Health Care Informatics Education: Matters to Consider

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In Health Informatics for the Curious: Why Study Health Informatics

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Introduction

Health informatics is the interdisciplinary study of the design, development, adoption and application of IT-based innovations in health care services, delivery, management and planning. The U.S. National Library of Medicine adopted this definition per the *Health Informatics Journal* Editor, Dr. Proctor ([http://www.nlm.nih.gov/hsrinfo/informatics.html](http://www.nlm.nih.gov/hsrinfo/informatics.html)). The IT-based technologies and innovations have long transformed other industries, including retail, banking, and manufacturing. Transforming effects, however, have not been completely recognized in the health care domain. In 2010, President Obama’s Council of Advisors on Science and Technology (PCAST) examined this issue in its report entitled, *Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward*. The PCAST concluded the following:

In other sectors in which IT has had a transforming effect, rapid progress has been catalyzed by wise technology choices that open up markets to competition and innovation. Such technology choices include the standardization of simple universal methods for the exchange of information across multiple platforms and organizations. In other sectors, universal exchange standards have resulted in new products that knit together fragmented systems into a unified infrastructure. The resulting “network effect” then increases the value of the infrastructure for all, and spurs rapid adoption. By contrast, health IT has not made this transition. The market for new products and services based on health IT remains relatively small and undeveloped compared with corresponding markets in most other sectors of the economy, and there is little or no network effect to spur adoption. The network effect is defined as the user externality by which the more people who use a network, the greater its value to each of them. The classic example is the rapid adoption of universal telephone service in the early 20th century (p 1).

The technology and efficiency lags in healthcare are often termed antiquated. These lags impact processes, patients and people in both clinical and financial systems (Payton, et al, 2011) as well as the need for interdisciplinary knowledge and teams. These interdisciplinary teams can provide a bridge for health professionals, including the informatics specialist, and can offer competencies to provide patient-centered care (Brailsford, et al., 2012). Healthcare information technology (health IT) is often described as overly expensive, poorly designed, highly proprietary, and difficult to implement and use. These depictions present challenges to the current standards of health informatics but also offers opportunities for improvement.

Health Informatics Domains

Health informatics is being used to support the function and advancement of various fields of medicine and health including consumer health, public health, disease management, personal health record keeping, and clinical research.

*Consumer Health Informatics*
Consumer health informatics focuses on how health information is and can be used to aid patients and consumers in better understanding, accessing, and utilizing health care resources. Included in the field are health literacy and health education, and patient-centered technologies that can be used by organizations. These domain experts develop tools individual and systems-level tools to support consumers who are interested in managing their health. These tools and applications tend to use consumer-friendly language, account for various levels of health literacy, are easily accessible via methods and internet sites where consumers are likely to frequent. An important part of consumer informatics is analyzing data in order to assess consumer demands and needs while integrating these findings into rapidly evolving products and systems. Consumer health informatics intersects with other disciplines, such as public health, health education, disease management, and communication science (AMIA, 2014).

**Electronic Health Records**

Electronic health records have been developed to aid consumers and care providers with tracking and managing health data. By contrast, electronic personal health records are electronic records that contain an individual’s personal identifiers and health related information, such as allergies, medications, medical history and any recent medical test results. These records should conform to national standards of interoperability which allows them to pull and merge data from multiple sources to be shared with, managed or controlled by the individual (e.g., this is particularly of interest to patients as health consumers). Electronic records that allow data from varied sources and organizations to be imported or exported are stand-alone systems while those connected to a specific organization are called tethered applications. Tethered applications are also called patient portals and allow patients to access and view health records from hospital or physicians’ offices, without modification. In some instances, patients are able to communicate with their providers via their electronic health records capabilities. (AHRQ, 2013)

**Disease Management**

Chronic diseases, such as heart failure, diabetes and hypertension, account for most of the health care costs in the United States (Shapiro and Moreno, 2006). These conditions, however, are the most common and preventable, and are characterized by high-risk behaviors in one in four US adults (Centers for Disease Control and Prevention, 2014).

Chronic conditions are illnesses that are long-term and must be managed and treated over time. Clinicians and patients should collaborate to improve and sustain health indicators associated with chronic conditions.

