

Introduction to Biomedical and Health Informatics for OHSU Summer College Interns

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Goals for talk

- Welcome new summer interns
- Introduce you to field of biomedical and health informatics broadly
- Introduce you to myself and my work
- Highlight the big-picture issues that motivate the field and drive its work
- Describe the educational and career opportunities in the field



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Many problems in healthcare have information-related solutions

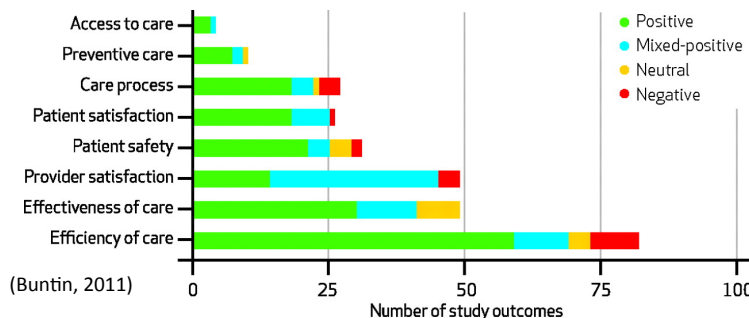
- Quality – not as good as it could be (McGlynn, 2003; Schoen, 2009; NCQA, 2010)
- Safety – errors cause morbidity and mortality; many preventable (Kohn, 2000; Classen, 2011; van den Bos, 2011)
- Cost – rising costs not sustainable; US spends more but gets less (Angrisano, 2007)
- Inaccessible information – missing information frequent in primary care (Smith, 2005)

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Growing evidence that information interventions are part of solution

- Systematic reviews (Chaudhry, 2006; Goldzweig, 2009; Buntin, 2011) have identified benefits in a variety of areas
 - Although 18-25% of studies come from a small number of “health IT leader” institutions



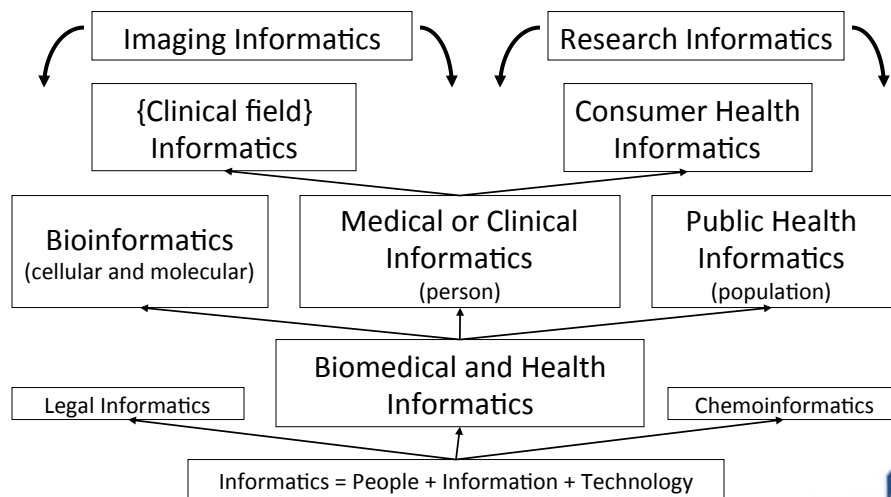
Biomedical and health informatics underlies the solutions

- *Biomedical and health informatics* (BMHI) is the science of using data and information, often aided by technology, to improve individual health, health care, public health, and biomedical research (Hersh, 2009)
 - It is about information, not technology
 - <http://www.billhersh.info/whatis>
- Practitioners of BMHI are usually called *informaticians* (sometimes *informaticists*)
- Overview textbooks: Hoyt, 2012; Shortliffe, 2013



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BMHI has many sub-areas



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Informatics before the Obama era

- Growing recognition of value in healthcare
 - Evidence for improved safety, quality, and cost of healthcare
 - Research and demonstration funding by NLM, AHRQ, and others
 - Actions of Bush Administration – e.g., appointment of first National Coordinator for HIT, establishment of AHIC, HITSP, etc.
- Emerging importance in other areas
 - Clinical and translational research – prominent role in CTSA programs (Bernstam, 2009; Richesson, 2012)
 - Genomics – bioinformatics, personalized medicine (Altman, 2012)
 - Consumer health – growth of personal health records (PHRs) (Miller, 2009; Kharrazi, 2012), including from companies, e.g., Microsoft HealthVault

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Then a new US president came along...



