What is Biomedical and Health Informatics? (1)

What is Biomedical & Health Informatics?
William Hersh, MD
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What is biomedical and health informatics?

- I get asked this so often that I keep a Web site
  - http://www.billhersh.info/whatis/
- And a blog
  - http://informaticsprofessor.blogspot.com
- I have also written articles and chapters about it
  - Medical informatics: improving healthcare through information (Hersh, 2002)
  - But there are barriers (Hersh, 2004)
  - Characterization of and changes in the profession (Hersh, 2006)
  - Many career opportunities as well (Hersh, 2008)
  - Reconciling definitions of terms (Hersh, 2009)
  - The informatics professional workforce (Hersh, 2010)
  - Clinical informatics in the context of health systems science (Hersh, 2017)

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Other views

- Early definition: "storage, acquisition, and use of information" (Greenes, 1990)
- Other (US) perspectives
  - "The science of information applied to biomedicine ... data plus meaning." (Bernstam, 2010)
  - Paradigm shift in biomedicine from "individual brains to systems of brains" (Stead, 2010)
  - AMIA: "The interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving, decision making, motivated by efforts to improve human health" (Kulikowski, 2012)
- European and global perspectives (Haux, 2010; Hasman, 2011; Geissbuhler, 2011)

WhatIs1   3

Let us start by defining "informatics"

- The discipline focused on the acquisition, storage, and use of information in a specific setting or domain (Hersh, 2009)
  - Is more about information than technology
- Sometimes defined as activity at the intersection of people, information, and technology
- The science of "sociotechnical systems" (Coiera, 2007)

People

Information   Technology
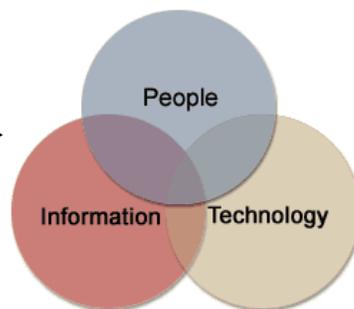
(SUNY Buffalo)

WhatIs1   4

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What informatics "is and isn't" (Friedman, 2012)

- Is
  - Cross-training where basic informational sciences meet a biomedical application domain
  - Relentless pursuit of assisting people
  - Tower of achievement
    - Model formulation
    - System development
    - System implementation
    - Study of effects

- Isn't
  - Scientists or clinicians tinkering with computers
  - Analysis of large data sets per se
  - Circumscribed roles related to deployment of electronic health records (*point of disagreement)
  - Profession of health information management
  - Anything done using a computer

WhatIs1   5

It has a "fundamental theorem" and a "golden rule"

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

Goal of informatics is

Goal is not

Golden Rule (Kuperman, personal communication, 2013):

"Never implement unto others that which you would not implement unto yourself"

WhatIs1   6

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My current preferred terminology

- *Biomedical and health informatics* (BMHI) is the field concerned with the optimal use of information, often aided by technology, to improve individual health, healthcare, public health, and biomedical research
  - Informatics applied in a more focused domain is {X} informatics, e.g., nursing, dental, pathology, primary care, etc.
  - Can be classified by "level" of domain but also has some overarching areas, e.g., imaging and research
- Practitioners of BMHI are usually called *informaticians* (sometimes *informaticists*)

WhatIs1   7

It also has an "adjective problem"

