The Doctor is in, but is Academia? Re-Tooling IT Education for a New Era in Healthcare

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ABSTRACT

Healthcare information technology is at a crossroads today. As legacy data systems converge with bleeding edge technologies, the technology environments of today's hospitals and clinics are evolving rapidly, producing new care delivery models. As a result, we need to reassess how information technology education is meeting the needs of healthcare practitioners and institutions. The recent push to adopt Health Information Technology (HIT) with financial incentives and penalties attached was a bold move, but establishing policies is easier to pen than implement. The challenge faced by many healthcare organizations is the lack of technical and organizational infrastructure, as well as skilled man power. This special issue seeks to bring new approaches to the IT classroom, particularly with HIT curriculum, training, and education. Students entering the workforce or completing professional programs will have more career options with an understanding of how to leverage enabling technologies. Those in a healthcare management and leadership capacities will also benefit from this special edition as each of the articles presented address strategic level issues and the need for IT leadership in the planning and implementation of enterprise level systems, to ensure the safety, privacy and security off all patients are protected. The authors of this special issue offer interdisciplinary perspectives on key topics shaping HIT around the world. As members of academia, curriculum is at the heart of the matter and our authors offer justification and case studies on areas where academia needs to continue its growth to serve the healthcare industry.

Keywords: Curriculum design and development, Health insurance portability and accountability act (HIPAA), Emerging technologies, Health care

1. INTRODUCTION

When the conversations began revolving around this Healthcare special edition, clinics and hospitals across the US were struggling with how to implement the Health Information Technology for Economic and Clinical Health (HITECH) Act. The purpose of HITECH is to promote the adoption and meaningful use of health information technology and certified electronic health record technology (CEHRT). The first phase of the program details the requirements for the use of electronic health record (EHR) systems by hospitals and health care professionals. It is a key metric for compliance and accreditation. A primary goal for healthcare organizations is to demonstrate a value based approach to their adoption and application of healthcare information technology (Centers for Medicare & Medicaid Services, 2014). Since that time, we have seen a roller coaster of changes, delays, and implementation approaches in meeting the requirements. And independent of shifting political climates, one thing is certain – information technology has become a key driver in the delivery and management of care, across socioeconomic and interdisciplinary boundaries.

This Special Edition seeks to explore where we are today and where we need to be in IT education as it relates to the healthcare industry. Are we properly equipping our students to rise to the occasion and capitalize on these new opportunities? Will those entering the medical profession and allied health fields have the skills to embrace disruptive technologies and manage the trade-offs to effectively integrate new tools into their care delivery system. As scholars, in what ways are we advancing healthcare information technology and its management beyond traditional industry models? What can we do to proliferate and embrace disruptive technologies, and harness them to safely provide patient care? What are the opportunities for injecting new life into IT curriculums?

1.1 Industry Synopsis and Challenges

The past 4 years have seen an unprecedented push to adopt information technology in the healthcare environment. That push has arrived with mixed results. In meeting the growing demands of healthcare institutions trying to leverage technology, a highly specialized labor force is needed to facilitate the design, implementation, and support of the myriad of tools that are entering the marketplace (Computer Sciences Corporation, 2010).

This genesis in a new era of healthcare will tap into design and engineering innovations, along with the need for properly educated users and support staff, including those that support the technology itself. From clinical applications and the actuary using decision support systems for underwriting, to the son or daughter connecting their elderly parents to the networked in-home devices for diagnosis and online consultation, no healthcare process will be devoid of technology. This paradigm shift in healthcare models begs the question – how do we get there, and who will do it? Both policy and patient care are banking heavily on innovations in IT and telecommunications to lower costs while driving design and development to ultimately improve the quality and delivery of care.

A number of challenges will continue to vex the healthcare industry with the increased dependency on information technology. As adoption grows, so will the threats to operational stability. The fundamental issues facing healthcare are areas that will be familiar to the IT educator, but may be new territory for many clinicians.

1.2 Data Systems

As the adoption of EHR expands, the new data amassed will increase exponentially, and data systems will need to be managed and integrated to handle this exponential increase. Data systems essential to decision support activities such as International Classification of Diseases (ICD) codes, Healthcare level 7 (HL7) data exchange, lab results, patient record systems, and patient financial records will need to be interoperable. With the recent mandate from the White House for mass adoption of EHR in a short time frame, technology is throwing patient care into a realm where information flows are becoming much more complex, and clinicians are saddled with hastily designed solutions (College of Healthcare Information Management Executives, 2015).

