

Informatics Education and Competency: Necessary for Effective Information Technology Use in Health and Biomedicine

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1

Overview of talk

- Biomedical and health informatics
- Why we need more of it (and health information technology, or HIT)
- What we know about the HIT workforce
- How we can/should build the HIT workforce
- The HITECH workforce development program



2

Biomedical and health informatics (BMHI) (Hersh, 2009)

- “The field that is concerned with the optimal use of information, often aided by the use of technology, to improve individual health, health care, public health, and biomedical research”
 - It is more about information than technology
- Assertion: Its optimal usage also requires people (Hersh, 2010)
 - Academics/researchers
 - Practitioners/professionals
 - Users

5



Why do we need more of it?

- In health care
 - Quality – not as good as it could be (McGlynn, 2003; Schoen, 2009; NCQA, 2010)
 - Safety – IOM “errors report” found up to 98,000 deaths per year (Kohn, 2000)
 - Cost – rising costs not sustainable; US spends more but gets less (Angrisano, 2007)
 - Inaccessible information – missing information frequent in primary care (Smith, 2005)
 - Empowering clinicians, e.g., nursing (Gugerty, 2009)

6



Why do we need more? (cont.)

- In research
 - A “learning health care system” (Eden, 2008; Friedman, 2010)
 - Improving clinical and translational research (Embi and Payne, 2009) by breaking translational barriers (Payne, 2005) and facilitating evidence-generating medicine (Embi)
- In public health (Araujo, 2009; upcoming AMIA PHI 2011 meeting), especially with growing public health value of clinical information (Bonander, 2010)
- For patients and consumers
 - Personal health records (Miller, 2009)
 - Other empowering applications (Gibbons, 2009)

7



In 2009, a new advocate entered

A screenshot of a CNN.com news article. The top navigation bar includes "HOME", "WORLD", "U.S.", "POLITICS", "CRIME", and "ENTERTAINMENT". Below the navigation bar, there are "Hot Topics" links for "U.S. Economy", "Movies", "Gaza", and "Consumer". The article is dated "updated 7:42 a.m. EST, Mon January 12, 2009". The main image is a portrait of Barack Obama. The headline reads "Obama's big idea: Digital health records". The sub-headline states: "President-elect Barack Obama, as part of his effort to revive the economy, is proposing a massive effort to modernize health care by making all health records standardized and electronic. The government estimates about 212,000 jobs could be created by this program, CNNMoney reports. full story".

“To lower health care cost, cut medical errors, and improve care, we’ll computerize the nation’s health records in five years, saving billions of dollars in health care costs and countless lives.”

First Weekly Address
Saturday, January 24, 2009

8



Health Information Technology for Economic and Clinical Health (HITECH) Act

- Portion of the American Recovery and Reinvestment Act (ARRA) that allocates up to \$29 billion to the Office of the National Coordinator for Health IT (ONC) to provide incentives for “meaningful use” of health information technology (HIT) through (Blumenthal, 2010; Blumenthal, 2010)
 - Adoption of electronic health records (EHRs)
 - Health information exchange (HIE)
 - Infrastructure
 - Regional extension centers – 62 across country
 - Research centers – four centers in specific areas
 - Beacon communities – 17 “beacon” demonstration projects
 - Workforce development programs – develop and implement it all

9



The people of informatics are a necessary component

- Focus on where we have data or recommendations
 - HIT workforce
 - Informatics competencies
- Research and development challenges for where we don't

10



What do we know about the HIT workforce?

- Largest (but not only) need now in healthcare settings
- Traditional groupings of professionals in healthcare
 - Information technology (IT) – usually with computer science or information systems background
 - Health information management (HIM) – historical focus on medical records; certified as
 - Registered Health Information Administrator (RHIA)
 - Registered Health Information Technologist (RHIT)
 - Clinical Coding Specialist (CCS)
 - Clinical informatics (CI) – often from healthcare backgrounds; focus on use of clinical information
- Most research about workforce has focused on counts of professional groupings (usually IT or HIM staffing)

11



What do the data show?

