Competencies for Global Health Informatics Education: Leveraging the US Experience

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Abstract

The American Recovery and Reinvestment Act has encouraged unprecedented expansion of the health information technology (HIT) industry and offers strong employment opportunities for those that qualify. However, academic institutions have been slow to address the changing nature of the profession and develop core competencies for a global HIT economy. A global curriculum framework flexible enough to operate across multiple cultures provides the foundation to develop these competencies. The competencies include health administration, the healthcare environment, and data standards, along with other related knowledge, skills, and abilities. Together, these components provide guidance to educators and industry professionals as to how to properly educate the emerging workforce.

Introduction

The United States has a long history of implementation of health information technology (HIT), particularly electronic health records (EHRs) and related information systems. The first EHR and computerized provider order entry (CPOE) systems became available in the United States in the 1970s.[1] Adoption was slow for several decades, however. As various healthcare organizations embarked on a combination of commercial purchases, internal custom development, and unique applications of their technology, this sector began to see steady growth.

In 2009, the Health Information Technology for Economic and Clinical Health (HITECH) Act, part of the American Recovery and Reinvestment Act (ARRA), accelerated the adoption of EHR systems and related HIT nationwide in response to this government incentive program. The compliance metrics and certification criteria defined within the legislation encouraged more standardization than had previously existed, which theoretically will enhance the interoperability of systems. In addition, health systems, medical clinics, and other healthcare entities of all sizes and types around the country have begun to find common ground based on collective experience regarding best practices, necessary skill sets, and personnel needs in HIT implementation. The high number of implementation sites, ranging from large integrated health systems to single practitioner offices, provides a wealth of knowledge through cumulative successes and failures. These implementations include both a technical component and a human capital component to ensure that the HIT system(s) are properly installed and used to their full potential.

Literature detailing the characteristics of a successful EHR or HIT implementation exists,[2, 3] but less attention has been paid to the educational preparation of those responsible for these projects, including the competencies required of the HIT workforce. In Figure 1, we provide a framework for proficiencies that should be addressed in global HIT workforce training programs. This framework is based on standards set forth by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) and the American Medical Informatics Association (AMIA). A single program

likely cannot be adapted for use in all nations because of the differences in health systems and healthcare worldwide.[4] Rather, a framework that provides a foundation and flexibility for local adaptation will be more effective at bringing about positive health outcomes through technology internationally. The framework should mimic the three spheres of healthcare informatics: administration, healthcare environment, and data, which include the competencies put forth by CAHIIM and AMIA.

The following sections describe the competencies necessary for successful implementation of HIT.

Administration

Management (Project and Strategic)

Strategic planning is an important precursor to effective project implementation. As noted in a Saudi Arabian study in 2011, setting an effective vision is crucial to appropriately scoping a project from the beginning.[5] A poor vision and poor execution strategy can doom an otherwise well-developed project plan. By building skills in strategic planning, a health informatics professional can assist the organization in visualizing the end goal of the project and devising appropriate project management tasks to accomplish this vision.

From inception to conclusion, project management skills can be vital to the success of a project. In particular, as it relates to HIT, effective project management includes appropriate incorporation of clinical knowledge and resources early in the process. The larger a project becomes, the greater the importance of planning to ensure that all components of the project are addressed in a timely, logical order. Strong project management skills are essential for successful implementations and are a necessary competency for individuals pursuing a career in health informatics across the globe. For large, national HIT initiatives, such as that of Taiwan, project management can be invaluable in ensuring coordination throughout the program.[6]

Change Management

By clearly articulating the strategic plan and vision to stakeholders, successful HIT professionals can lessen the pain of mandated change and can implement appropriate change management techniques. Even in regimented, controlled environments, where change is demanded, acceptance of change can affect the outcomes.[7] The situation becomes even more complex when change within a health information system is not mandated, but rather requires engagement from disengaged stakeholders.[8–10] This is the case in many community healthcare settings in the United States, for example, where not all end users are necessarily employed by the organization or otherwise enjoined to accept change.