For physicians, there are still a number of issues that need to be addressed to integrate technologies together effectively; the coordination of entering, reviewing, verifying, and managing patient data has required an extra 1-2 employees per doctor. Additionally, the EHR systems do not "talk" to one another which requires faxing of notes and lab results. Two recent studies found that most providers have installed EHR systems, however, less than half of those systems can share patient care documents and only 14% can share outside of their own EHR system (Creswell, 2014). Prior to the implementation of HITECH, industry experts anticipated that a forced, widespread adoption of electronic health records would have unintended consequences. Those consequences range from workflow interruption to hardware and software interoperability problems, both of which could result in serious medical errors in patient care (Bloomrosen, et al., 2011).

Research conducted in the feasibility of big data analytics as it relates to vaccination and public health surveillance have identified the value and challenges of collecting non-clinical consumer generated data. Healthcare is a prime candidate for big data applications, and as organizations move to harness the explosion of information, the healthcare industry will need to be equipped with appropriate tools and models where the integrity, privacy, security and accuracy of information can be preserved (Liyanage, et al., 2014).

1.3 Mobility

With the advent of broadband wireless connectivity, machine to machine (M2M) network architectures are allowing for

the decentralization of monitoring devices, enabling both patient and doctor to be mobile. This connectivity further stresses the IT infrastructure. As more devices become networked and wireless, security concerns also arise with medical device safety. Implanted devices and body area networks (BAN) can malfunction, become hacked, or infected with a computer virus that can transfer to other nearby implanted wireless devices, much like an organic virus (McGee, 2014).

Today access to wired and wireless high speed data networks, in conjunction with sophisticated personal devices, such as wearables, is making remote treatment more affordable with greater accuracy, due to real-time data capture. With the proliferation of connected devices known as the internet of things, it is estimated that there will be over 50 billion nodes by 2020 (Gartner, 2013), including wearables and embedded devices. It is also predicted that telehealth, the use of electronic information and telecommunications technologies to support long-distance clinical health care, will grow to 56 % by 2018 (Graham, 2013).

Another side of mobility is telemedicine. While the HITECH act touted the benefits of telemedicine, this is not new, as specialties such as dermatology were early adopters of various methods of telemedicine and virtual care (Institute of Medicine, 1996). By taking advantage of available imagery, dermatologists have been able to effectively diagnose and educate patients remotely (Breen and Matusitz, 2010). Researchers at Scripps Translational Science Institute in San Diego, CA, predicts that as much as 50% of patient care will occur remotely, replacing the office visit, with in-person consultations becoming the exception, not the norm (Bowman, 2014).

An additional issue that is important to note - are the new sources of input and coordination wireless devices bring to the EHR from clinics and hospitals. Outside of the traditional healthcare setting, smartphones can now monitor data from patients. For example, EKG, pulse, cholesterol and blood sugars can all be monitored and included in the EHR. Communication and data input initiated by the patient needs to be monitored by a physician and logged into the database throughout the EHR where it must be accessible to the right stakeholders in a timely manner (Mandl and Kohane, 2012).

The patient as the point of origin of the data source is a game changer, made possible by the advancing health and medical capabilities of consumer accessible smart products. With large populations of consumers adopting these devices and phone apps, the influx of data generated from wearable biometric sensors will be tremendous – much greater than current systems design has anticipated for patient data collection and analysis (Topol, Steinhubl, and Torkamani, 2015).

1.4 Security

With the proliferation of information systems throughout all facets of healthcare, security has become a major challenge as security breaches have skyrocketed. Data loss of patient information costs the healthcare industry an estimated 7 billion. Theft of patient data is at an all-time high with the recent data breech of Anthem, an estimated 80 million patient records have been compromised. This is sixteen times the previous record, making up approximately one quarter of the US population. The healthcare industry will need to reassess its approach to IT security spending and acquiring the necessary tools and expertise (Conn, 2015). Attacks will continue to increase, with healthcare records today commanding a premium on the black-market. Healthcare records often sell at more than ten times higher than that of stolen credit card data (Humer and Finkle, 2014).

As a result and in spite of stringent HIPAA regulations, privacy is a major concern because all this technology means there are more access points into the data systems as hospitals and insurers partner with more vendors. The impact of third party entities who access patient health information (PHI) can create security vulnerabilities for the primary data owner, putting their patient's data at risk and exposing them to HIPAA violations and liability. The growth of data and analytics continue to create new markets that further complicate this conundrum, and healthcare organizations will need to undergo a thorough evaluation of who has access to their patient database, and include these factors in the organization's security strategy (Hicks, 2014).

