Biomedical and Health Informatics in the Era of ARRA

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Overview of talk

- Definition and overview of discipline
- Electronic health record (EHR)
- Health information exchange (HIE)
- Progress and barriers
- Government activities
- Opportunities for study and careers
- For more information

Informatics has supporters in high places

"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."

American Recovery and Reinvestment Act (ARRA) of 2009 is investing $36-40 billion in health information technology (HIT)

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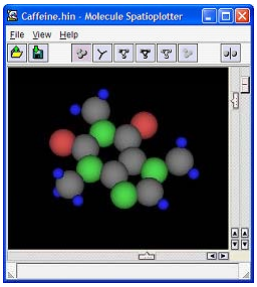
Other opportunities



"Modern biomedical scientists use computers and robots to separate molecules in solution, read genetic information, reveal the three-dimensional shapes of natural molecules like proteins, and take pictures of the brain in action. All of these techniques generate large amounts of data, and biology is changing fast into a science of information management. There is no way to manage these data by hand. What researchers need are computer programs and other tools to evaluate, combine, and visualize these data."

http://nihroadmap.nih.gov/bioinformatics/

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Informatics is an "ahead of the curve" career

Careers that are "relatively new, already viable, and promise further growth…" (Nemko, 2008)

U.S.News & WORLD REPORT

Wednesday, February 6, 2008

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Biomedical and

Ahead of the Curve: Health Informatics Specialist

By Marty Nemko
Posted December 19, 2007

Among leading centers: University of Oregon Medical Center

Health Informatics Specialist/Manager. "The job market for health informatics people is absolutely out of sight," exclaims Merida Johns, founding director of the graduate program in Health Informatics at the University of Alabama-Birmingham. And it's no surprise: Hospitals, insurers, and regional collaboratives are switching to electronic medical records. Nurses and doctors, urged to do more evidence-based medicine, are using computerized expert systems to guide their diagnoses and treatment recommendations. Healthcare providers are also collecting more data to evaluate quality of care.

What is biomedical and health informatics (BMHI)?

- I get asked this so often that I keep a Web site
  - http://www.billhersh.info/whatis/
- I have also written about it
  - Overview of "medical informatics" (Hersh, 2002)
  - But there are barriers (Hersh, 2004)
  - Characterization of and changes in the profession (Hersh, 2006)
  - Many career opportunities as well (Hersh, 2008)
  - Definitions of field (Hersh, 2009)
- And I keep writing about it
  - http://informaticsprofessor.blogspot.com

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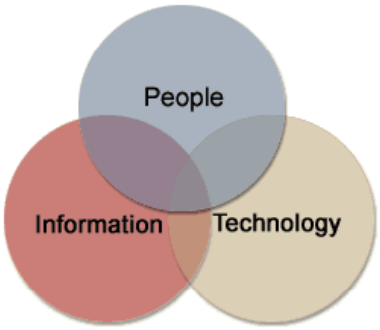
Let us start by defining "informatics"

- Has been defined as activity at the intersection of people, information, and technology
  - Other fields would claim they do this too
- Is more about information than technology
  - IT is one of many tools of informatics



(SUNY Buffalo)

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It has a "fundamental theorem" (Friedman, 2009)

Goal of informatics is:

Goal is not:

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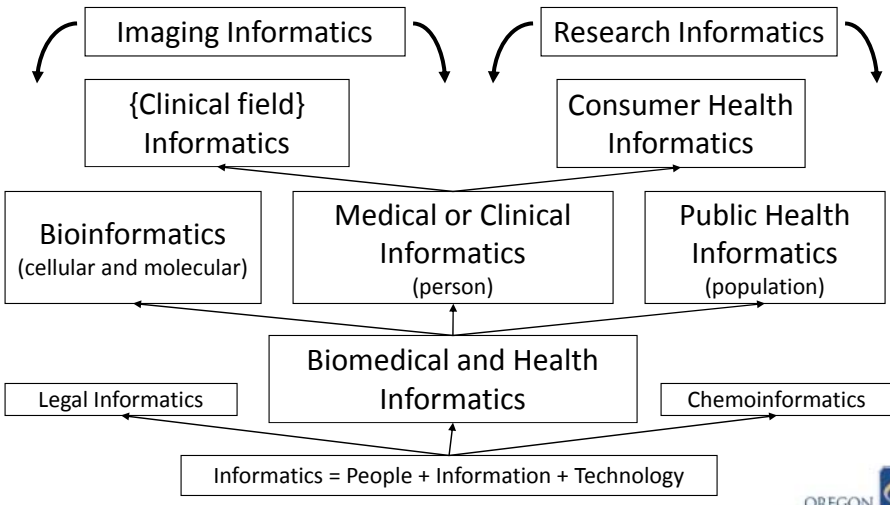
My current preferred terminology (Hersh, 2009)