When incorporating change management into a global curriculum, it is important to remember that how individuals cope with change often depends upon the local environment. In particular, local cultural norms, traditions, and hierarchies can determine the best approach to change management from one country or region to the next. For example, in Japan a scheduled project update meeting may simply be an opportunity for individuals to report progress to the group, while in France the same meeting may serve as a discussion forum for new ideas.[11, 12] Effective HIT training programs around the world need to incorporate change management principles, but in a manner adapted to local norms. These principles should also include a strong focus on communication, particularly communication skills in the team setting. Effective communication requires not only competency in the principles of change management, but also knowledge, skills, and abilities in the area of cultural competencies.

Process Improvement

Much angst surrounds HIT implementations; however, long-term success depends on ongoing process improvement as the systems become a vital infrastructure in an ever-changing field. Medical knowledge is constantly growing and evolving as new medications, procedures, protocols, and diagnostics arise around the world. A continual review of workflow and process modeling data to improve patient care and outcomes is a priority in healthcare facilities.[13]

A number of process improvement mechanisms and tools exist. Process improvement skills and the methods behind them provide a framework in HIT training programs to allow HIT workers to know which tools to use in given situations. An effective process improvement system, coupled with effective use of tools, is likely to foster long-term stability and ongoing value derivation after a successful HIT implementation.

Finance

While it is unlikely that healthcare informatics professionals will find themselves in the finance department of a healthcare organization, a foundational knowledge of finance and, specifically, return on investment (ROI) will ensure their ability to lobby for resources in their facility. Financial knowledge is also important in the case of soliciting requests for information, proposals, and quotations. Without a basic understanding of financial principles, health informatics professionals may realize too late that their needs are not met by contractors and vendors. In addition to the ROI of resources, healthcare informatics professionals must be knowledgeable regarding the revenue cycle. This requirement will vary in countries that have a single-payer system, such as England, but information about costs of healthcare services are necessary to meet budget constraints and forecast facility expenditures.[14, 15]

Data

Data Management

To some degree, database management depends on the chosen technology platform for a particular HIT implementation. A basic understanding of database programming and interface maintenance can be helpful in fostering a greater understanding of a particular technology's capabilities. Certain additional skills also can be valuable as part of a training program. In HIT in particular, knowledge of data standards in a given environment is crucial.

Appropriate formatting and understanding of data yields an opportunity to take advantage of data warehousing and analytics. A particular benefit of HIT is the availability of health information in digital form, which allows for extensive analysis of information previously locked into paper formats that were difficult to review and combine. Through workforce training that combines an understanding of data and technology with local standards and formats for that data, a country-specific training program can prepare workers who will assist healthcare organizations in taking full advantage of the benefits to be gained from aggregated data that can be filtered.

Data Standards

Numerous standards bodies can exist within a country, sometimes related to similar aspects of care but addressing industry issues from a different perspective. While HL7 is an internationally recognized HIT standard, adoption of standards between countries can vary based on the decisions made by governing bodies. In the United States, the Health Insurance Portability and Accountability Act of 1996, as well as its subsequent iterations, endorses certain standards that maintain data integrity and privacy as data move between various health information systems. Use of function-specific standards thus becomes mandatory. The Office of the National Coordinator for Health Information Technology also endorses specific HIT standards for inclusion in EHR certification through its Meaningful Use program. The same standards and enforcement bodies may not be found in other nations, but global competencies should include the standards applicable to the region or country.

The Canada Health Infoway is an independent, federally funded body that reviews and endorses standards for use across Canada. As a result, while Canada and the United States share a common border, similar language profiles, and similar health technology states, systems developed in one country may not necessarily be transportable to the other without modification. In addition, implementation of HIT in a particular country may depend heavily on the standards (or lack of standards) in place in that country. Interoperability, data warehousing, program interfacing, and system configuration all hinge upon an understanding of how data tables match and which standards allow for seamless data flows. These data flows are important for matching the desired clinical processes and improving care outcomes.