"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

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...and we entered a new “ARRA”

- Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA)
 - Incentives for electronic health record (EHR) adoption by physicians and hospitals (up to \$27B)
 - Direct grants administered by federal agencies (\$2B)
- Other provisions in other areas of ARRA, e.g.,
 - Comparative effectiveness research
 - NIH and other research funding
 - Broadband and other infrastructure funding

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Why has it been so difficult to get there? (Hersh, 2004)

Health Care Information Technology Progress and Barriers

William Hersh, MD

IN THE 3 DECADES SINCE THE TERM “MEDICAL INFORMATICS” was first used, individuals working at the intersection of information technology (IT) and medicine have developed and evaluated computer applications aimed

at improving patient care, and also cataloged the incomplete but encouraging underlying evidence.¹¹ As with many applications of IT, the technology can improve the existing situation but also empower clinicians and patients to think more fundamentally about how inno-

- Cost
- Technical challenges
- Interoperability
- Privacy and confidentiality
- Workforce

care IT.¹² It is no exaggeration to declare that the years ahead portend the “decade of health information technology.”¹³ Informatics is poised to have a major impact in patient-clinician communication. In the Clinical Crossroads article

See also p 2255.

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ment. The rest goes to those who typically do not pay for

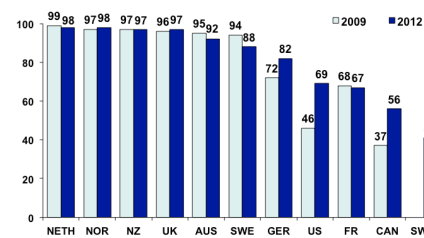
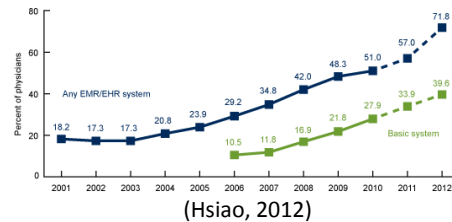
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(Reprinted) JAMA, November 10, 2004—Vol 292, No. 18 2273



US has low rates of adoption in inpatient and outpatient settings

- Adoption in the US is low for both outpatient (Hsiao, 2012) and inpatient settings (DesRoches, 2012) though improving
- By most measures, US is a laggard and could learn from other countries (Schoen, 2012)
- Most other developed countries have undertaken ambitious efforts, e.g.,
 - Denmark (Protti, 2010)
 - England (Payne, 2011)



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(Schoen, 2012)

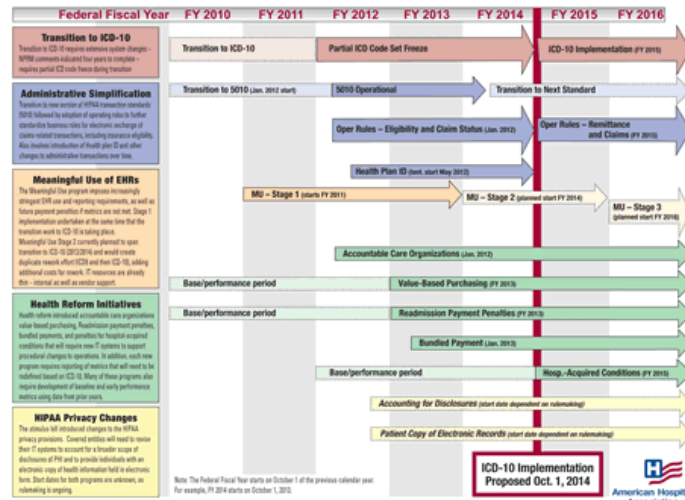
The new “ARRA” of health information technology (HIT) in the US

- HITECH provides financial incentives for “meaningful use” (MU) of HIT
 - Inspired by Stark (2010); operationalized by Blumenthal (2010)
 - All initiatives administered by the Office of the National Coordinator for Health IT (ONC, www.healthit.gov)
- MU is driven by five goals for the US healthcare system
 - Improving quality, safety and efficiency
 - Engaging patients in their care
 - Increasing coordination of care
 - Improving the health status of the population
 - Ensuring privacy and security

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MU is just one of several challenges