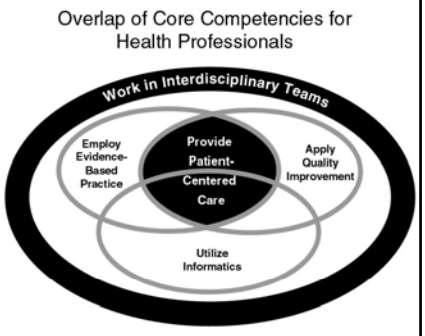
- *Biomedical and health informatics* (BMHI) is the field concerned with the optimal use of information, often aided by technology, to improve individual health, health care, public health, and biomedical research
  - Differs from information technology (IT) in that it is
    - Strongly rooted in domains (e.g., health care)
    - IT is one (of many) tools employed
- Practitioners are BMHI are usually called *informaticians* (sometimes *informaticists*)
- Disagreements over terminology in both noun and adjectives preceding it
  - Has an "adjective problem"

Categories of BMHI



Informatics now viewed as a core competency for health professionals

- According to Institute of Medicine report, the modern health professional must have competency in informatics as part of larger goal to provide patient-centered care (Greiner, 2003)
- Informatics competency is not just computer literacy!
  - The "Google generation" does not necessarily have good information skills (CIBER, 2008)



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Major applications in clinical informatics (CI)?

- Based on two core types of information, with different uses and applications
  - Person-specific information is generated in the care of patients
    - Applications: electronic health record (EHR), personal health record (PHR), telemedicine, etc.
  - Knowledge-based information is the scientific literature of health care (Hersh, 2009)
    - Applications: information retrieval systems, evidence-based medicine

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Motivations – why do we need more CI?

- Quality – not as good as it could be (McGlynn, 2003; NCQA, 2008; Schoen, 2009)
- 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)

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Key capabilities of the EHR (IOM, 2003)

- Motivators
  - Improve patient safety
  - Support delivery of effective patient care
  - Facilitate management of chronic conditions
  - Improve efficiency
  - Have feasibility of implementation
- Capabilities
  - Health information and data
  - Result management
  - Order management
  - Decision support
  - Electronic communication and connectivity
  - Patient support
  - Administrative processes
  - Reporting and population health management

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EHRs allow and align "secondary use" (or "re-use") of clinical data

- Secondary use of clinical data (Safran, 2006; Safran, 2007) from the EHR includes
  - Personal health records (PHRs)
  - Health care quality measurement and improvement
  - Health information exchange (HIE)
  - Clinical and translational research
  - Public health surveillance for emerging threats

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Beyond the EHR: HIE

- "Anytime, anywhere access to clinical information for the care of patients" – William Yasnoff, MD, PhD
- "Data following the patient" – Carolyn Clancy, MD, Director, AHRQ
- Requires that information seamlessly flow across business boundaries
  - Challenges are not only technical, but also financial, legal, etc. (Rosenfeld, 2006)
- But there are other successful examples of information exchange, such as ATM cards, wireless networks, etc.

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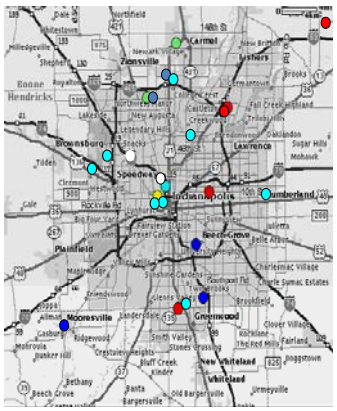
Example of HIE: Indiana Health Information Exchange

- (McDonald, 2005)
- www.ihie.org
- Access to clinical information in real time by
  - Most hospital emergency departments
  - Many hospital-based clinicians
  - Results pushed to primary care providers
  - Homeless care network
  - Public school clinics
  - County Health Department
  - Indiana State Health Department



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"Results" of other HIE efforts have been mixed

- Successful
  - Inland Northwest Health System (INHS, www.inhs.org), Spokane, WA
  - Massachusetts eHealth Collaborative (www.maehc.org) (Halamka, 2005)
- Less so
  - Santa Barbara County Care Data Exchange – combination of technical, leadership, and funding problems (Miller, 2007; Brailer, 2007)
  - Oregon (Conn, 2007)
- Likely to see more progress due to ARRA

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How much progress have we made with HIT?

