Training Health Care Personnel to Work with Health Care Data

Elizabeth Layman, PhD, RHIA, CCS, FAHIMA

The Institute of Medicine of the National Academies (IOM) has recognized since the early 1990s that the United States needs an electronic health record system.[1-3] An electronic health record system is the keystone of the US Department of Health and Human Services' overarching initiative to increase the use of health information technologies in the health care sector. Two IOM reports, *To Err Is Human: Building a Safer Health System* and *Crossing the Quality Chasm: The IOM Health Care Quality Initiative*, particularly encouraged the migration to electronic health record systems.[4,5]

Underpinning the requirements for health care data are the recommended 8 core functionalities and 6 key capabilities of electronic health record systems.[3] A brief review of selected core functionalities and key capabilities suggests the extensive scope of health care data that is needed. For example, health information and data is a core functionality. Data associated with health information are patient or client demographics, facility and provider identification, encounter dates, admission and discharge dates, disease and service codes, clinical notes, problem lists, and medication lists. Decision support is another core functionality. Limited examples of health care data needed for decision support are warnings and contraindications for medications, out-of-range values for laboratory tests, and reminders for interventions and screenings. Reporting and population health management is another core functionality. A few examples of health care data needed for this management include specimens, procedures, results, laboratory identification, patient's temperature, outbreak data, adverse event reports, and registry data.

The 6 key capabilities describe what electronic health record systems should be able to do. The first key capability is longitudinal collection of data for and about individuals. Thus, electronic health record systems should be able to assemble the health care data about an individual across the span of that individual's life from all the sites of health care delivery. Examples of these sites include hospitals, physician offices, health departments, pharmacies, fitness centers, student health services, radiologic centers, dental offices, ophthalmologic practices, mental and behavioral health centers, rehabilitation units, and skilled nursing facilities. Related to longitudinal collection is interoperability, another key capability. Interoperability allows linkages among providers. Through these linkages, providers are able to exchange data. For example, dental offices can check insurance eligibility and benefits. Another important capability is that electronic health record systems allow authorized users to access individual and aggregate data. Thus, in addition to supporting clinical decision making at the point of care, electronic health record systems allow policy makers to analyze aggregate data. The key capabilities, therefore, support the delivery of integrated health care to individuals and to populations.

"Effective use of health care data means that health care personnel, health care organizations, and health care systems have real-time information about the health of individuals and of populations…"

The variety, sources, and uses of health care data indicate the complexity of the training effort that is needed. After training, health care personnel should be able to transform individual health care data elements into information and information into knowledge. With knowledge, the health care sector can

Elizabeth Layman, PhD, RHIA, CCS, FAHIMA, is professor and chair of the Department of Health Services and Information Management at East Carolina University in Greenville, North Carolina. She can be reached at laymane (at) ecu.edu.

promote high standards, interoperability, and effective use of health care data.

High standards of care are represented by evidence-based practice. Evidence-based practice can be the use of medical and health knowledge in external referent systems or the use of standards promulgated by the professional associations and oversight entities. One key capability of electronic health record systems is the ability to connect to external knowledge such as drug references, clinical laboratory tests manuals, and anatomical references. For health care organizations, an example of a high standard of care is assuring that providers have complete health records upon which to base diagnosis and treatment. Evidence-based practice may also be supported by clinical guidelines and quality measures. For example, the National Quality Measures Clearinghouse sponsored by the Agency for Healthcare Research and Quality lists quality measures by professional association/developer, disease/condition, treatment/intervention, and measure.[6] These measures are data driven. The mortality rate for acute myocardial infarction per 100 discharges requires data on diagnostic codes, discharge status, and numbers of discharges. In addition, to put the rate in context, data on numbers of transfers, on length of stay, and on risk factors are also needed. In another example, the Centers for Medicare and Medicaid Services has process measures that require data to calculate median time from arrival at a hospital to the administration of fibrinolytic agents in patients with ST segment elevation and to calculate the percent of patients with acute myocardial infarction who have a history of smoking cigarettes and who receive smoking cessation counseling during the hospital stay. Thus, health care data can support quality improvement when the data are available in real time at the point of clinical decision making as well as retrospectively when they are available for analysis.