Overlapping Timelines of ICD-10, Meaningful Use of EHRs, and Health Reform Initiatives



<http://www.aha.org/advocacy-issues/hit/mu/overw-time.shtml>

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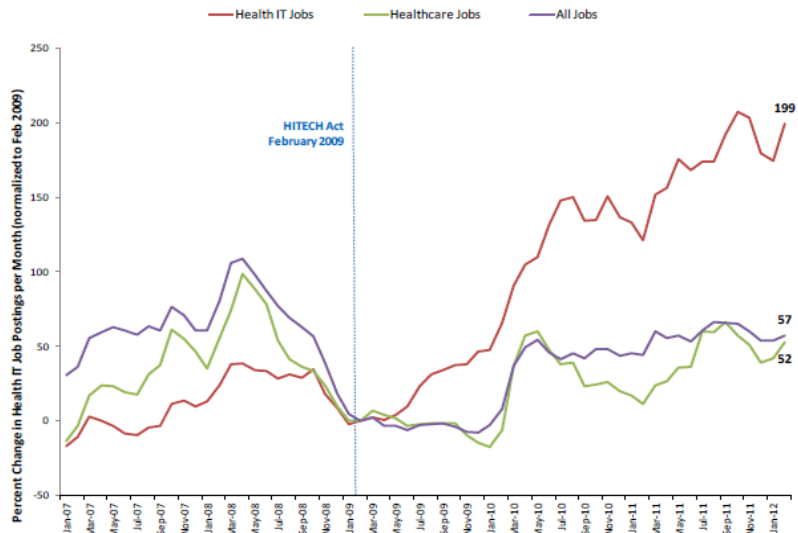
Opportunities for career development and study in BMHI

- Many educational opportunities at a variety of levels, mostly graduate
 - <http://www.amia.org/informatics-academic-training-programs>
- OHSU program one of largest and well-established (Hersh, 2007)
 - Graduate level programs at Certificate, Master's, and PhD levels
 - "Building block" approach allows courses to be carried forward to higher levels
- Formal certification in various disciplines
 - Baccalaureate certification in nursing informatics for many years
 - Long-standing certification in HIM, e.g., CCS, RHIT, RHIA
 - New subspecialty for physicians recently approved (Shortliffe, 2011)

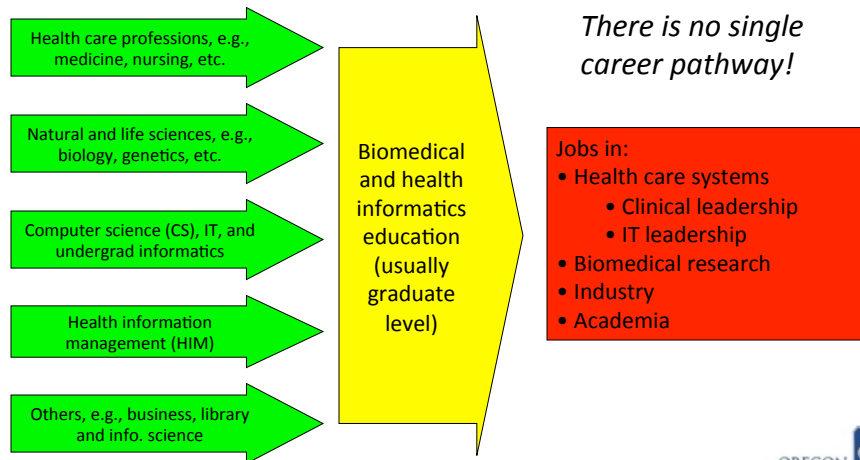
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Job growth exceeding healthcare and general economy (Furukawa, 2012)



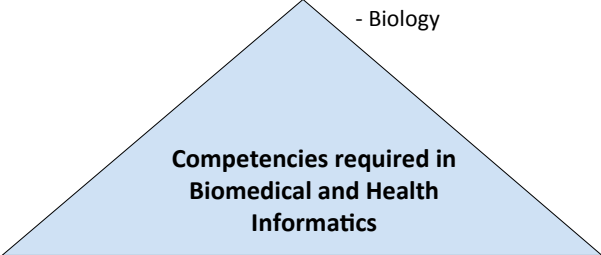
Career pathways have diverse inputs and outputs (Hersh, 2009)



What competencies must 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

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OHSU program has three tracks