On one hand, physicians need to stay abreast of recent breakthroughs in treatments, technologies, and medications. Evolving industry and consumer expectations suggest that physicians and other care providers will integrate clinical innovations into their practice and modify treatment plans for their patients where appropriate (AHRQ Factsheet, 2013). On the other hand, patient adherence to treatment plans is critical to disease management. That is, patients should take prescribed medication, observe any side effects or reactions, comply with treatment regimens and stay in communication with physicians. Various emerging health technologies offer a way to bridge and facilitate physician-patient communication. It allows not only better ways to share,
organize and store information between the two, but better tracking of self-care by the patient and improved monitoring by the physician. (Shapiro and Moreno, 2006)

**Public Health Informatics**

After the September 11, 2001 attack on the United States, the need for a coordinated and expedient matter to connect health professionals and health care systems to large populations affected by natural disasters or bioterrorism became apparent. When a disaster occurs, mass injuries and casualties result, requiring new computer systems that can collect and analyze information and immediately coordinate and distribute that health information (AHRQ Factsheet, 2013). In addition to bioterrorism, public health informatics includes biosurveillance, prevention, preparedness, outbreak management, and electronic laboratory reporting. The focus of public health informatics is to utilize technology to address challenges faced by populations of people as opposed to individuals (AMIA). This, however, includes monitoring major disease outbreaks, such as the 2014 Ebola virus in West Africa and the 2013 polio eradication throughout the global community. Hence, the public health focus intends to detect and/or respond to medical threats in local, state, national and international communities.

**Why Health Informatics and Why Now?**

According to Dalrymple (2011), health informatics emerged in the seventies and became more popular in the eighties. Not long after the ushering in the new millennium, however, health informatics took center stage. Economic downturns around the globe forced countries to examine spending habits and cut costs where needed (Darlymple, 2011). Health care was identified as one of the sectors needing the most reform for the purpose of quality improvement as well as financial viability. We also saw the introduction of several technological tools, such as applications for mobile devices as well as wireless and cloud based applications (Braunstein, 2013). These, as well as existing applications, were being used in other disciplines, helping to streamline processes in those markets, leading to increased efficiency and economic sustainability.

Within this context and by the early 2000s, the United States government began supporting initiatives to improve health care through the development and integration of the field of health informatics (Braunstein, 2013). Federal legislation, including the Affordable Care Act, was issued which mandates a switch to electronic health records by 2014 (Darlymple, 2011). In response to the changing health care landscape and technology innovations, educational programs have flourished while hospitals and physicians’ offices are converting to electronic systems instead of paper files. Moreover, consumers are increasingly encouraged to take charge of their health. As a result of federal policy and shift towards informatics, in general, a 2012 survey revealed that 70 percent of health insurers, 48 percent of hospitals and 39 percent of pharmaceutical and life sciences companies plan to increase hiring of technical informatics professionals” (Pricewaterhouse Coopers, 2012) within two years. Another government group estimated that over the next few years, a shortage of about 50,000 healthcare information technology jobs is expected (Information Week Government).
Health Informatics Programs and Schools

Health Informatics educational programs have grown enormously over the past five years. By 2011, about 200 different institutions offered some type of informatics degree (Darlymple, 2011). Due to the high demand, there are many points of entry into the field of informatics. Thus, programs abound at all levels of education from community college to doctoral degrees. There are two main credentialing bodies - the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) for institutions and the Registered Health Information Technician (RHIT) for students once they complete their coursework and pass the certification exam. Not only is there variation in program offerings, but entering students also bring a diverse set of skills and backgrounds with them. Some students come from careers in health, such as nursing or medicine, and some come from technology-driven careers in engineering, mathematics or computing. The key driver appears to be interdisciplinary programs with different emphasis on marriage of technology, business, health and policy domain knowledge.

Academic programs may be housed with one of any number of departments, including but not limited to, information technology, health information management/administration, business, and medicine. It was even noted that, after a review of the literature, over 20 different health informatics core competency lists were discovered (Darlymple, 2011). The variety and scope of educational opportunities in the field are evident in the curricula and program descriptions of diverse institutions. Most, however, veer towards either the clinical aspect of informatics or the information science side, with some blend. Though many programs are online, most still encourage or require an internship or fieldwork in a selected sub-specialty.