Interoperability is based on messaging standards or data exchange standards for information systems. These standards enable health care data to be exchanged and used among information systems across multiple sites of care. Many organizations have been involved with the development of these standards, and a lack of coordination has impeded interoperability. Examples of standards include Health Level 7 (HL7); clinical medical vocabularies such as the Systemized Nomenclature of Medicine, Clinical Terms (SNOMED-CT), Logical Observation Identifiers Names and Codes (LOINC), and the Unified Medical Language System (UMLS); and Digital Imaging and Communications in Medicine (DICOM). E-prescribing has been made possible by the National Council for Prescription Drug Programs (NCPDP) standards. The American National Standards Institute (ANSI) has developed messaging standards for the exchange of financial and administrative transactions. The ASTM (formerly American Society for Testing and Materials) has created many standards for electronic health record systems in the areas of health data security, record content, and the continuity of care record. Recently, a working group of the American Health Information Community has been very active in recommending and testing interoperability specifications (IS).[7] Functional electronic health record systems are dependent upon the coordination of these many standards.

Effective use of health care data means that health care personnel, health care organizations, and health care systems have real-time information about the health of individuals and of populations and that they have this information when they need it and in formats they can easily understand. For example, when opening the record of a patient with diabetes, the endocrinologist has immediate access to HbA1c values both as raw data and as a line graph. Moreover, if the patient was hospitalized in another state, the HbA1c values from the out-of-state hospital stay have automatically flowed into the physician's record. In terms of effective use of health care data at the organizational level, the medical group to which the endocrinologist belongs can aggregate the data for its patients with diabetes. In another example, health care data will flow—when authorized—from the hospital to the home health agency or from the rehabilitation center to the durable medical equipment vendor. At the system level, effective use of health care data would allow policy makers, administrators, and analysts to project demand, supply, and distribution of health care personnel. Generally, effective use of health care data also requires that health care personnel, health care organizations, and health care systems can manipulate the data to create knowledge about individuals' and populations' health at any point in time as well as over time.

Within health care organizations, the key health care personnel needing initial training are physicians, nurses, information service technicians, and clerical personnel. Physicians and nurses generate the volume of health care data. Information service technicians could anticipate report structures if they understood secondary uses of health care data in accreditation, regulation, and reimbursement. Training clerical personnel would enhance the accuracy of data entry. This training could be received in many formats including continuing education at conferences, on-site sessions in education departments of health care organizations, online continuing education from universities, and formal classes at community colleges and universities.

According to a recent report, 1000 public health informaticians and 1000 public health executives with informatics leadership training are needed in the health care system by 2010.[8] A public health informatics officer would be placed in each state health department. The authors of the report recommend both continuing education and formal education.

Nationally, several training and educational opportunities exist, many of which are online. The American Medical Informatics Association (AMIA) is developing a certification for physician clinical informaticians.[9] Under a grant from the Robert Wood Johnson Foundation, the AMIA is also developing a core content document and a draft set of training requirements for a physician subspecialty in applied clinical informatics.[9] Additionally, in order to generate sheer numbers, the AMIA has the "10x10" initiative or 10 000 clinical informaticians by the year 2010.[10] Under this initiative, universities, professional medical associations, and the AMIA itself are offering single and multiple courses to

expand the knowledge of electronic health records, health care quality, exchange standards, public health informatics, and bioinformatics. Examples of initiatives include the Centers for Disease Control and Prevention two-year fellowship in public health informatics[11] and the Technology Informatics Guiding Education Reform (TIGER) Initiative which aims to make informatics a nursing competence.[12] The establishment of these initiatives represent current efforts to prepare health care personnel to use health care data.

In North Carolina, several options exist to train people to work with health care data. First, North Carolina has a well organized and robust system of Area Health Education Centers (AHECs). A search of the statewide calendar identified an offering entitled "health information on the Internet."[13] The AHECs also offer online courses. Second, North Carolina has an extensive community college system. This system offers individual courses on health care data or one-year certificates and associate degrees in fields that use and manage health care data. Community college offerings are both face-to-face and online. Finally, campuses of the University of North Carolina system offer individual courses and baccalaureate, masters, and doctoral degrees in health or medical informatics. Some of these offerings are also online.[14] While these examples focus on systems in North Carolina, other states have similar systems.

A 2006 joint report of the American Health Information Management Association and the AMIA identified 2 levels of competence for health personnel, as both health information users and health information specialists.[15] Physicians and nurses are the prime health information users, while other users include health administrators, policy makers, and regulators who make decisions based on the data. Reimbursement specialists at a health insurance company are also health information users and use the data to determine whether to pay a claim. Health information specialists comprise health information managers, applied clinical informaticians, and information technology resource managers. These personnel work to assure the integrity of the technological infrastructure and the quality of the health care data. For example, they work to ensure the security of off-site storage and the accuracy of coded data. The competence required of these health information specialists and health information users depends upon the support available to them and the independence of their use of the health information.

