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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Trends and consequences in healthcare

Trends	Consequences
Everyone wants to better manage health	Personal monitoring and devices
Patients want to interact with healthcare the same as they do with other industries	Personal health records and patient portals
Care is expensive and potentially dangerous	More need for electronic health records: • Communication and coordination of care • Quality measurement and improvement
Ever-expanding knowledge base of health and medicine	Better search and decision-support systems
Concerns about privacy	Balancing privacy vs. public good of data use
Increasing data intensity of biomedical research	Need for skills in "big data" and data analytics
Dispersed population	Use of telemedicine
Health threats – natural and manmade	Surveillance and public health

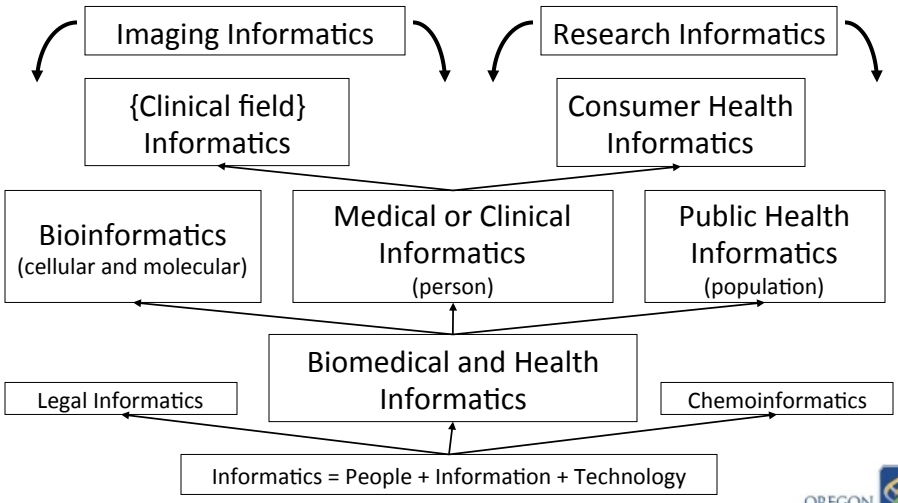
3

All of these are addressed by biomedical and health informatics

- *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, 2014; Shortliffe, 2014

4

BMHI has many sub-areas



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BMHI also has a "fundamental theorem"

Fundamental Theorem (Friedman, 2009) – based on "relentless pursuit of assisting people"

Goal of informatics is

Goal is not

What it is and isn't (Friedman, 2012)

Is

- Cross-training where basic informational sciences meet a biomedical application domain
- Relentless pursuit of assisting people

Isn't

- Scientists or clinicians tinkering with computers
- Analysis of large data sets per se
- Anything done using computers

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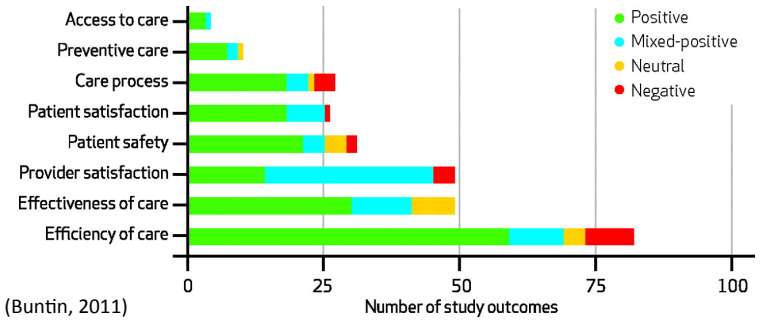
Growing evidence that information interventions are part of solution

- Systematic reviews (Chaudhry, 2006; Goldzweig, 2009; Buntin, 2011; Jones, 2014) have identified benefits in a variety of areas



(Buntin, 2011)

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 aim-

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

care IT.[59] It is no exaggeration to declare that the years ahead portend the "decade of health information technology."[10]

Informatics is poised to have a major impact in patient-clinician communication. In the Clinical Crossroads article

See also p 2255.

in this issue of JAMA, Slack demonstrates the value that patient-physician e-mail can have in improving patient care, and also catalogs 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 innovation can lead to changes in the way medicine is practiced

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

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Informatics received a boost from a new US president

"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

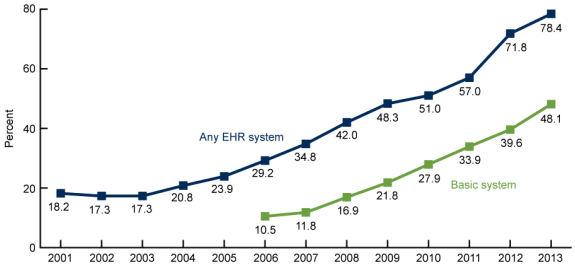
9

…and 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)

