

What is Biomedical Informatics? How is it relevant to me as a primary care educator?

William Hersh, M.D.
Professor and Chair
Department of Medical Informatics & Clinical Epidemiology
Oregon Health & Science University
Portland, OR, USA
Email: hersh@ohsu.edu
www.billhersh.info

References

- Amatayakul, M. and Lazarus, S. (2005). *Electronic Health Records: Transforming Your Medical Practice*. Englewood, CO. Medical Group Management Association.
- Anonymous (1999). Medical School Objectives Project: Medical Informatics Objectives. Washington, DC, Association of American Medical Colleges.
<http://www.aamc.org/meded/msop/start.htm>.
- Anonymous (2000). Recommendations of the International Medical Informatics Association (IMIA) on education in health and medical informatics. *Methods of Information in Medicine*, 39: 267-277. http://www.imia.org/pubdocs/rec_english.pdf.
- Anonymous (2001). Health Informatics Competency Profiles for the NHS. London, England, National Health Service Information Authority.
http://www.nhsia.nhs.uk/nhid/pages/resource_informatics/hi_competencyprofiles.pdf.
- Anonymous (2005a). Standards for Health Information Management Education - Associate Degree Program Standards. Chicago, IL, Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM).
http://library.ahima.org/xpedio/groups/public/documents/accreditation/bok1_026306.pdf.
- Anonymous (2005b). Standards for Health Information Management Education - Baccalaureate Degree Program Standards. Chicago, IL, Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM).
http://library.ahima.org/xpedio/groups/public/documents/accreditation/bok1_026307.pdf.
- Anonymous (2006). Building the Work Force for Health Information Transformation. Chicago, IL and Bethesda, MD, American Health Information Management Association and American Medical Informatics Association.
http://www.ahima.org/emerging_issues/Workforce_web.pdf.
- Anonymous (2007a). Employer Health Benefits 2007 Annual Survey. Menlo Park, CA, Kaiser Family Foundation. <http://www.kff.org/insurance/7672/index.cfm>.
- Anonymous (2007b). Health Information Science Knowledge and Skills. Chicago, IL, Medical Library Association. <http://www.mlanet.org/education/platform/skills.html>.
- Anonymous (2007c). The State of Health Care Quality: 2007. Washington, DC, National Committee for Quality Assurance.
http://web.ncqa.org/Portals/0/Publications/Resource%20Library/SOHC/SOHC_07.pdf.
- Ash, J., Stavri, P., et al. (2003). Implementing computerized physician order entry: the importance of special people. *International Journal of Medical Informatics*, 69: 235-250.

- Brailer, D. (2005). Interoperability: the key to the future health care system. *Health Affairs*, 24: W5-19-W5-21. <http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.19v1>.
- Chantler, S. (1999). The role and education of doctors in the delivery of health care. *Lancet*, 353: 1178-1181.
- Covvey, H., Zitner, D., et al. (2001). Pointing the Way: Competencies and Curricula in Health Informatics. Waterloo, Ontario, Canada, University of Waterloo.
http://www.cs.uwaterloo.ca/health_info/health_docs/CurriculaMASTERDocumentVersion1Final.zip.
- Curran, C. (2003). Informatics competencies for nurse practitioners. *AACN Clinical Issues*, 14: 320-330.
- Duncan, K., Austing, R., et al. (1978). Health Computing: Curriculum for an emerging profession - report of the ACM curriculum committee on health computing education. *Proceedings of the 1978 ACM Annual Conference/Annual Meeting*, Washington, DC. ACM Press. 277-285.
http://portal.acm.org/ft_gateway.cfm?id=804112&type=pdf&coll=GUIDE&dl=GUIDE&CFID=47975758&CFTOKEN=19987037.
- Friedman, C., Altman, R., et al. (2004). Training the next generation of informaticians: the impact of 'BISTI' and bioinformatics; a report from the American College of Medical Informatics. *Journal of the American Medical Informatics Association*, 11: 167-172.
- Garde, S. and Hovenga, E. (2006). Australian Health Informatics Educational Framework. Brunswick East, Australia, Australian College of Health Informatics.
http://www.achi.org.au/documents/publications/Health_Informatics_Educational_Framework_20060326.pdf.
- Gostin, L. and Hodge, J. (2002). Personal privacy and common goods: a framework for balancing under the national health information privacy rule. *Minnesota Law Review*, 86: 1439-1479.
http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID346506_code021104630.pdf.
- Hartley, C. and Jones, E. (2005). *EHR Implementation - A Step-By-Step Guide for the Medical Practice*. Chicago, IL. American Medical Association.
- Hersh, W. (2002). Medical informatics - improving health care through information. *Journal of the American Medical Association*, 288: 1955-1958.
- Hersh, W. (2004). Health care information technology: progress and barriers. *Journal of the American Medical Association*, 292: 2273-2274.
- Hersh, W. (2008). Course Description - AMIA-OHSU 10x10 Course. Bethesda, MD, American Medical Informatics Association.
<http://www.amia.org/10x10/partners/ohsu/description.asp>.
- Hersh, W. and Williamson, J. (2007). Educating 10,000 informaticians by 2010: the AMIA 10x10 program. *International Journal of Medical Informatics*, 76: 377-382.
- Ivanitskaya, L., O'Boyle, I., et al. (2006). Health information literacy and competencies of information age students: results from the interactive online Research Readiness Self-Assessment (RRSA). *Journal of Medical Internet Research*, 8(2): e6.
<http://www.jmir.org/2006/2/e6/>.
- Johnston, D., Pan, E., et al. (2003). The Value of Computerized Provider Order Entry in Ambulatory Settings. Boston, MA, Center for Information Technology Leadership.
- Karras, B. (2007). Public Health Informatics Competencies. Seattle, WA, Center for Public Health Informatics. <http://cphi.washington.edu/competencies>.