Competence involves both breadth and depth of knowledge within domains. General domains include biomedical sciences; health care delivery system; information and communication technologies; information management planning; electronic health information systems; data standards; data privacy, security, and confidentiality; data analysis and outcomes (decision support, accreditation, regulation, accountability); and leadership. Minimal educational foundations needed to work with health care data include biomedical sciences, health care delivery systems, information and communication technologies, and regulations and accreditation standards. Health informaticians such as public health informaticians or nurse executive-informaticians would need knowledge across the 4 general domains. Dependent upon the discipline of the health personnel member, additional content areas could include classifications, nomenclatures, terminologies, and taxonomies; epidemiology; health law; organizational behavior and management; and research and statistics.

Within all the domains, the extent of expertise depends upon the role of the health personnel member. For example, a telehealth communications specialist setting up the connection between a local physician at an assisted living center and a tertiary care center needs to know the definitions of the sites in the continuum of care so he or she will know what assisted living centers and tertiary care centers are. On the other hand, an inspector from the North Carolina Division of Health Service Regulation not only needs to know all the sites of care but also all the regulatory requirements for each of those sites. Determining how wide and how deep people need to be trained will require ongoing study and review by professional associations and academic disciplines as electronic health records develop and spread throughout the continuum of care.

Promoting high standards for quality through interoperability and effective use of health care data are compelling reasons to train health care personnel to understand how to use health care data. Current health personnel need training through continuing education, and future health personnel need training in their basic and academic preparation. A sustained effort is needed to achieve the long-term goal of a data-prepared workforce. **NCMJ**

REFERENCES

1 Dick RS, Steen EB, eds. *The Computer-Based Patient Record: An Essential Technology for Health Care*. Washington, DC: National Academies Press; 1991.

2 Dick RS, Steen EB, Detmer DE, eds. *The Computer-Based Patient Record: An Essential Technology for Health Care*. Revised ed. Washington, DC: National Academies Press; 1997.

3 Committee on Data Standards for Patient Safety, Institute of Medicine of the National Academies. *Key Capabilities of an Electronic Health Record System*. Washington, DC: National Academies Press; 2003.

4 Committee on Quality of Health Care in America, Institute of Medicine of the National Academies. *To Err is Human: Building a Safer Health System*. Washington, DC: National Academies Press; 2001.

5 Committee on Quality of Health Care in America, Institute of Medicine of the National Academies. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.

6 National Quality Measures Clearinghouse. Agency for Healthcare Research and Quality Web site. http://www.qualitymeasures.ahrq.gov/about/about.aspx. Updated March 24, 2008. Accessed March 22, 2008.

7 American Health Information Community: Meetings, January 22, 2008. Department of Health and Human Services Web site. http://www.hhs.gov/healthit/community/meetings/m20080115.html. Accessed March 22, 2008.
8 American Health Information Community: Meetings, January 22, 2008. Population Health and Clinical Care Connections Workgroup of the American Health Information Community. Department of Health and Human Services Web site. http://www.hhs.gov/healthit/community/meetings/m20080115.html. Accessed March 22, 2008.
9 Frequently asked questions – draft core content document for applied clinical informatics. American Medical Informatics Association Web site. http://www.amia.org/inside/initiatives/rwj/faq.asp. Updated January 2, 2008. Accessed January 10, 2008.
10 AMIA 10x10: 10,000 trained by 2010. American Medical Informatics Association Web site. http://www.amia.org/10x10/. Updated July 25, 2007. Accessed January 8, 2008.
11 Public health informatics fellowship program (PHIFP) at CDC. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/EPO/PHIFP. Updated November 26, 2007. Accessed March 31, 2008.
12 The TIGER initiative: evidence and informatics transforming nursing: 3-year action steps toward a 10-year vision. T.I.G.E.R. Technology Informatics Guiding Education Reform Web site. https://www.tigersummit.com/uploads/TIGERInitiative_Report2007_bw.pdf. Accessed January 8, 2008.
13 State-wide calendar of continuing education. North Carolina Area Health Education Centers Web site. http://db.ncahec.net/ncahec/cecal/calendar.cfm. Accessed January 11, 2008.
14 The University of North Carolina Online. University of North Carolina system Web site. http://www.online.northcarolina.edu/. Accessed March 31, 2008.
15 Steering Committee of the American Health Information Management Association and the American Medical Informatics Association. *Building the Work Force for Health Information Transformation*. Chicago, IL: American Health Information Management Association; 2006. http://www.ahima.org/emerging_issues/Workforce_web.pdf. Published January 8, 2008. Accessed March 31, 2008.