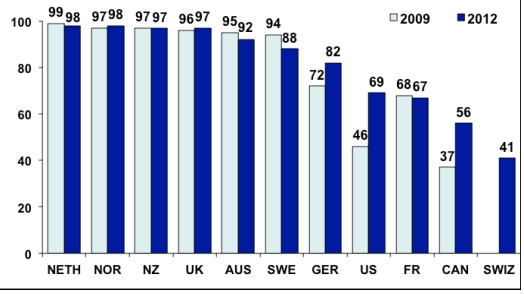
10

US has low rates of EHR adoption but is improving



(Hsiao, 2014)

(Schoen, 2012)



Opportunities and challenges for BMHI going forward

- Optimizing the electronic health record (EHR)
  - Analytics of EHR and other clinical data for increasing quality, efficiency, and coordination of healthcare
  - Standards, interoperability, and health information exchange (HIE)
  - Will expand to "big data" when we add in data from genomics, imaging, personal health devices, etc.
- Patient/consumer engagement
  - Use of personal health record (PHR) for engaging consumers and patients in their health and healthcare
- Precision/personalized medicine
  - Based in part on bioinformatics and computational biology, with potential to revolutionize diagnosis and treatment of disease

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Important for research too

- Clinical & Translational Science Award (CTSA, www.ctsacentral.org) Program
  - Accelerating translation of research from laboratory to clinic and communities (Richesson, 2012)
- Patient-Centered Outcomes Research Institute (PCORI, www.pcori.org)
  - Comparative effectiveness research (Selby, 2012)
  - Clinical Data Research Networks (Fleurence, 2014) – www.pcornet.org
- NIH Big Data to Knowledge (BD2K; http://bd2k.nih.gov)
  - Training the next generation of scientists in data and related techniques

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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)
  - http://www.ohsu.edu/informatics-education
  - 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
  - Long-standing certifications in
    - Nursing informatics
    - Health information management – RHIA, RHIT, CCS
  - New clinical informatics subspecialty for physicians recently approved (Detmer, 2014)
  - AMIA developing "interprofessional" certification for other disciplines

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Opportunities for career development (cont.)

INFORMATICS PROFESSOR

THIS BLOG MAINTAINS THE THOUGHTS ON VARIOUS TOPICS RELATED TO BIOMEDICAL AND HEALTH INFORMATICS BY DR. WILLIAM HERSH, PROFESSOR AND CHAIR, DEPARTMENT OF MEDICAL INFORMATICS & CLINICAL EPIDEMIOLOGY, OREGON HEALTH & SCIENCE UNIVERSITY.

THURSDAY, JULY 3, 2014

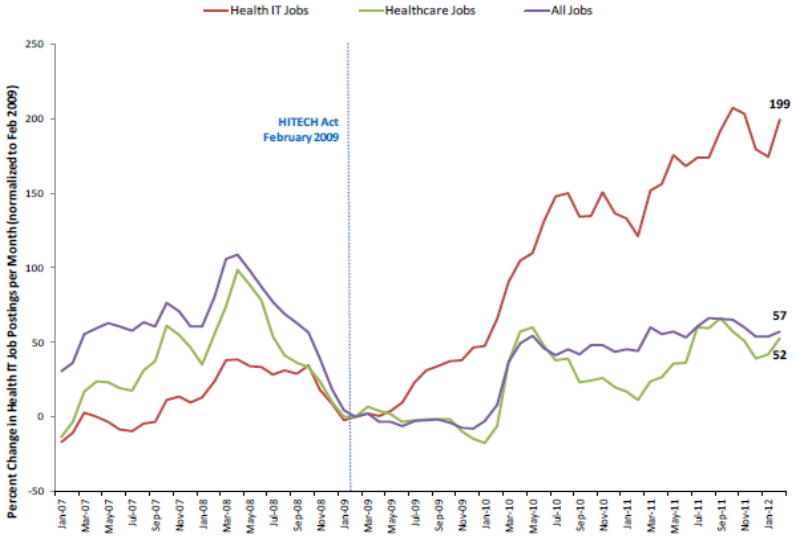
Advice to a Young Person Considering a Career in Informatics

One of the biggest challenges I face in introducing potential students to the myriad of career opportunities in biomedical and health informatics that potentially await them comes with young people. I believe that the main reason for this is this group's little exposure to our healthcare system and its myriad of problems and challenges. Like most young people, they tend to be healthy and have had very little experience with healthcare and other health-related areas. While there is little difficulty in explaining the problems that informatics tries to solve to older individuals, perhaps whose parents or children have been impacted by healthcare, or who are among the myriad of mid-

