Defining Health Informatics

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[dih-fahy-ning] [helth] [in-fer-mat-iks]

adjective, noun, noun

1. An educator's in-depth look at what informatics is and what it can do for HIM professionals

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In the movie *Annie Hall*, Woody Allen finds himself in a movie theater line in front of a man who seemingly knows everything about, well, everything. When the discussion turns to the theories of philosopher Marshall McLuhan, an enraged Allen pulls McLuhan from the shadows to give the malefactor his comeuppance. Allen then gazes into the camera and asks, "Boy, if life were only like this?"

A scene similar to the one described above is unfolding in healthcare as it relates to the field known as "informatics." In some circles informatics is seen as the answer to everything that ails healthcare, while in others it's a way to make life simple for physicians, patients, administrators, regulators, third party payers-all healthcare parties.[1,2] To evaluate the truth of these statements, several important questions need to be asked:

- What is *informatics*?
- How do the various adjectives preceding the term informatics (such as health, dental, medical, imaging) impact its meaning?
- How can a specific example such as "health informatics" enable a health information management professional to improve how healthcare is delivered in the US?

An explanation of just what HIM and other healthcare professionals consider health informatics is somewhat complex.

Origins of Informatics

The Oxford English Dictionary notes that the term "informatics" originated from three semantically independent foreign language terms-the Russian "informatika," the French "informatique," and the German "informatik." The dictionary explains that the German informatik signifies "the automated processing of information," while the French informatique represents "the branch of study dealing with (automated) information processing in general." The Russian informatika is "the theory of scientific information." All three terms have been used in English to describe "the academic subject known as computer science." The dictionary entry concludes by offering the following definition for the term informatics:

"The branch of study that deals with the structure, properties, and communication of information and with the means of storing or processing information."

Juxtaposed is the definition used by informatics expert William Hersh, who identified the field in a journal paper as a "discipline focused on the acquisition, storage, and use of information in a specific setting or domain."

The identification of a specific setting or domain is important because it highlights what Hersh calls the "adjective problem" or the innumerable set of "words that precede the term informatics."

Listen to any conversation that includes the subject of technology and healthcare and one may hear the terms medical informatics, health informatics, dental informatics, bioinformatics, imaging informatics, nursing informatics, or clinical

informatics. All of these expressions do not mean the same thing-informatics is different depending on the preceding adjective. An understanding of the field of biomedical informatics helps illustrate the differences.

Biomedical Informatics Defined

The Board of the American Medical Informatics Association (AMIA) defines biomedical informatics (BMI) as an "interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem-solving, and decision-making, driven by efforts to improve human health." This definition is further qualified by four corollaries: the scope and breadth of the discipline, theory and methodology, technological approach, and the human and social context.

Scope and Breadth

BMI explores logical methods to represent, simulate, test, and transform biomedical data across a variety of points including molecular, individual, population, biological, and social data, using basic and applied research within the healthcare arena, according to AMIA.

Theory and Methodology

BMI is concerned with developing theory and applying that theory to generate new methods to effectively store, retrieve, use, manage, and share biomedical data, information, and knowledge.

Technological Approach

BMI investigates and applies computer science, information technology, information science, and data communications in a continuous effort to uncover novel methods for storing, retrieving, using, and disseminating biomedical information.

Human and Social Context

BMI theories, methods, and applications emanating from the field have a direct and profound impact on people. Therefore, those who use BMI must be careful to employ a systems perspective examining the sociological, behavioral, organizational, and ethical impact that artifacts from the field have on the healthcare professionals using them, and the patients who receive the services influenced by informatics.

Health Informatics Positions

The study of health informatics effectively translates into many "real-world" professions. The following is a list of common positions that health informaticians occupy in the healthcare industry, along with their base job descriptions.

Clinical Systems Specialist

Evaluate clinical information needs and processing requirements for departments within a healthcare facility. Investigate and develop automated clinical systems that support the mission and vision of the hospital.

Senior Systems Analyst, Interface Data Analyst

Experience working with interface engine software (Openlink, Corepoint, or Cloverleaf). Strong knowledge of HL7 and HIE. Has relevant experience in data extraction and moving information among different applications within a heterogeneous healthcare information system.

Director of Health Information Management (HIM)

Accountable for the successful maintenance of patient records, both electronic and paper based, and the organization and administration of the health information management department.

Lead Patient Care Informatics Specialist

Act as a liaison to nursing, physicians, and information services. Candidate must feel comfortable being involved in the development, implementation, management, and support of a clinical information system.

Manager of Analytic Services

Construct analytical models to support program evaluation, operational and clinical analyses, and reporting for responsible business units or organizations. Design and implement analytical solutions to improve processes, measure clinical quality goals, and meet regulatory reporting and analysis requirements.

Health Information Management – Senior Application Specialist

Thorough understanding of multi-application software and its inter-relationship with the delivery of healthcare. In-depth understanding of workflow in health information management is required.

Biomedical Informatics vs. Health Informatics

To understand the relationship between biomedical informatics and other disciplines, the Board of the American Medical Association states that “BMI is the scientific discipline that supports applied research and practice in several biomedical disciplines.” Two of those disciplines-bioinformatics and health informatics-use the “methods, techniques, and theories” generated by biomedical informatics and apply them in specific situations. For example, bioinformatics can be defined as the “application of informatics in cellular and molecular biology, often with a focus on genomics,” according to Hersh. Health informatics can be fully described as a discipline focused on the acquisition, storage, and use of information in healthcare when directly applied to patients or healthy individuals, according to AMIA. Health informatics can be further divided into sub-specialties such as:

- Clinical informatics-informatics applied in a clinical setting
- Medical informatics-informatics applied to physicians
- Nursing informatics
- Dental informatics
- Public health informatics

The key to understanding all of these terms is to define general informatics and the setting in which practice is taking place.