- **Clinical Informatics**
 - Original track, focused on informatics in health, healthcare, public health, and clinical research settings
- **Bioinformatics and Computational Biology (BCB)**
 - Focused on informatics in genomics, molecular biology, and their translational research aspects
- **Health Information Management (HIM)**
 - Overlapping with clinical informatics, focused on HIM profession and leading to Registered Health Information Administrator (RHIA) certification



OHSU offers a variety of degrees and certificates

- Doctor of Philosophy (PhD)
 - For those who wish to pursue research, academia, or leadership careers
- Master of Science (MS)
 - Research master’s, including for those with doctoral degrees in other fields who wish to pursue research careers
- Master of Biomedical Informatics (MBI)
 - Professional master’s degree for practitioners and leaders
- Graduate Certificate
 - Subset of master’s degree as an introduction or career specialization



Tracks, degrees and certificates, and availability

Degree/Certificate Track	PhD	MS	MBI	Grad Cert
Clinical Informatics	On-campus	On-campus	On-campus	On-campus
		On-line	On-line	On-line
Bioinformatics and Computational Biology	On-campus	On-campus		
Health Information Management		On-campus	On-campus	On-campus
		On-line	On-line	On-line



Overview of OHSU graduate programs

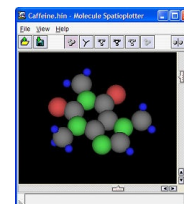
<p><u>Masters</u></p> <p>- Tracks:</p> <ul style="list-style-type: none"> - Clinical Informatics - Bioinformatics <p>- Thesis or Capstone</p>	<p><u>PhD</u></p> <ul style="list-style-type: none"> - Knowledge Base - Advanced Research Methods - Biostatistics - Cognate - Advanced Topics - Doctoral Symposium - Mentored Teaching - Dissertation
<p><u>Graduate Certificate</u></p> <p>- Tracks:</p> <ul style="list-style-type: none"> - Clinical Informatics - Health Information Management 	
<p><u>10x10</u></p> <p>- Or introductory course</p>	

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Opportunities in BMHI are not limited to healthcare

- Bioinformatics – genomics and personalized medicine (Altman, 2012)
- Clinical and translational research – building a “learning” healthcare system (Friedman, 2010; Richesson, 2012)
- Public health – protecting the public and promoting health (Araujo, 2009)
- Consumer health – for all ages, especially aging Internet-savvy baby boomers (Gibbons, 2009)
- Imaging informatics – use of images for biomedical research, clinical care, etc. (Bui, 2010)

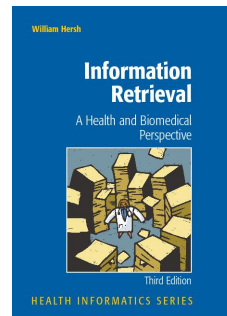


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My own research

- Information retrieval (aka, Search)
 - Access to online information, from journals, Web sites, images, etc. to medical records with major effort now focused on latter
 - TREC Medical Records Track (Voorhees, 2012) – part of larger interest in “secondary use” of clinical data (Safran, 2007)
- Health IT workforce (Hersh, 2008; Hersh, 2010)



www.irbook.info
(Hersh, 2009)



Conclusions

- BMHI is an important science and profession for improving health, healthcare, public health, and biomedical research with data and information
 - Most resources in clinical informatics but plenty of other opportunity in bioinformatics, public health informatics, consumer health informatics, clinical research informatics, imaging informatics, etc.
- The grand experiment of HITECH is going on in the US – results not yet in
- There are many opportunities for practitioners, researchers, and others in BMHI



For more information

- Bill Hersh
 - <http://www.billhersh.info>
- Informatics Professor blog
 - <http://informaticsprofessor.blogspot.com>
- OHSU Department of Medical Informatics & Clinical Epidemiology (DMICE)
 - <http://www.ohsu.edu/informatics>
 - <http://www.youtube.com/watch?v=T-74duDDvwU>
 - <http://oninformatics.com>
- What is Biomedical and Health Informatics?
 - <http://www.billhersh.info/whatis>
- Office of the National Coordinator for Health IT (ONC)
 - <http://www.healthit.gov>
- American Medical Informatics Association (AMIA)
 - <http://www.amia.org>
- National Library of Medicine (NLM)
 - <http://www.nlm.nih.gov>