- Kluge, E. (2003). Security and privacy of EHR systems--ethical, social and legal requirements. *Studies in Health Technology and Informatics*, 96: 121-127.
- Kohn, L., Corrigan, J., et al., eds. (2000). *To Err Is Human: Building a Safer Health System*. Washington, DC. National Academy Press.
- McGlynn, E., Asch, S., et al. (2003). The quality of health care delivered to adults in the United States. *New England Journal of Medicine*, 348: 2635-2645.
- McGowan, J., Passiment, M., et al. (2007). Educating medical students as competent users of health information technologies: the MSOP data. *MEDINFO 2007 - Proceedings of the Twelfth World Congress on Health (Medical) Informatics*, Brisbane, Australia. IOS Press. 1414-1418.
- Miller, R., West, C., et al. (2005). The value of electronic health records in solo or small group practices. *Health Affairs*, 24: 1127-1137.
- O'Carroll, P. (2002). Informatics Competencies for Public Health Professionals. Seattle, WA, Northwest Center for Public Health Practice.
http://healthlinks.washington.edu/nwcphp/phi/comps/phi_print.pdf.
- Overhage, J., Perkins, S., et al. (2001). Controlled trial of direct physician order entry: effects on physicians' time utilization in ambulatory primary care internal medicine practices. *Journal of the American Medical Informatics Association*, 8: 361-371.
- Pigott, K., deLusignan, S., et al. (2007). An informatics benchmarking statement. *Methods of Information in Medicine*, 46: 394-398.
- Safran, C., Bloomrosen, M., et al. (2007). Toward a national framework for the secondary use of health data: an American Medical Informatics Association white paper. *Journal of the American Medical Informatics Association*, 14: 1-9.
- Safran, C. and Detmer, D. (2005). Computerized physician order entry systems and medication errors. *Journal of the American Medical Association*, 294: 179.
- Schleyer, T. (1999). Competencies for Dental Informatics V 1.0. Pittsburgh, PA, University of Pittsburgh Center for Dental Informatics.
<http://www.dental.pitt.edu/informatics/competencies.php>.
- Shortliffe, E. and Cimino, J., eds. (2006). *Biomedical Informatics: Computer Applications in Health Care and Biomedicine*. New York, NY. Springer-Verlag.
- Smith, P., Araya-Guerra, R., et al. (2005). Missing clinical information during primary care visits. *Journal of the American Medical Association*, 293: 565-571.
- Staggers, N., Gassert, C., et al. (2002). A Delphi study to determine informatics competencies at four levels of practice. *Nursing Research*, 51: 383-390.

What is Biomedical Informatics? How is it relevant to me as a primary care educator?

