reform efforts, for example. Receiving less attention is inadequate science – more explicitly, problems involving the science of health promotion and care delivery. These issues impact both quality and costs, with estimates for unwarranted care – just one part of inadequate science – ranging from US$250 to $325 billion per year in the United States.[2] These inadequate science problems present significant barriers to realizing the vision and promise of PHC.

PHC could help address difficulties associated with the science of health promotion and care delivery by using broader and deeper patient information and applying more complete clinical knowledge to help promote patient-centered health and predict, prevent, aid in early detection of, treat and manage diseases. Through improved science, PHC has great potential to improve quality and reduce overall costs of health promotion and care delivery. However, it is incredibly informa-

tion and knowledge intensive even compared to today's complex needs, which already exceed human cognitive capacity. Access to and appropriate use of burgeoning volumes of patient information and clinical knowledge will require a powerful health information technology (HIT) environment.

Toward a new HIT environment

A much more open, robust, flexible, standards-based HIT environment will be required to enable personalized healthcare. This environment must be capable of capturing, storing, analyzing and appropriately sharing information about individual patients and patient populations. It must be capable of rapidly generating new clinical knowledge, managing that knowledge and easily incorporating the knowledge into clinical processes and workflows for decision making for health promotion and care delivery.

This environment also must facilitate appropriate interactions among constituents, whether they involve patients communicating with their care delivery teams, communications among care providers or researchers working across traditional organizational, industry or country boundaries. However, these capabilities were not top priorities when today's HIT systems were designed and implemented. Today's systems were designed primarily to facilitate administrative functions such as billing and payments and to automate specific clinical encounters such as a doctor's appointment or hospital inpatient stay.

To realize the vision of PHC, five interdependent HIT-related challenges must be overcome:

1. Lack of an interoperable HIT environment for care delivery and research
2. Prevalence of tightly coupled applications and data
3. Inadequate data and knowledge standards
4. Insufficient analytics capabilities
5. Absence of a clinical decision-making foundation.

Figure 1 summarizes key capabilities required to tackle the five challenges. These challenges are much more difficult to address than the HIT-related issues associated with healthcare's fragmentation and waste problems. They are also more complex than the IT-related problems faced in other industries. Solutions will require sophisticated use of existing IT-related capabilities, as well as the development of new approaches.

The future…

A robust HIT environment that addresses the five challenges is necessary but by no means sufficient for a successful journey to PHC. Other issues relating to policy, funding, education, culture and ethics must also be tackled. As such, the path to PHC will require numerous experiments, with rapid adoption of lessons learned through both successes and failures.

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1	**Interoperability** • Specialized information and knowledge sources • EHRs for research
2	**Applications/data** • Exchange data easily and appropriately • Access specialized data or information sources
3	**Standards** • Clinical knowledge • Patient-reported data • Patient identification
4	**Advanced analytics** • Simulations • Predictive modeling • Optimization
5	**Clinical decision-making foundation** • Knowledge acquisition, management and incorporation • Integration, reduction and visualization • Patient-centered cognitive support • Reinterpretation of static patient information • Long-term outcomes tracking

Sources: IBM Global Business Services; IBM Institute for Business Value.

Figure 1: **Five interdependent HIT-related challenges must be addressed for PHC.**

Some may question the costs associated with the PHC path. However, as countries and organizations continue to make significant investments in healthcare, they need to ask themselves: Should expenditures continue on waste, inefficiency and low-value care or, instead, should investments be made to enable the transformation to a more personalized, patient-centric, value-based, rapidly learning, affordable and sustainable healthcare system? Clearly, we favor the second option and believe that PHC is integral to comprehensive health reform.

How can IBM help?

- IBM empowers healthcare stakeholders and patients with the right processes, culture, technology and tools to improve the value of healthcare services and to help achieve more personalized healthcare and a healthier society.
- IBM research continues to apply scientific breakthroughs to solve healthcare and life sciences challenges, including realtime analyses of clinical data streams and tools that make it easier for doctors to navigate complex patient information.

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1 Adams, Jim, Edgar L. Mounib, Aditya Pai, Neil Stuart, Randy Thomas and Paige Tomaszewicz. "Healthcare 2015: Win-win or lose-lose?" IBM Institute for Business Value. October 2006. http://www.ibm.com/healthcare/hc2015

2 Kelley, Robert. "Where can $700 billion in waste be cut annually from the U.S. healthcare system?" Thomson Reuters. October 2009.

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