

What Every Bioinformatics Student Should Know About Clinical Informatics

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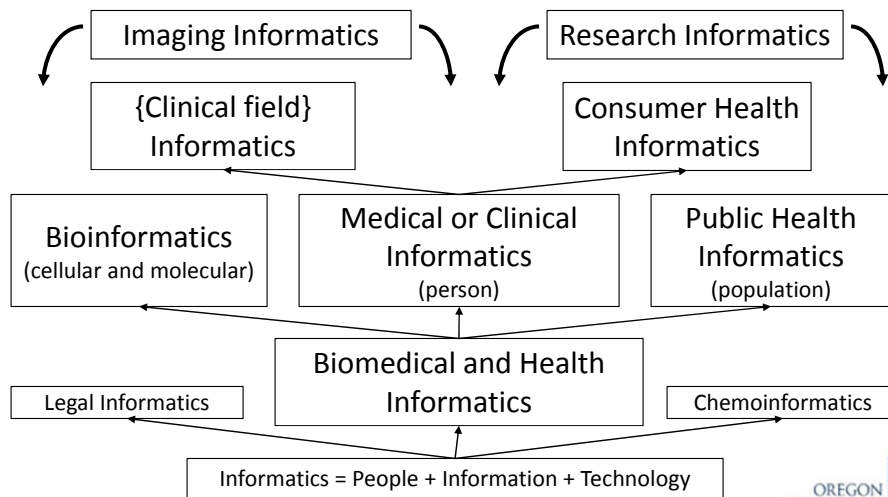
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Biomedical & Health Informatics (Bill's view; Hersh, 2009)



In case you have been sequencing genomes too much since 2009...



“To improve the quality of our health care while lowering its cost, we will make the immediate investments necessary to ensure that within five years, all of America’s medical records are computerized ... It just won’t save billions of dollars and ***thousands of jobs*** – it will save lives by reducing the deadly but preventable medical errors that pervade our health care system.”

President-Elect Barack Obama
January 5, 2009



3

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

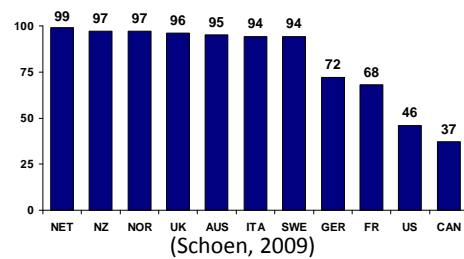
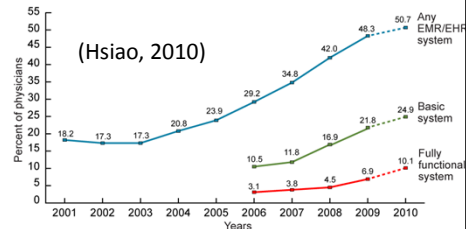
- Portion of the American Recovery and Reinvestment Act (ARRA) that allocates up to \$29 billion to the Office of the National Coordinator for Health IT (ONC) to provide incentives for “meaningful use” of health information technology (HIT) through (Blumenthal, 2010; Blumenthal, 2010)
 - Adoption of 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



4

HITECH guided by low rates of EHR adoption in US

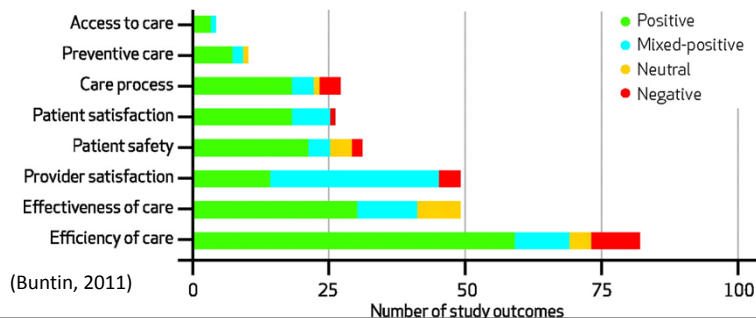
- Adoption in the US is low for both outpatient (Hsiao, 2010) and inpatient settings (Jha, 2010)
- By most measures, US is a laggard and could learn from other countries (Schoen, 2009)
- Most other developed countries have undertaken ambitious efforts, e.g.,
 - England (Hayes, 2008)
 - Denmark (Protti, 2010)



5

But HITECH is based on science ... the science of (clinical) informatics

- 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



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 innovation can lead to changes in the way medicine is practiced.

- 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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But there is value in getting there

- Secondary use of clinical data for (Safran, 2007)
 - Clinical and translational research
 - Quality measurement and improvement
 - Public health
 - Personal health
- Although there are caveats (Berlin, 2011)
 - Clinical documentation can be incomplete and inaccurate
 - Observational (as opposed to experimental) studies provide less inference



Must keep in mind tenets of evidence-based medicine (Straus, 2005)

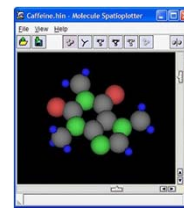
- Diagnosis
 - Temptation: Genomic variation and association with risk of disease
 - Caveat: Diagnostic tests must be appropriately validated in proper spectrum of patients to whom they might be applied
- Treatment
 - Temptation: Treatment based on personalized, especially genomic attributes
 - Caveat: Need to reconcile ability to perform experimental vs. observational studies
- Overview of challenges: processing and interpreting data; applying results (Fernald, 2011)



9

Opportunities in clinical informatics are not limited to healthcare

- Clinical and translational research – building a “learning” healthcare system (Friedman, 2010)
- 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)
- And of course, translational bioinformatics – applying genomics and bioinformatics to patient care and personal health



10