William Hersh, M.D.
Professor and Chair
Department of Medical Informatics & Clinical Epidemiology
Oregon Health & Science University
Portland, OR, USA
Email: hersh@ohsu.edu
www.billhersh.info



1

Overview

- Definition of field
- Why doesn't everyone use an EHR already?
- State of the art for informatics education
- Review of educational resources (articles, books, bibliography, clinfo wiki, 10x10)



2

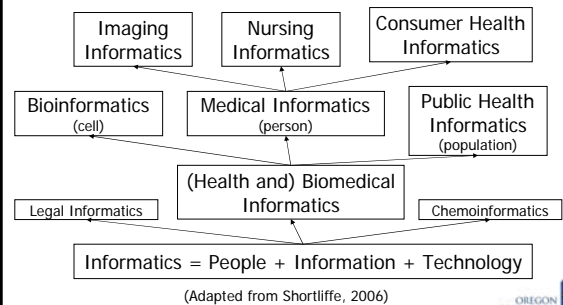
Definition of field

- Biomedical informatics – the field concerned with the acquisition, storage, and use of information in health care and biomedical research (Hersh, 2002)
- Different from pure computer science or information technology
 - Focuses on issues in subject domain, in this case health care or biomedical research
 - Draws on other sciences, including business and management, information science, anthropology, etc.



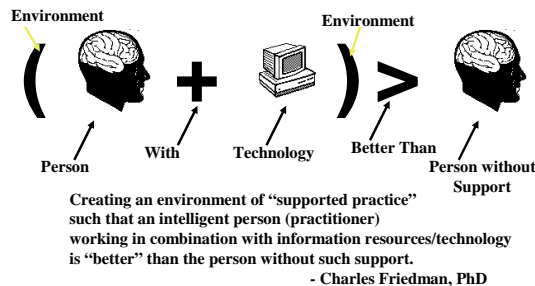
3

Typology of informatics – across the health and biomedical spectrum



4

The “fundamental theorem” of informatics



5

Classification of information in biomedical informatics

- Clinical information is of two basic types, with different uses and applications
 - *Patient-specific* information is generated during the care of patients
 - Applications: electronic health records, telemedicine, etc.
 - *Knowledge-based* information is the scientific literature of health care and biomedical research
 - Applications: information retrieval systems, evidence-based medicine
- Use of data from biomedical research also highly variable depending on application



6

Why do we need more informatics in health care?

- Quality (McGlynn, 2003; NCQA, 2007) – pick your favorite study
- Safety (Kohn, 1999) – IOM errors report and follow-up
 - “Medicine used to be simple, ineffective, and relatively safe. Now it is complex, effective, and potentially dangerous.” (Chantler, 1999)
- Cost (Kaiser Family Foundation, 2007) – health care costs continue to rise and outpace inflation
- Inaccessible information –missing in 13.6% of primary care visits (Smith, 2005)

7

Why doesn't everyone use an EHR already? (Hersh, 2004)

Health Care Information Technology Progress and Barriers

William Hersh, MD

is the Executive Director of the Center for Health Systems Research and Analysis at the University of Michigan. He is also a senior advisor to the Michigan Health Care Information Technology Task Force.

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

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Reprinted: Hersh, William D. (2004). Health Care Information Technology: Progress and Barriers. In: Health Care Information Technology: Progress and Barriers. Edited by William D. Hersh. Copyright 2004, University of Michigan. All rights reserved.

Downloaded: 06/01/2015 10:00:00 AM

See also p. 2255.

Copyright 2004, University of Michigan. All rights reserved.

Cost barriers

- Even though there is overall ROI, benefit does not accrue to those who pay, especially in small practices (CITL, 2003)
 - Practices only see 11% of ROI – most goes to insurance companies and laboratories
 - But they are usually asked to pay the cost of EHRs
- More recent data, however, suggests physicians do achieve positive ROI around 2.5 years after initial investment, although range is wide (Miller, 2005)

9

Technical challenges

- While underlying technology (e.g., networks, relational database systems) is well-established, other technical issues remain, such as
 - Implementing systems, especially in office settings (Hartley, 2005; Amatayakul, 2005)
 - Matching systems to workflow – best systems add time in some areas but make it up in others (Overhage, 2001)

10

Need for standards to achieve interoperability

- Clinical data is trapped in “silos,” not easily moved from one system to another (Brailer, 2005)
- Growing push for attention to “secondary use of clinical data,” which can align benefits for quality assessment, clinical research, public health surveillance, etc. (Safran, 2007)
- To achieve this, need standards for data elements, terminology, messaging, etc.
- Why are we not there? Lack of incentives, such as
 - Vendors ambivalent
 - Clinicians do not prioritize documentation
 - Genuine scientific disagreement over best approaches

11

Concerns about privacy and confidentiality

- (Gostin, 2002; Kluge, 2003)
- VERY real, but
 - Security technologies are well-known and proven effective
 - Paper-based records are at least as insecure as EHRs and probably more so
 - Human curiosity will trump even best methods, so we need to consider benefits versus risks