- Mostly done in hospital settings; usually focused on one (of three main) groups
 - IT – HIMSS Analytics Database™ study
 - HIM – Bureau of Labor Statistics data
 - CI – mainly estimates
- Recent work focused on needs for the ARRA EHR agenda, i.e., meaningful use

12



HIMSS Analytics study (Hersh and Wright, 2008)

- Assessed current and anticipated HIT workforce needs using HIMSS Analytics Database™ (www.himssanalytics.com), which contains
 - Self-reported data from about 5,000 US hospitals, including number of beds, total staff FTE, total IT FTE, applications, and vendors used for applications
 - EMR Adoption Model™, which scores hospitals on eight stages to creating a paperless record environment

13

HIMSS Analytics EMR Adoption Model™

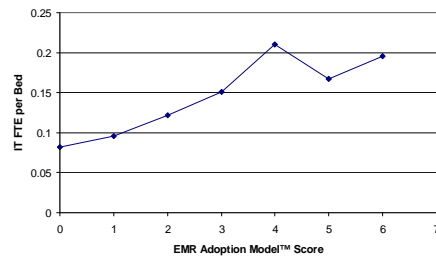
Level required for documented benefits of HIT (*meaningful use?*)

Stage 7	Medical record fully electronic; CDO able to contribute to EHR as byproduct of EMR
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS
Stage 5	Closed loop medication administration
Stage 4	CPOE, CDSS (clinical protocols)
Stage 3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology
Stage 2	CDR, CMV, CDSS inference engine, may have Document Imaging
Stage 1	Ancillaries – Lab, Rad, Pharmacy – All Installed
Stage 0	All Three Ancillaries Not Installed

14

Results

- IT per non-IT staff ~ 1:60
- IT FTE per bed rises from stages 0 to 4
- Extrapolating to country as a whole
 - 108,390 IT staff at current adoption levels
 - Would increase to 149,174 if all stages <4 hospitals moved to stage 4
 - Sound bite: Need for >40,000 more!



Limitations of study:

- Extrapolations
- Data incomplete
- Does not include CI or HIM
- Current practices, not best practices

15



HIM data from US Bureau of Labor Statistics

- From US Bureau of Labor Statistics occupational employment projections 2008-2018 (BLS, 2009)
 - Medical Records and Health Information Technicians (RHITs and coders) – about 172,500 employed now, increasing to 207,600 by 2018 (20% growth)
- Also employed as managers and in a variety of other occupations (RHIAAs)

16



Clinical informatics

- Individuals who bring skills at intersection of health care and IT (Hersh, 2008; Hersh, 2009)
 - Focus more on information than technology
 - Likely to lead “meaningful use” of HIT
- Estimates of need
 - One physician and nurse in each US hospital (~10,000) (Safran, 2005)
 - About 13,000 in health care (Friedman, 2008) and 1,000 in public health (Friedman, 2007)
 - Growing role of CMIO and other CI leaders (Leviss, 2006, Shaffer, 2010)
 - Limitation: Lack of Standard Occupational Code (SOC) – more important than we think (BLS, 2004)

17



ONC estimates 51,000 needed for HITECH agenda in 12 job roles

- Mobile Adoption Support Roles
 - Implementation support specialist*
 - Practice workflow and information management redesign specialist*
 - Clinician consultant*
 - Implementation manager*
- Permanent Staff of Health Care Delivery and Public Health Sites
 - Technical/software support staff*
 - Trainer*
 - Clinician/public health leader†
 - Health information management and exchange specialist†
 - Health information privacy and security specialist†
- Health Care and Public Health Informaticians
 - Research and development scientist†
 - Programmers and software engineer†
 - Health IT sub-specialist†

(to be trained in *community colleges and † universities)

18



How do we build the workforce?

- Historically most education at graduate level
 - Informatics is inherently multidisciplinary and there is no single job description or career pathway
- More information on programs on AMIA web site
 - <http://www.amia.org/informatics-academic-training-programs>
- Commentary at
 - <http://informaticsprofessor.blogspot.com>
- Let's look at
 - Competencies
 - Career pathways
 - OHSU program experience
 - ONC Workforce Development Program

19



What competencies should informaticians have? (Hersh, 2009)

Health and biological sciences:

- Medicine, nursing, etc.
- Public health
- Biology

**Competencies required in
Biomedical and Health
Informatics**

Management and social sciences:

- Business administration
- Human resources
- Organizational behavior

Computational and mathematical sciences:

- Computer science
- Information technology
- Statistics

20



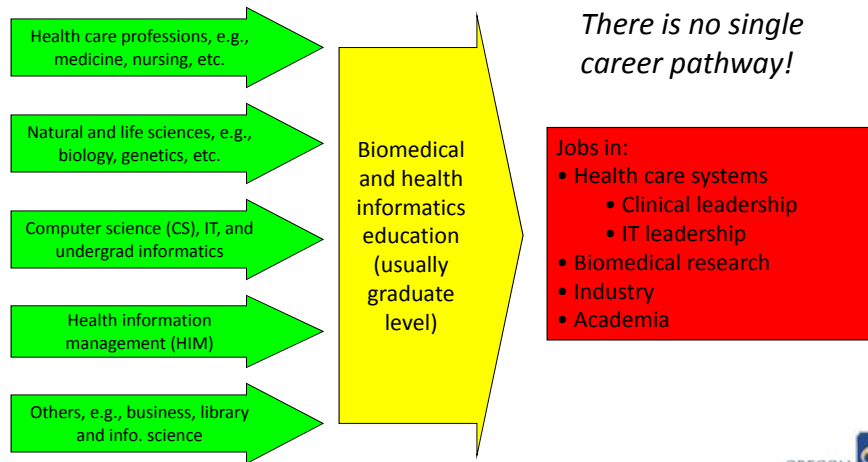
Inventory of competencies for various groups (Hersh, 2010)

- Competencies differ by group
 - Informaticians
 - Developing, implementing, and evaluating systems
 - Making optimal use of information
 - Clinicians
 - Applying informatics in delivery of care
 - Patients
 - Health information literacy

Table 2 Inventory of competencies in biomedical and health informatics.

Organization or Journal [Reference]	Year	Discipline	Title
Association for Computing Machinery [49]	1978	Computer science	Health Computing; Curriculum for an Emerging Profession
[50]	1992	Informatics	Recommendations of the German Association for Medical Informatics, Biometry and Epidemiology
Association of American Medical Colleges [51]	1999	Medical students	Medical School Objectives Project: Medical Informatics
International Medical Informatics Association [52]	2000	Informatics	Recommendations of the International Medical Informatics Association (IMIA) on education in health and medical informatics (updated in 2010)
UK National Health Service [53]	2001	Informatics	Health Informatics Competency Profiles for the NHS
American Nurses Association [54]	2001	Nursing	A Delphi Study to Determine Informatics Competencies for Nurses at Four Levels of Practice
...			
Nursing Clinics of North America [68]	2008	Nursing	Technology and informatics competencies
AMIA-OHSU 10x10 Course [69]	2009	Informatics	AMIA-OHSU 10x10 Program - Detailed Curriculum, Learning Objectives
AMIA Core Content for Clinical Informatics [35]	2009	Informatics	Core content for certification of physicians (with others to follow later)
TIGER Nursing Informatics [70]	2009	Nursing Informatics	TIGER Informatics Competencies Collaborative (TICC) Final Report
Office of the National Coordinator for Health IT [71]	2009	Electronic health record adoption	HIT Workforce Competencies by Role
Centers for Disease Control and Prevention, [72]	2009	Informatics	Public Health Informatics Competencies
International Medical Informatics Association [73]	2010	Informatics	Recommendations of the International Medical Informatics Association (IMIA) on education in biomedical and health informatics

Career pathways have diverse inputs and outputs (Hersh, 2009)