Health informatics programs globally should include a country-specific evaluation of current standards, standards bodies, and common data types. At times, a poor choice of technology can lead to difficulties in experiencing the expected benefits of health informatics.[16] In particular, in a country that has primarily a single national system to be deployed, such as Taiwan, a deep understanding of the data types and standards correlation within the system is imperative to providing a trained workforce capable of implementing, maintaining, and refining the country's health information systems over time. For example, the use of disease data classifications such as the International Classification of Diseases, Tenth Revision (ICD-10) for determining health trends globally is imperative and supported by CAHIIM and AMIA standards.[17, 18]

Biostatistics/Analytics

Much of the anticipated benefit in digitizing health data derives from the subsequent ability to analyze the data in order to focus on health outcomes and population management. Payment and care provision models vary throughout the world, so the expected application of statistical analysis may be different from one health environment to the next. However, a statistical background and understanding of basic public health, epidemiology, and biology principles provides a foundation for biometry, analytics, and data use.[19, 20]

In a training program geared toward applications of HIT, a fundamental understanding of these principles can guide implementations in such a way as to arrange data flows that allow for downstream statistical analysis. After implementation, improved data analytics becomes an important benefit of having installed that technology. Manipulation of the data can also guide further maintenance and development of the systems, by identifying data gaps or opportunities for further data enrichment.

Healthcare Environment

Regulatory Environment and Ethical Considerations

Each nation's healthcare system has a unique regulatory environment, shaped by laws, payment models, safety and privacy regulations, and cultural norms. Thus, an understanding of an individual country's regulatory environment is necessary. In some countries, regulation may create an environment of "top-down" implementation driven by a national or regional mandate with specified performance criteria; in other countries, a lack of strong regulation may yield "bottom-up" HIT implementation focused on local business and strategic needs with unique, varied performance criteria.[21] Understanding regulatory requirements can facilitate a successful HIT implementation.

The US regulatory environment is unique, and expertise within it does not necessarily transfer to other nations. Nonetheless, the experience in the US HIT industry suggests that an understanding of the regulatory environment, regardless of the nation, is important to the success of HIT in both the short and long term. While a universal curriculum cannot be created to teach this competency is not possible because of the unique nature of individual nations and health systems, this model suggests that individual countries, under the leadership of their professional organizations, should adopt unique nationwide standards in this area. For example, privacy and (cyber)security are concerns that must be addressed to improve widespread acceptance of HIT worldwide.[22]

In addition to competencies related to regulatory environments, ethical considerations must be a central piece of the HIM competencies. These considerations include the areas of autonomy, beneficence, nonmaleficence, and justice.[23] Unlike the regulatory environment, ethical considerations cross social and cultural barriers and can be consistently added to curricula in all parts of the world.

Healthcare System

In each of the competencies listed above, an intimate knowledge of the healthcare system is mentioned as essential to the success of any HIT project. A true understanding of not only the regulations that guide the system but also the culture, norms, and traditions of the system is essential. HIT students

must have knowledge of the organization of health institutions and of the overall health system in their country before progressing to the informatics core competencies outlined by AMIA.

Patient-centered Care

In the United States, the HITECH Act will require the use of patient portals and other means of secure messaging between patients and physicians to earn incentives as part of the Meaningful Use program requirements in the coming years. European governments are also focusing on communication with the patient in an attempt to promote shared responsibility for health outcomes.[24] Research indicates that 61 million people use the Internet in lieu of an expensive visit to a healthcare provider,[25] and many patients use the Internet either in addition to or in lieu of a personal health record (PHR). Therefore, informatics students worldwide must embrace the concept of patient centeredness when studying HIT solutions. Specific knowledge of effective patient engagement techniques is essential to the success of government programs and the transformation of healthcare.

Conclusion

Recent experiences in the United States provide a wealth of knowledge that is applicable to other nations around the globe as they prepare and enhance their own workforces for optimal utilization of health information systems. Common experiences and methods in the United States can provide an excellent foundation for worldwide training programs. However, each program will need to be adapted to its local environment in order to be most effective. Use of the core competency framework described here will provide the foundation for localized adaptation in each environment. Additional research is needed in this area, including how core content can be modified across geographically diverse regions.

The level of detail of a training program can be matched to the desired outcome of its participants. Programs may range from certificate courses to doctorate-level training. Students must consider their personal goals and objectives in choosing the correct level of difficulty; in addition, an organization must determine its needs in directing and/or employing individuals based upon their level of training. HIT training programs abroad likely will need to incorporate multiple tiers of depth and breadth in conjunction with the scope of work to be done within that country.