- Chaudhry (2006) systematic review of 257 studies identified, with benefits shown for
  - Adherence to guideline-based care
  - Enhanced surveillance and monitoring
  - Decreased medical errors
- Caveat: 25% of studies came from 4 institutions and few studies of commercial systems
  - Concerns about generalizability

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Progress (cont.)

- Assessing complications, mortality, and costs for 4 conditions (MI, CHF, CABG, pneumonia) based on level of IT for 41 urban hospitals in Texas (Amarasingham, 2009)
  - Increased use of automated notes and records associated with decreased overall mortality
  - Use of CDS associated with decreased complications and lowered costs
- Bates (2009) notes this represents commercial systems in ordinary hospitals, unlike most previous studies

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Caveats about progress

- HIT may introduce error (Koppel, 2005) or other unintended consequences (Ash, 2004)
- Recent report from National Research Council found IT has not met its potential in health care (Stead, 2009; good overview in: Conn, 2009 and Conn, 2009)
  - Focus of HIT should be on improving health and healthcare, not on technology

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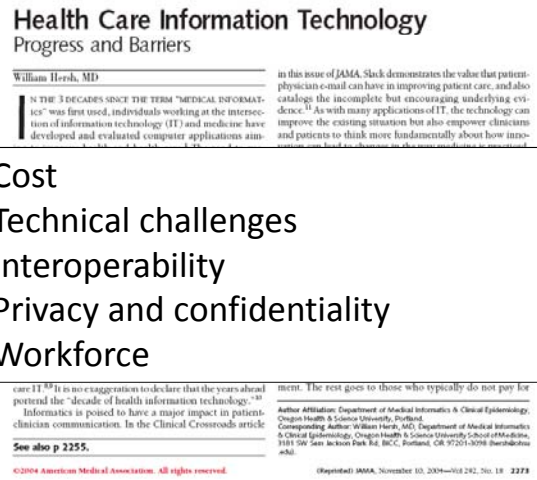
Why are we not there? What are the barriers? (Hersh, 2004)



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-

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.[1] 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-

care IT.[8,9] 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

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

See also p 2255.

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

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But we are in a new "ARRA" of HIT

- Categories of funding
  - Incentives for adoption by physicians and hospitals ($36-40B)
  - Direct grants administered by federal agencies ($2B)
  - Other provisions in other areas of legislation, e.g.,
    - Comparative effectiveness research
    - NIH and other research funding
    - Broadband and other infrastructure funding
- All HIT initiatives lumped together in HITECH Act, overseen by Office of the National Coordinator for Health IT (ONC) (PWC, 2009)
  - Headed by Dr. David Blumenthal, who expounded his views in NEJM (2009)
  - http://healthit.hhs.gov/portal/server.pt

Incentives for "meaningful use" of EHRs

- Implemented through increased Medicare or Medicaid reimbursement
- Non-hospital-based Physicians
  - Incentive quantity is calculated based on Medicare or Medicaid charges and is capped per physician depending on when first is a meaningful user, up to $48,000
- Hospitals
  - In addition to the amount already paid from Medicare or Medicaid for hospital services, a hospital meaningfully using an EHR will be paid an incentive
  - Incentive base amount is $2M, which is adjusted by the hospital's number of discharges, Medicare/Medicaid patient mix, up to $9M, and phased down over four years

What is "meaningful use" (Classen, 2009; Blumenthal, 2009)?

- Centered around national health outcomes goals
  - 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
- Proposed by ONC HIT Policy Committee to CMS, who will set final rule by early 2010
  - Incentive payments delivered via Medicare or Medicaid reimbursement

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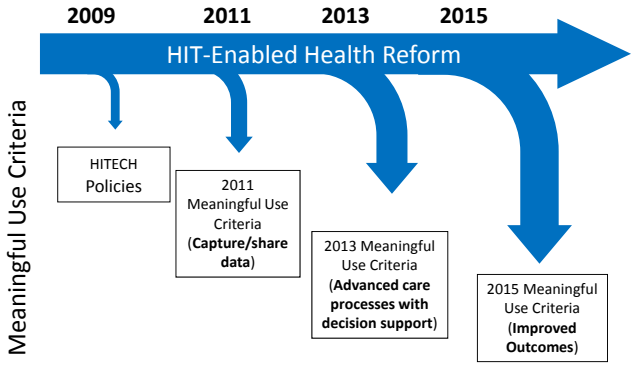
Meaningful use will be staged in three phases