Experience of the OHSU program

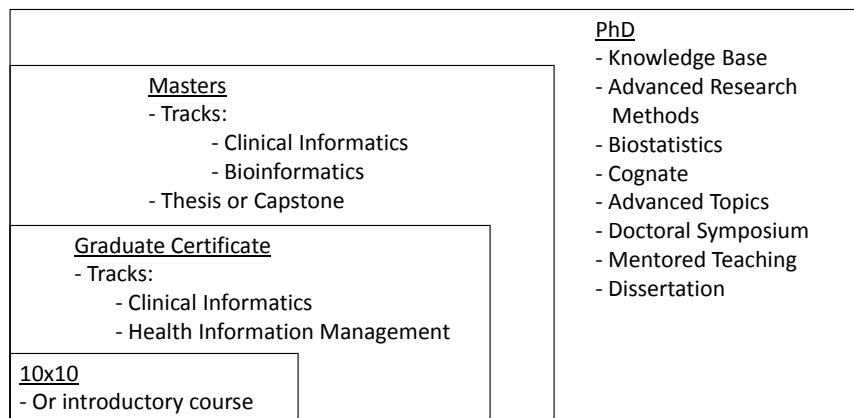
- <http://www.ohsu.edu/dmice/>
- Graduate-level programs at Certificate, Master's, and PhD levels
 - “Building block” approach allows courses to be carried forward to higher levels
- Two “populations” of students
 - “First-career” students more likely to be full-time, on-campus, and from variety of backgrounds
 - “Career-changing” students likely to be part-time, distance, mostly (though not exclusively) from healthcare professions
- Many of latter group prefer “a la carte” learning
 - This has led to the successful 10x10 (“ten by ten”) program that began as OHSU-AMIA partnership (Hersh, 2007; Feldman, 2008)

AMIA 10x10™
10,000 Trained by 2010

23



Overview of OHSU graduate programs



24



ONC workforce development program

- Community College Consortia to Educate Health Information Technology Professionals Program (\$70M)
- Curriculum Development Centers Program (\$10M)
- Program of Assistance for University-Based Training (\$32M)
- Competency Examination for Community College Programs (\$6M)

25



Community College Consortia to Educate HIT Professionals Program

- Five regional consortia of 82 community colleges to develop short-term programs to train 10,000 individuals per year in the six community college job roles
- Anticipated enrollment of people with healthcare and/or IT backgrounds – probably baccalaureate or higher degrees



Curriculum Development Centers Program

- Five universities to collaboratively develop (with community college partners) HIT curricula for 20 components (topics)
 - Oregon Health & Science University (OHSU)
 - Columbia University
 - Johns Hopkins University
 - Duke University
 - University of Alabama Birmingham
- One of the five centers (OHSU) additionally funded as National Training and Dissemination Center
- Version 2 of curriculum delivered to community colleges in May, 2011, with release to all institutions of higher education in July, 2011

27



Program of Assistance for University-Based Training

- Funding for education of individuals in job roles requiring university-level training at nine universities with existing programs
 - Oregon Health & Science University (OHSU)
 - Columbia University
 - University of Colorado Denver College of Nursing
 - Duke University
 - George Washington University
 - Indiana University
 - Johns Hopkins University
 - University of Minnesota (consortium)
 - Texas State University (consortium)
- Emphasis on short-term certificate programs delivered via distance learning
- OHSU program run as “tuition assistance” program for existing programs
 - www.informatics-scholarship.info

28



Other important workforce developments

- Physicians
 - Proposal to establish a clinical informatics subspecialty (Detmer, 2010) based on core curriculum (Gardner, 2009) and training requirements (Safran, 2009)
- Other health professionals
 - Nursing – TIGER initiative (Gugerty, 2009)
 - HIM (Wilhelm, 2007; Dimick, 2008)
 - Nutrition (Hogge, 2010)

29



Conclusions: What we know

- Informatics is maturing as a discipline and profession
 - Field has emerging identity as one with expertise in using information to solve biomedical and health problems
- There are tremendous opportunities now and in the future
 - A competent and well-trained workforce is an essential requirement
- Stay tuned for the results of the HITECH “experiment” in the years ahead

30



Conclusions: What we still need to know

- What is the optimal role of people in informatics?
 - Especially in areas beyond clinical informatics and HIT
- How can people best use information to improve health?
 - Empowering the learning health care system
 - Clinicians

31



For more information

- Bill Hersh
 - <http://www.billhersh.info>
- Informatics Professor blog
 - <http://informaticsprofessor.blogspot.com>
- OHSU Department of Medical Informatics & Clinical Epidemiology
 - <http://www.ohsu.edu/informatics>
 - <http://www.ohsuscholarships.info>
 - <http://oninformatics.com>
- What is BMHI?
 - <http://www.billhersh.info/whatis>
- Office of the National Coordinator for Health IT
 - <http://healthit.hhs.gov>
- American Medical Informatics Association
 - <http://www.amia.org>

32

