Introduction to Biomedical and Health Informatics

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References


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Outline of talk

• Information-related problems and solutions in healthcare
• Why do we need more informatics?
• Why are we not there?
• Details of ARRA programs
• The workforce need for informatics
• Educational and career opportunities in informatics
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)

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
- Practitioners are BMHI are usually called informaticians (sometimes informaticists)

BMHI has many sub-areas

- Imaging Informatics
- Research Informatics
- Consumer Health Informatics
- Medical or Clinical Informatics (person)
- Public Health Informatics (population)
- Bioinformatics (cellular and molecular)
- Legal Informatics
- Chemoinformatics

Informatics = People + Information + Technology
Informatics BO (before Obama)

• Growing recognition of value in healthcare
  – Evidence for improved safety, quality, and cost of healthcare
  – Widespread usage worldwide (Schoen, 2009; Protti, 2010)
  – 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 (Zerhouni, 2007; Bernstam, 2009)
  – Genomics – bioinformatics, personalized medicine (Hamburg, 2010)
  – Individual health – growth of personal health records (PHRs) (Detmer, 2008), including from companies, e.g., Microsoft HealthVault

But 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
...and the US 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

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

- Cost
- Technical challenges
- Interoperability
- Privacy and confidentiality
- Workforce
US has low rates of adoption in inpatient and outpatient settings

- Adoption in the US is low for both outpatient (Hsiao, 2011) and inpatient settings (Jha, 2010) though improving
- 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)

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

- HITECH provides financial incentives for “meaningful use” (MU) of HIT (Blumenthal, 2010; Blumenthal, 2010)
  - Incentives for EHR adoption by physicians and hospitals (up to $27B)
  - Direct grants administered by federal agencies ($2B)
  - All initiatives administered by the Office of the National Coordinator for Health IT (ONC, http://healthit.hhs.gov/)
MU is just one of several challenges

http://www.aha.org/advocacy-issues/hit/mu/overview-time.shtml

Other HITECH funding initiatives

- HIT Regional Extension Centers (RECs)
  - $677 million to fund 62 RECs that will provide guidance, mainly to small primary care practices, in achieving meaningful use (Maxson, 2010), e.g., in Oregon: OHITEC

- State-based health information exchange (HIE)
  - $547 million in grants to states to develop HIE programs (Kuperman, 2011)

- Beacon communities
  - $250 million to fund 17 communities that provide exemplary demonstration of the meaningful use of EHRs (McKethan, 2011)

- Strategic health information advanced research projects (SHARP)
  - $60 million for four collaborative research centers
ONC Workforce Development Program

Based on need for 51,000 professionals in 12 workforce roles

- Nine universities funded, with emphasis on short-term training using distance learning
- OHSU funded to enroll trainees in existing programs
- Five universities funded to develop curricula for community college programs
- OHSU funded to develop curricula and to serve as National Training & Dissemination Center (NTDC)

Who are the HIT workforce and what do know about them? (Hersh, 2010)

- Three historical groups of professionals in HIT
  - Information technology (IT) – usually with computer science or information systems background
  - Health information management (HIM) – historical focus on medical records
  - Clinical informatics (CI) – often from healthcare backgrounds
- Problematic HIT implementations often attributable to lack of understanding of clinical environment and use of IT within it (Leviss, 2010)
How many IT personnel does the US have and need?

- IT – to reach level of known benefit and meaningful use, may need 40,000 (Hersh, 2008)
  - Medical Records and Health Information Technicians (RHITs and coders) – about 172,500 employed now, increasing to 207,600 by 2018 (20% growth)
- CI – estimates less clear for this emerging field
  - 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, 2009)

Experience of the OHSU program (http://www.ohsu.edu/informatics/)

- 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)
    - Overview and access to demo: http://www.billhersh.info/10x10.html
    - Significant minority of these adult learners do not complete a program but still use knowledge and skills gained
Opportunities in BMHI are not limited to healthcare

- Bioinformatics – genomics and personalized medicine (Sarkar, 2011; Fernald, 2011)
- Clinical and translational research – building a “learning” healthcare system (Embi, 2009; Friedman, 2010)
- Public health – protecting the public and promoting health (Araujo, 2009)
- Consumer health – for all ages, especially aging Internet-savvy baby boomers (Detmer, 2008; Gibbons, 2009)
- Imaging informatics – use of images for biomedical research, clinical care, etc. (Bui, 2008)

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://www.informatics-scholarship.info
  - http://ioninformatics.com
- What is Biomedical and Health Informatics?
  - http://www.billhersh.info/whatis
- Office of the National Coordinator for Health IT (ONC)
  - http://healthit.hhs.gov
- American Medical Informatics Association (AMIA)
  - http://www.amia.org
- National Library of Medicine (NLM)