Informatics = People + Information + Technology
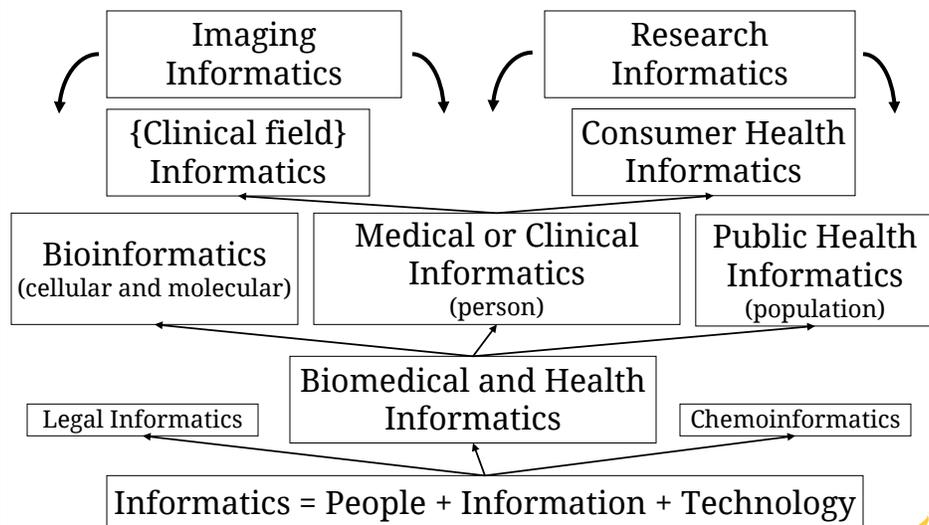
(Hersh, 2009; adapted from Shortliffe, 2006)
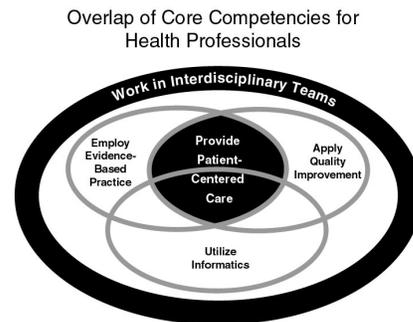
WhatIs1   8

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Informatics now viewed as a core competency for health professionals

- According to Institute of Medicine report, the modern healthcare 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)
- Informatics is a core component of the "learning health system" (Friedman, 2010; Smith, 2012)

Overlap of Core Competencies for Health Professionals

WhatIs1   9

Some historical perspectives on informatics

- Origin of term attributed to Dreyfus in 1962 (Fourman, 2002)
- Achieved widespread use in France (*informatique*), Russia, and later rest of Europe in 1960s to denote computing issues related to information use
- "Medical informatics" first used in 1974 (Collen, 1994)
  - More European history from Moehr (2004)
  - History of field documented by Collen (1995, 2015)
  - Oral histories of some early pioneers of field – https://lhncbc.nlm.nih.gov/project/medical-informatics-pioneers
- At present, most significant use is in biomedical arena, but it is used by other domains, such as law, chemistry, social sciences, etc.

WhatIs1   10

How is informatics distinguished from related terms?

- *Information technology* (IT) – computer and related technology
- *Computer science* is academic discipline that underlies IT (and other technologies)
- *Management information systems* is another field underlying IT (usually in business schools)
- *Health information technology* (HIT or health IT) – health-related application of IT

WhatIs1   11

Other related terms

- *Health information management* (HIM) – discipline historically focused on management of (paper) medical records (changing in current environment), with three main levels of practice
  - *Registered Health Information Administrator* (RHIA) – highest level, baccalaureate degree
  - *Registered Health Information Technologist* (RHIT) – associate degree
  - *Certified Coding Specialist* (CCS) – usually less then associate degree

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Other related terms

- *Information and communications technology* (ICT) – same as IT with added emphasis on telecommunications
- eHealth – use of ICT for health
- *Telemedicine* – provision of healthcare when participants separated by time and/or distance
- *Telehealth* – pursuit of health when separated by time and/or distance
- *mHealth* – use of mobile devices for health

WhatIs1   13

Other related terms

- *Evidence-based medicine* (EBM) – the application of the best scientific evidence in medical decision-making
- *Evidence-based practice* (EBP) – the application of EBM in clinical practice
- *Comparative effectiveness research* (CER) – research that compares one or more diagnostic or treatment options to evaluate effectiveness, safety or outcomes (also called *patient-centered outcomes research*)
- *Information retrieval* (also known as *search*, part of larger *knowledge management*) – the field devoted to searching (mostly text, mostly knowledge-based information)

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