2. THE ROLE OF EDUCATION IN HEALTHCARE INFORMATION SYSTEMS

With the implementation of the HITECH act came a directive to enable workforce education and training to address the skills and staffing shortage anticipated with adoption of HITECH mandates. Five universities and eighty two community colleges received funding to create HIT programming. The caveat with the stimulus funding for higher education is that it only provided funding for short-term adoption goals, and did not provide for long-term sustainability (McGowan, Cusack, and Bloomrosen, 2012). As with any industry impacted by the internet and big data, the healthcare industry is facing its own version of a dot com boom, balancing business processes, cycles of innovation and obsolescence, with maintaining the standard of care.

Academia is the nexus of research and knowledge transfer, where evidence based models and methods are developed and validated. The healthcare industry can greatly benefit from an infusion of training and education programs to help instill proven principles of IT management, as well as the creativity and resources to innovate new products and best practices.

Healthcare programs can also infuse new life into traditional higher education IT curriculums, while helping to address a significant HIT labor shortage. An initial government assessment by the Office of the National Coordinator (ONC), identified major shortages in skilled IT professionals, and project a need of at least 50,000 related jobs needed to harness the HIT revolution. According to a report from Price Waterhouse Coopers Healthcare Research Institute, it is conceivable that this estimate is significantly understated (Price Waterhouse Coopers, 2013), and given the number of devices and vendors entering the market, the HIT skills gap is likely to continue expanding.

Other considerations for integration of healthcare into IT curriculums in higher education is the shift in patient care paradigms to a patient driven model in which patients

dynamically generate both consumer health and biometric data, influencing treatment approaches and having increased empowerment over their own health. This is in contrast to the model of the provider driving the care, and the patient waiting for reactive treatment from the physician (Swan, 2009). This is facilitated by data transfers and analytics of biomedical data, which is now much more accessible due to remote monitoring, access to information, EHRs, and broadband internet connectivity. As the number of doctors who embrace distance medicine continues to grow, and as patients armed with both their own consumer data and their own health research of conditions and symptoms, patients can work with their doctors to have a more comprehensive and collaborative game plan to treatment (Forkner-Dunn, 2003).

The need for healthcare systems to be increasingly collaborative provides an opportunity for academia to help the healthcare industry architect a true interdisciplinary approach, thus eliminating operational fragmentation and developing the cohesion needed for healthcare information technology implementations to be effective and safe for patients (McCarthy, Mueller, and Wrenn, 2009). Academic programs in higher educational institutions will need to create new curriculum to teach the management and delivery of technologies that are changing healthcare delivery (Mandl and Kohane, 2012). Conversely, curriculum approval processes will have to be more expeditious and flexible in order for cutting edge research and education to reach industry when its timeliness and relevance has the greatest impact.

3. SPECIAL ISSUE OVERVIEW

As Information Systems educators, clinicians, and researchers all contributed to this Special Issue of the Journal of Information Systems Education, they offer a rich diversity of perspectives and creative solutions to foster critical dialogue to benefit both academia and the healthcare industry.

The first two papers are teaching cases with the teaching notes available to verified instructors only via the jise.org website. Please contact editor@jise.org with an e-mail from your college or university e-mail account that contains a college or university URL that will verify your instructor status. You will receive by return e-mail the URL and password to access the Teaching Notes. The teaching case, "Hippi Case Hospital: Towards proactive Business Processes in Emergency Room Services" presents students with a case on project management skills. The case is evaluated with the Analysis Framework and helps student develop solid project management skills. Tan and Shankararaman offer this real-world case study in process management for an emergency department, and provide teaching notes with some variations for instruction and helping to facilitate critical thinking for students. While the case study uses a fictitious name, the case itself is based on an actual hospital, and reflects the conundrum of patient surge that hospitals world-wide experience. The goal is to show students that effective use of organizational data can empower decision-makers to make better informed decisions.

The second case, "HealthCare.gov: Opportunity out of Disaster," by Cundiff, McCallum, Rich, Truax, Ward, and Havelka examines the recent public relations disaster when the HealthCare.gov was launched with the information on the Affordable Care Act. The authors provide examples of both good and bad IT project management practices and pose questions for discussions for complex, multi-vendor outsourced projects.

In the article, "Developing Health Information Technology (HIT) Programs and HIT Curriculum: The Southern Polytechnic State University Experience" authors Zhang, Reichgelt, Rutherfoord, and Wang offer their insight into the development of their program's HIT curriculum. They include HIT workforce development initiatives and major HIT and health information management educational resources. The authors work is guided by two of the major health information management and health IT organization (AHIMA and HIMSS) plus ABET. ABET is the Accreditation Board for Engineering and Technology programs.