A symbiotic relationship exists between BMI and related disciplines and sub-specialties. For example, the discipline of health informatics provides an arena for BMI to apply its theories, methods, and applications in settings such as hospitals, clinics, and primary care offices. Important knowledge is gained from the direct application of these artifacts that can be used to improve theory and generate new knowledge in both related sub-specialties and disciplines and the field of BMI. A continuous cycle made up of theory, application, and practice is formed between the disciplines and sub-disciplines, allowing the field to continually evolve and grow over time.

Defining Informatics’ Role and Competencies

A professional working in the informatics field is called an informatician. A professional working in a specific discipline, like healthcare, is called a health informatician. A relevant question to ask is what skills must these individuals possess to be considered capable in a chosen area? More importantly, what informs institutions of higher learning regarding the development of curriculum, programs, and courses designed to provide individuals with needed skills to perform within a select area of informatics?

The answer is each academic area of informatics has developed a set of competencies, created and regulated by a governing body. For example, AMIA has created a set of core competencies to be used as a "set of recommendations or guidelines for graduate education in BMI." For health informatics, a preliminary set of competencies has been created by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM), while Technology Informatics Guiding Education Reform provides a set of guidelines for nursing informatics.

HIM's Role in Health Informatics

In the past, a major responsibility of the health information management (HIM) professional was maintaining and securing the paper medical record. As use of electronic medical records continues to grow, this role has expanded into diverse areas such as digital security and privacy, system acquisition and implementation, disaster planning, and system analysis. This has led to a hotly contested debate within the field where many believe that in order to earn the respect of administrators and physicians, as well as an increase in salary, HIM professionals need to obtain a graduate degree.

Hersh clarifies this point by stating that "HIM professionals have historically been educated at the associate or baccalaureate level whereas informaticians often come from clinical backgrounds, including those with doctoral degrees, such as M.D., Pharm.D., etc." Based on the discussion thus far, a natural progression for the HIM professional would be to pursue graduate-level training in the field of health informatics.

CAHIIM has outlined three broad curriculum facets for health informatics graduate degree training. These facets include "Information Systems," "Informatics," and "Information Technology." Under the facet of Information Systems, professionals will need to possess competencies in system design, project management, workflow re-engineering, health IT standards, and electronic health records. Within the Informatics facet, competencies include medical decision-making, the human-computer interface, clinical decision support, and text and data mining. In the third and final facet of Information Technology, competencies include health information technology expertise, principles of data representation, electronic data exchange, systems testing and evaluation, and networking principles.

An HIM professional holding a master's degree in health informatics can play an integral part in the acquisition, implementation, and testing of new clinical applications at their healthcare organization. During the acquisition process, the HIM professional may work on a team performing system analysis and design. As part of the team, the HIM professional may execute a needs assessment, identify a set of needs, build the organization's strategic plan, develop a set of functional requirements and technical specifications for the new system, perform site visits, and participate in vendor demonstrations. Furthermore, the HIM professional can engage in the practice of workflow analysis to re-engineer current processes in an effort to optimize the use of the new technology throughout the organization.

Once the new application has been acquired, the HIM professional can develop the forms, templates, and screens used by physicians, nurses, and ancillary clinical staff to input/retrieve data in the new system. The key to the success of this process is for the HIM professional to work in direct contact with the end-users of the system. This will require the HIM professional to perform a detailed task and cognitive analysis of how healthcare professionals perform their jobs to determine how the new technology can optimize the execution of daily tasks.

Finally, the HIM professional can create databases to store information within the application, and develop and harden telecommunication networks to allow data to be transmitted to providers who may be practicing at satellite organization facilities. The HIM professional can also be involved in testing the new application to ensure all identified requirements operate at functional levels and strategic goals of the organization are being met. Further testing to ensure data from the new application is interoperable with other organization applications is also vital.

This is just a sampling of how an HIM professional working as a health informatician can contribute to the design, development, and day-to-day operation of an organization's health information system.

More than Just Computer Science

Early uses of the term informatics were linked to the field of computer science, and the applied field of information technology. As a field of study, however, informatics entails more than just computer science. While informatics makes use of research emanating from computer science through direct application of research to solve current problems, the main focus is

"information" and how that information affects the processes, procedures, communication practices, and individual actions that have a direct impact on the type of care provided.[4]

This point is highlighted by research that shows that in order for health IT to be productive, "for every dollar invested in IT systems, firms typically had to invest several dollars for implementation, training, and process redesign."[4] Health informatics isn't just about health IT, it is a systematic way to use information to improve the healthcare process.

Just don't tell Woody Allen that you are an informatics expert now.

Notes

1. Shortliffe, E., and J. Cimino. (ed). *Biomedical Informatics: Computer Applications in Health Care and Biomedicine.* 3rd Edition. New York: Springer, 2006.
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4. Jones, S., Heaton, P., Rudin, R., E. Schneider. "Unraveling the IT productivity Paradox-Lessons for Health Care." *New England Journal of Medicine.* 366: 24; p. 2243–2245.

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