- Apply by adoption year, i.e., 2011 criteria required in first adoption year
- Subdivided into care goals, each of which have objectives and measures for providers and hospital

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For each of the three phases, there are

- Objectives
  - For hospitals
    - e.g., 10% of all orders via CPOE, implement one clinical decision rule, report quality data to CMS, etc.
  - For providers
    - e.g., same as hospitals but add electronic prescribing, generate lists of patients with specific conditions, etc.
- Measures
  - e.g., percent of patients with Hypertension under control, reports stratified by patient attributes
- For all, see matrix on ONC Web site

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HITECH has a variety of other funding initiatives

- Sec. 13201 – Establishment of multidisciplinary Centers for Health Care Information Enterprise Integration
- Sec. 3012 – HIT Implementation Assistance
  - $600M for 70 Regional Health IT Extension Centers
- Sec. 3013 – Promotion of HIE
  - $600M in grants to states
- Sec. 3015 – Demonstration Programs to Integrate IT into Clinical Education
- Sec. 3016 – Information Technology Professionals on Health Care
  - Funding for health IT workforce training and re-training; program(s) to be announced

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Other federal government HIT activity

- American Health Information Community (AHIC, http://www.hhs.gov/healthit/ahic.html)
  - Established by Mike Leavitt, Secretary of HHS to promote increased adoption of HIT
  - Includes 17 commissioners from different stakeholders
  - Specifies "use cases" that feed
    - Harmonization of standards by Health Information Technology Standards Panel (HITSP) – http://www.ansi.org/hitsp/
    - Certification of EHRs to reduce risk of investment by Certification Commission for HIT (CCHIT) – www.cchit.org
  - Now transforming to public-private National E-Health Collaborative (NEHC) – status uncertain due to new policy bodies in ARRA
- Other agencies also involved, e.g., AHRQ, NIH, CMS, etc.

HIT is not limited to the United States

- United Kingdom – NHS Connecting for Health
  - http://www.informatics.nhs.uk/
  - Most ambitious in world: have spent billions on developing nationwide EHR for all citizens (Chantler, 2006)
- Australia HealthConnect
  - http://www.healthconnect.gov.au/
- Canada Health Infoway
  - http://www.infoway-inforoute.ca/
- Most developed countries have ongoing programs; in many respects, US is a laggard and could learn from abroad (Wilson, 2007)

Opportunities for careers in BMHI

- Plenty of opportunity in all areas of BMHI
  - Largest in CI, but plenty in bioinformatics, public health informatics, etc.
- Three historical groups of HIT professionals
  - IT – gap of 40,000 jobs between current and optimal use (Hersh, 2008)
  - Health information management (HIM) – historical "medical records" profession in transition in EHR era
  - CI – combining knowledge of health care, advanced information use, and people and soft skills
- ONC estimates 50,000 workers needed to implement federal HIT agenda (Monegain, 2009)
  - Job roles and competencies developed by ONC (2009)

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Opportunities for career development and study in BMHI

- Educational programs at many institutions
  - http://www.amia.org/informatics-academic-training-programs
  - OHSU program (Hersh, 2007) one of largest and well-established
- AMIA 10x10 program – started with aim to educate 10,000 health professionals in informatics by year 2010 (Hersh, 2007)
  - http://www.amia.org/10x10/partners/ohsu/

AMIA 10x10™ 10,000 Trained by 2010

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Informatics in Oregon

- State leadership establishing
  - HIE planning – $8M from ARRA
  - HIT Oversight Committee (HITOC) established
- HIT Extension Center
  - OCHIN and OHSU leading statewide proposal
  - Developing business plan for 90% match after 2 years
- Education
  - OHSU leadership locally, nationally, internationally
  - Community colleges and OIT developing programs
  - Workforce development grant proposal to Dept. of Labor aims to combine education at all levels

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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/dmice
  - http://oninformatics.com
- What is BMHI?
  - http://www.billhersh.info/whatis
- National Library of Medicine (NLM)
  - http://www.nlm.nih.gov
- American Medical Informatics Association (AMIA)
  - http://www.amia.org
- Healthcare Information Management Systems Society (HIMSS)
  - http://www.himss.org
- American Health Information Management Association (AHIMA)
  - http://www.ahima.org

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