The next paper, "Health Informatics in the Classroom: An Empirical Study to investigate the Higher Education's Response to Healthcare Transformation" by Ashrafi, Kuilboer, Joshi, Ran, and Pande talks about a new generation of health informatics professionals that can utilize big data in the field of healthcare, and the distinction between clinical and non-clinical health informatics. The authors also make suggestions for academia to assure that public health professionals have the knowledge, tools, and training to advance the mission of public health. The results of their study should be of interest to those who are educating a new generation of the workforce in health informatics.

Zheng, Zhang, and Li's manuscript, "Bringing Business Intelligence to Health Information Technology Curriculum," investigates the current HIT educational programs, business intelligence (BI) industry, healthcare BI job listings, and students' perceptions of BI and how BI could be incorporated into HIT programs. The survey of students found they were interested in a HIT course containing BI components or a BI course specialized in the healthcare context. The authors developed a general curriculum framework and exemplar implementation strategies to demonstrate how BI can be incorporated into an HI or an HIT program.

Patient education is critical, especially where getting the right information at the right moment in the right form depends on the information and communication technology. In the final paper, Pirhonen, Silvennoinen, and Sillence talk about a conceptual framework with applied technology having the most instrumental value. They suggest the application of the primary nurse providing care and support with the help of appropriate information systems. They also suggest that patient centered practices in patient education should be promoted. This paper further underscores the importance of fostering patient trust in maintaining a balance of systems and people in a tech dependent environment.

4. CONCLUSION: CHALLENGE TO EDUCATORS

The articles selected for this special edition provide insight into the tools needed as we enter a new era of healthcare, beyond what policy makers may have imagined with the HITECH initiative. With healthcare innovation out-pacing regulation and policy, as educators, we play a key role in equipping the next generation of managers, technologists, and clinicians.

Academia is in a prime position of influence to help address the system challenges faced by healthcare, which continue, and most likely will continue to be under resourced. Strategic and technical frameworks are needed to help provide the new platform for patient care delivery. A purely technological approach must be tempered with sound business and medical planning to produce lean approaches and results driven solutions and professionals. Academia can leverage decades of IT best practices from all industries to offer a "best in breed" approach. Additionally, we need to help advance innovation and provide direction for the new asymmetric devices and information flows that will come from unconventional sources.

For medical schools and allied health programs, teaching students the fundamental concepts of IT systems including systems management, architectures, and risk mitigation, will provide them with the acumen to make sound decisions, taking a well-rounded approach to treating their patient beyond the computer as the benefits and limitations of technology are kept in balance. Information systems students will gain insight to real world application of IT principles while understanding the importance of how their activities can have a direct impact on the health and well-being of the ultimate end user – the patient. Students who may pursue other industries will still benefit from exposure to healthcare IT principles, by gaining an understanding of the design and implementation constraint of the healthcare framework, including standards, privacy, security, and the interoperability needs of a complex industry.

For the clinician and those training to be doctors and nurses, understanding how technology can be integrated into their work, will enable them to extend the Hippocratic Oath in how they care for their patient in the presence of technology. It is with gratitude for the contributions and patience of our colleagues, in presenting this issue and the hope of the editors to inspire and challenge academia to rise to the occasion of being at the forefront of this life changing, life-saving calling.

5. REFERENCES

Bloomrosen, M., Starren, J., Lorenzi, N. M., Ash, J. S., Patel, V. L., & Shortliffe, E. H. (2011). Anticipating and Addressing the Unintended Consequences of Health IT and Policy: A Report from the AMIA 2009 Health Policy Meeting. *Journal of the American Medical Informatics Association : JAMIA*, 18(1), 82–90.

Bowman, D. (2014). Telemedicine, Digital Health Vital to Med Industry's Transition into the Future. *FierceHealthIT*. Retrieved December 24, 2014, from http://www.fiercehealthit.com/story/telemedicine-digital-health-vital-med-industrys-transition-future/2014-11-19.

Breen, G.M. & Matusitz, J. (2010). An Evolutionary Examination of Telemedicine: A Health and Computer-Mediated Communication Perspective. *Social Work in Public Health*, 25(1), 59–71.

Centers for Medicare & Medicaid Services (CMS). (2014). 2014 Definition Stage 1 of Meaningful Use. Retrieved November 6, 2014, from https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Meaningful_Use.html.