12

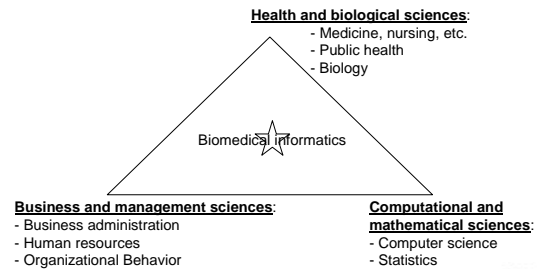
Workforce

- Probably the most important aspect of a successful enterprise health IT implementation is people, especially “special people” (Ash, 2003)
- The job is too important to be left to pure IT professionals – clinicians must provide leadership and be actively involved
- Recent workforce report from AHIMA and AMIA documents need (AHIMA-AMIA, 2006)
 - Safran (2005) has advocated we need at least one physician and one nurse in each of the 6,000 US hospitals knowledgeable in informatics

13



What competencies are needed in informatics?



14



There is no dearth of competencies in informatics

- Health care professionals
 - AAMC Medical School Objectives Project (1999)
 - American Nurses Association (Staggers, 2002)
 - Northwest Center for Public Health Practice (O'Carroll, 2002)
 - American Association of Critical-Care Nurses (Curran, 2003)
 - “Information age” students (Ivanitskaya, 2006)
 - Medical Library Association (2007)
- Informatics professionals
 - Association for Computing Machinery (Duncan, 1978)
 - International Medical Informatics Association (2000)
 - National Health Service (2001)
 - Pointing the Way: Competencies and Curricula in Health Informatics (2001)
 - Commission on Accreditation for Health Informatics and Information Mgmt. Education (CAHIIM) – Associate and Baccalaureate (2005)
 - Benchmarking statement (Pigott, 2007)

15



Where does one find more information? Textbooks

- Shortliffe et al., *Biomedical Informatics: Computer Applications in Health Care and Biomedicine* (3rd edition), Springer-Verlag, 2006
- LaTour and Eichenwald, *Health Information Management - Concepts, Principles, and Practice* (2nd edition), AHIMA, 2006
- Baxevas, *Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins* (3rd edition), Wiley-Interscience, 2005
- Huang, *PACS and Imaging Informatics: Basic Principles and Applications*, Wiley-Liss, 2004
- Saba and McCormick, *Essentials of Nursing Informatics*, McGraw-Hill, 2005

16



More information (cont.), Journals

- Journal of the American Medical Informatics Association (JAMIA, www.jamia.org)
- Journal of Biomedical Informatics (JBI)
- Methods of Information in Medicine (MIM)
- International Journal of Medical Informatics (IJMI)
- Bioinformatics
- Biomed Central (BMC, www.biomedcentral.com)
 - BMC Medical Informatics and Decision Making
 - BMC Bioinformatics

17



More information (cont.), Meetings

- AMIA-related meetings
 - AMIA Annual Symposium and Spring Congress
 - Medinfo (triennial)
- Other health IT meetings
 - HIMSS, local chapters and national
 - AMDIS Physician-Computer Connection
 - Towards an Electronic Patient Record (TEPR)
 - eHealth Initiative/Connecting Communities for Better Health
- Health care meetings
 - AAMC GIR and general meetings
 - Specialty society meetings

18



More information (cont.), Web sites

- AHRQ National Resource Center for Health IT – healthit.ahrq.gov
- HIT Implementation Testing and Support – <http://xreg2.nist.gov/hit-testing/>
- iHealthBeat – www.ihealthbeat.org
 - Also has daily email list, best among the many
- Informatics Review – www.informatics-review.com
 - Run by OHSU faculty member, Dr. Dean Sittig
- UK Health Informatics Today – <http://www.bmis.org/ebmit.html>
- World Health Organization – http://www.who.int/topics/medical_informatics/en/
- Fierce Health IT – www.fiercehealthit.com
- Connecting for Health Common Framework – <http://www.connectingforhealth.org/commonframework/>

19



State of the art of informatics education

- AMIA 10x10 program (Hersh, 2007)
 - Aims to train 10,000 clinicians in medical informatics by 2010 – nearly 400 trained by end of 2007
 - First offering in partnership with OHSU
 - <http://www.amia.org/10x10/>
- Other educational programs in biomedical informatics and related disciplines
 - <http://www.amia.org/informatics/acad&training/>
- Medical student education – uptake of MSOP (McGowan, 2007)



20