Global HIT programs cannot be monolithic and be effective in every environment. Local adaptation is necessary and desired. Thus, education that focuses on underlying principles and tools will be more effective than purpose-specific training in any given environment. Those common principles and skills, when adapted into a local environment or even for a specific project, have the potential to make a trained workforce more effective.
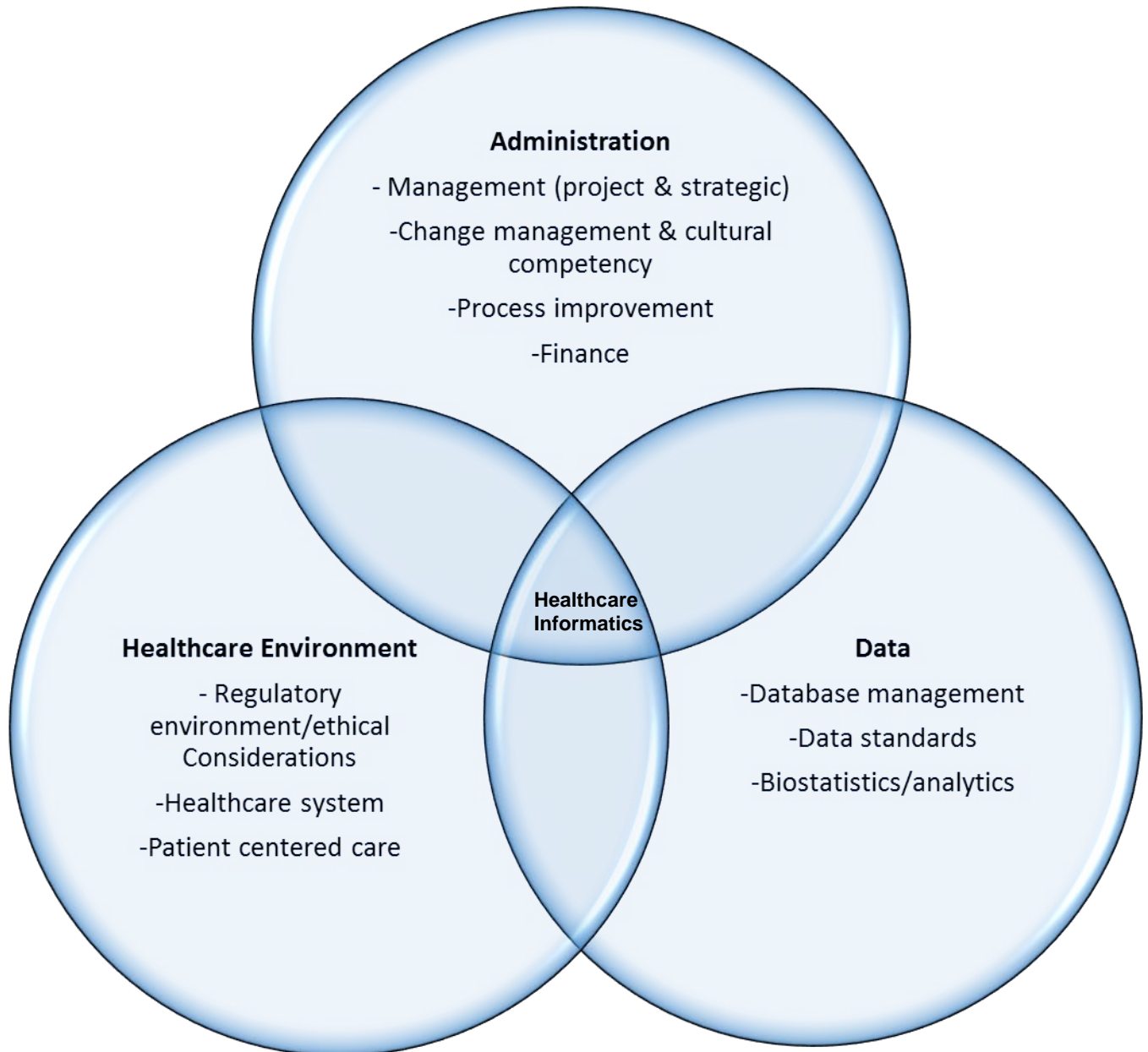
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Figure 1

Curriculum Environment Overview

Administration

- Management (project & strategic)

-Change management & cultural competency

-Process improvement

-Finance

Healthcare Environment

- Regulatory environment/ethical Considerations

-Healthcare system

-Patient centered care

Healthcare Informatics

Data

-Database management

-Data standards

-Biostatistics/analytics

Notes

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