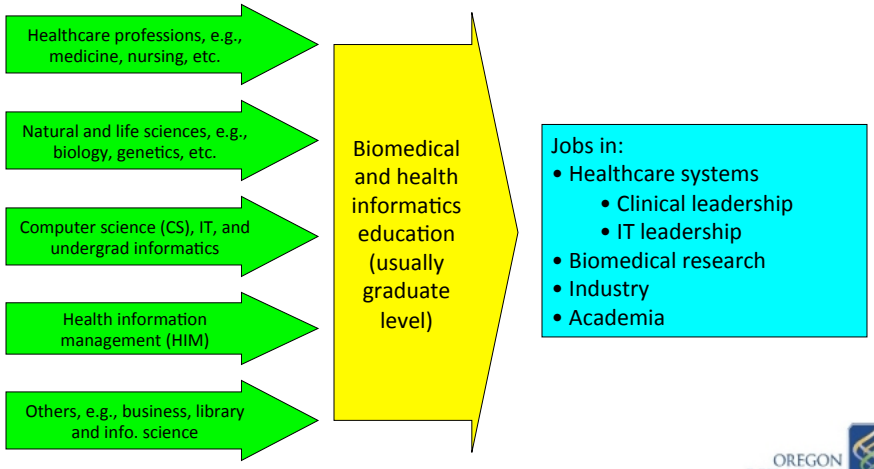
WILLIAM HERSH

http://www.billhersh.info/

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



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



17

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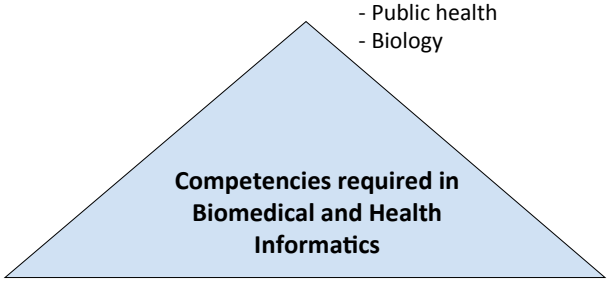
What competencies must informaticians have? (Hersh, 2009)

Health and biological sciences:
- Medicine, nursing, etc.
- Public health
- Biology



People skills:
- Communication and presentation
- Organizational behavior and management
- Project management

Computational and mathematical sciences:
- Computer science
- Information science and technology
- Statistics

18

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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-line	On-campus On-line	On-campus On-line
Bioinformatics and Computational Biology	On-campus	On-campus		
Health Information Management		On-campus On-line	On-campus On-line	On-campus On-line

21

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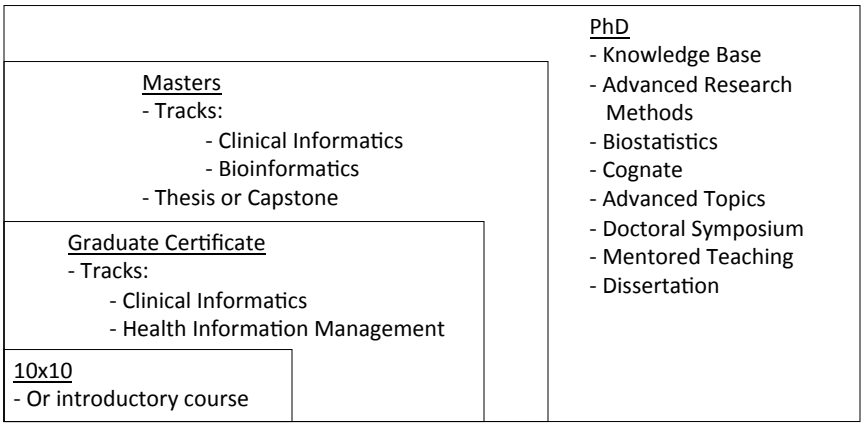
Overview of OHSU graduate programs



22

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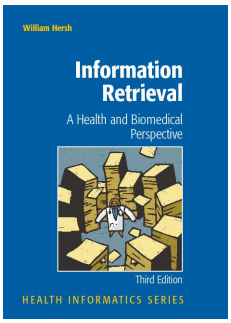
Another important activity is academia-industry collaboration

- Collaboration beyond usual federal grants
- http://www.ohsu.edu/idl

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
- Health IT workforce (Hersh, 2008; Hersh, 2010)
  - What is the right training for optimal use of IT in health and healthcare



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
- There are many opportunities for practitioners, researchers, and others

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