Despite differences in actual class offerings, according to Darlymple (2011), there is a critical need and focus on academic offerings on data, information and knowledge. Data is used to inform professionals about issues like patient preference, consumer safety, or failing systems. That information is then used to create improvements in operations or processes, thus improving knowledge and performance. Brailsford, et al. (2012) discussed Figure 1 which was adopted from the National Research Council (2003) to show how the data-information-knowledge framework can be implemented using interdisciplinary teams. Figure 1 shows the core competencies of health professionals with informatics overlapping with patient-centered, quality improvement and evidence-based skills.
Brailsford, et al. (2012, p 4) noted the relevance of this approach from a global perspective:

*Interdisciplinary approaches in health care were embraced by the newly formed Commission on Education of Health Professionals for the 21st Century which was launched in January (Bhutta et al, 2010). With representation spanning the global health care community, the commission will develop ‘a vision and recommend specific actions for catalysing the transformation of health professional education’. The group will address issues of workforce development, logistics of population movement, telecommunication and technological advances, all of which are viewed as interdisciplinary ‘systems’ needed to address emerging challenges facing researchers and practitioners in the 21st century.*

**Health Information Programs - Snapshot**

Below is a summary description of health informatics programs at each level of entry. It is based on four websites that compiled curricula and program data from top ranked health informatics programs in the United States.

*Bachelor's Degree Programs*
Bachelors’ degree programs vary in their breadth. Courses range in subject areas from organization structures, health policy, computing and information systems, communications, and management. Curricula also include physiology and epidemiology. The curricula vary in perspective of many different disciplines to expose students to broadly contributing themes and sectors in health informatics. During the four year course of study, students will often participate in an internship or similar activity to gain some introduction to working in the field. Specific courses commonly found in bachelor’s degree programs include: Project management, medical terminology, and health data management.

Master’s Degree Programs

Master’s degree programs are commonly online and cater to students who have a background in information technology, computing or a clinical expertise. These students are typically seeking to garner and/or hone additional skills though specific to some combination of health and technology. Research tracks and clinical training, sometimes in conjunction with medical schools, are offered. Similar to the Bachelors’ programs, these degreeed programs are interdisciplinary. Simulation labs in which students can practice, as well as preparatory courses for a certification exam are also incorporated into the curricula. Specific courses commonly found in Master’s programs include: Health informatics terminology, database design, health economics and legal issues in health informatics.

Graduate Certificate Programs

Certificate programs at the graduate level can be earned in as little as eight months. They are geared toward professionals who want to acquire basic skills that will allow them to do specific hands-on work, or those with some experience to gain knowledge that will allow them to assume more leadership duties at their place of work. Specific courses commonly found in graduate certificate programs include: Foundations of health informatics, healthcare information systems and project management.

Doctoral Programs

Doctoral programs are also interdisciplinary in scope, but are designed for students who have honed in on a sub-specialty of health informatics and would like to pursue research in that domain. Curricula tend to focus on the complexities of developing, designing, and managing systems. Statistical and mathematical approaches to analyzing systems and improving weaknesses in them are more prominent in Ph.D. programs. Management and policy courses that will open the door for leadership roles as well are also included in the course of study. Specific courses commonly found in doctoral degree programs include: Informatics research design, biostatistics, and health data analysis.

Observations and Future Direction

While health informatics holds the promise of streamlining health care, improving efficiency and cutting costs, we are now only in the initial stages of development and delivery. At this point, it
is important that each of the affected disciplines continue to make changes that will keep them in line with one another and maintain interoperability (Shapiro and Moreno, 2006). Health information specialists will need to be flexible, and able to anticipate or quickly respond to changes in the health care and IT fields. Additionally, practitioners will need to be able to think creatively about possible alternative approaches available for their use in patient care and relay those messages to informatics specialists (Braunstein, 2103). What will come in the next few years is evaluation and improvement of these new systems. It will be challenging to pinpoint best practices and know which systems work best for which populations and types of organizations. Until that point is reached, health information specialist will have to use their experience, judgment, and skills to create and improve the core competencies shown in Figure 1 as offered by the National Research Council (2003).

References


President’s Council of Advisors on Science and Technology (PCAST): Executive Office of the President (2010), Report to the President Realizing the Full Potential of the Health Information Technology to Improve Healthcare for Americans: The Path Forward.