College of Healthcare Information Management Executives (CHIME). (2015). Meaningful Use and Unintended Consequences: The Good, the Bad and the Ugly - Healthcare IT. Retrieved February 1, 2015, from http://chimecentral.org/meaningful-use-and-unintended-consequences-the-good-the-bad-and-the-ugly/.

Computer Sciences Corporation (CSC). (2010, July). U.S. Healthcare Workforce Shortages: HIT Staff. Retrieved April 2, 2013, from http://assets1.csc.com/health_services/downloads/_U.S._Healthcare_Workforce_Shortages_HIT_Staff.pdf.

Conn, J. (2015). Experts Doubt Anthem Breach Will Boost Security Spending. *Modern Healthcare*, 45(6), 9.

Creswell, J. (2014, September 30). Doctors Find Barriers to Sharing Digital Medical Records. *The New York Times*. Retrieved December 12, 2014, from http://www.nytimes.com/2014/10/01/business/digital-medical-records-become-common-but-sharing-remains-challenging.html.

Forkner-Dunn, J. (2003). Internet-Based Patient Self-Care: The Next Generation of Health Care Delivery. *Journal of Medical Internet Research*, 5(2). doi:10.2196/jmir.5.2.e8

Gartner. (2013, November 11). Gartner Says Personal Worlds and the Internet of Everything Are Colliding to Create New Markets. Retrieved January 3, 2014, from http://www.gartner.com/newsroom/id/2621015.

Graham, John R. (2013, December 28). Top Health Trend For 2014: Telehealth To Grow Over 50%. What Role For Regulation? Retrieved December 29, 2013, from http://www.forbes.com/sites/theapothecary/2013/12/28/top-health-trend-for-2014-telehealth-to-grow-over-50-what-role-for-regulation/.

Hicks, A. (2014). On the HIPAA Hook. *Journal of AHIMA* 85(4), 36-38.

Humer, C. & Finkle, J. (2014, September 24). Your Medical Record is Worth More to Hackers than your Credit Card. *Reuters*. Retrieved December 29, 2014, from http://www.reuters.com/article/2014/09/24/us-cybersecurity-hospitals-idUSKCN0HJ21I20140924.

Institute of Medicine (U.S.). (1996). *Telemedicine: A Guide to Assessing Telecommunications in Health Care*. (M. J. Field, Ed.). Washington, D.C.: National Academy Press.

Liyanage, H., de Lusignan, S., Liaw, S. T., Kuziemsky, C., Mold, F., Krause, P., & Jones, S. (2014). Big Data Usage Patterns in the Health Care Domain: A Use Case Driven Approach Applied to the Assessment of Vaccination Benefits and Risks. *Yearbook of Medical Informatics*, 9(1), 27–35.

Mandl, K. D. & Kohane, I. S. (2012). Escaping the EHR Trap — The Future of Health IT. *New England Journal of Medicine*, 366(24), 2240–2242.

McCarthy, D., Mueller, K., & Wrenn, J. (2009, August). Mayo Clinic: Multidisciplinary Teamwork, Physician-Led Governance, And Patient-Centered Culture Drive World-Class Health Care. *New York: Commonwealth Fund*. Retrieved June 4, 2013, from http://longtermscorecard.org/~/media/files/publications/case-study/2009/aug/1306_mccarthy_mayo_case-study.pdf.

McGee, M. (2014, October 21). Medical Device Hacks: The Dangers. HealthcareInfoSecurity. Retrieved December 13, 2014, from http://www.healthcareinfosecurity.com/medical-device-hacks-dangers-a-7464.

McGowan, J. J., Cusack, C. M., & Bloomrosen, M. (2012). The Future of Health IT Innovation and Informatics: A Report from AMIA's 2010 Policy Meeting. *Journal of the American Medical Informatics Association : JAMIA*, 19(3), 460–467.

Price Waterhouse Coopers (PWC) Health Research Institute. (2013). Healthcare IT Staffing Strategies. Retrieved January 9, 2014, from http://pwchealth.com/cgi-local/hregister.cgi/reg/pwc-hri-healthcare-it-staffing-strategies.pdf.

Swan, M. (2009). Emerging Patient-Driven Health Care Models: An Examination of Health Social Networks, Consumer Personalized Medicine and Quantified Self-Tracking. *International Journal of Environmental Research and Public Health*, 6(2), 492–525.

Topol, E. J., Steinhubl, S. R., & Torkamani, A. (2015). Digital Medical Tools and Sensors. *JAMA*, 313(4), 353.

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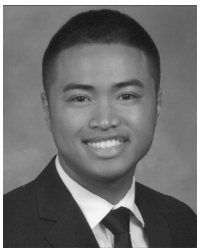

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