Awardee of The Office of the National Coordinator for Health Information Technology

Component 5: History of Health Information Technology in the U.S.

Instructor Manual

Version 3.0/Spring 2012

Notes to Instructors

This Instructor Manual is a resource for instructors using this component. Each component is broken down into units, which include the following elements:

- Learning objectives
- Suggested student readings, texts, reference links to supplement the narrated PowerPoint slides
- Lectures (voiceover PowerPoint in Flash format); PowerPoint slides (Microsoft PowerPoint format), lecture transcripts (Microsoft Word format); and audio files (MP3 format) for each lecture
- Self-assessment questions reflecting Unit Objectives with answer keys and/or expected outcomes
- Application Activities (e.g., discussion questions, assignments, projects) with instructor guidelines, answer keys and/or expected outcomes

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Contents

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Likewise, the above also applies to the Curriculum Development Centers (including Columbia University, Duke University, Johns Hopkins University, Oregon Health & Science University, University of Alabama at Birmingham, and their affiliated entities).

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Component Overview

This component traces the development of IT systems in health care and public health, beginning with the experiments of the 1950s and 1960s and culminating in the HITECH act, including the introduction of the concept of "meaningful use" of electronic health records.

Component Objectives

At the completion of this component, the student will be able to:

- Explain the rationale for elements of the HITECH Act in terms of the history of health IT
- Describe the background of today's health IT landscape including EHR, HIE, CDS, applications in Public Health, relevant professional organizations
- Describe the history of regulation of Health IT in the U.S.
- Describe how legislation related to privacy and security of electronic health information has evolved in the US.
- Discuss how financial incentives for use of HIT have changed over time.

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Information Security in the UAB School of Health Professions. During his tenure at UAB, he has served as Director of Information Technology for the Civitan International Research Center and Director of Informatics for the Pittman General Clinical Research Center. Mr. Herzig has also consulted on numerous informatics projects with external groups, including Southern Nuclear and the US Army Medical Command. Mr. Herzig is also the editor of the recent HIMSS book: Information Security in Healthcare: Managing Risk.

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Carol D. McKelvey, MA, RHIA, has been a member of the faculty of the Health Information Technology (HIT) Program at Wallace State Community College since 1993. She earned a B.S. degree in health information administration from the University of Alabama at Birmingham and an M.A. degree in health science from the University of Alabama. Over the past eight years, her concentration has been in the area of e-learning, serving as developer and instructor of distance education classes for the HIT Program, and evaluator of online course content and quality for Wallace State. Prior to becoming an educator, Ms. McKelvey served as the Director of Health Information Services in general acute care and rehabilitation settings. She is an active member of the American Health Information Management Association and the Alabama Association of Health Information Management.

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Dan L. Murphy, is an Instructional Design Manager in the School of Nursing. He has a BS in Corporate Training and Development and a prior Associate of Applied Science Degree (Instructor of Technology). He is currently studying for a Masters in Education in Instructional Technology. He has prior experience as a Technical Training Instructor and Technical Training Evaluator for the US Air Force. He has developed a Virtual Patient Simulator for which he has a patent pending. He currently provides instructional design support for a number of externally funded projects including “Distance-Based Education for International Study Coordinators”, “A Culturally Competent Online NNP Program”, “Psychiatric NP program for the Rural Deep South”, “Leadership Education in Child-Health Nursing (LECHN)”, “Culturally Competent Alabama Clinical Nurse Leaders Program”, and a “Distance Learning Culturally Competent ANP/GNP Program for rural and underserved populations.”

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private practice, teaching, consulting, outreach programs, and working with online learning and computer and communications technologies. In her current role, Dr. Robinson is completing her third clinical systems implementation and online curriculum for a professional school. Dr. Robinson is a graduate of the University of Medicine and Dentistry of New Jersey and has a master's degree in medical informatics from Columbia University. She also has several certifications, including Special Patient Care, IT Project Management, and Online Education. Among several honors and awards, Dr. Robinson is the recipient of the 2002 "Most Promising Health Professional" award from the International Women of Color in Health, Science and Technology, and the 2007 Faculty Award for research from the National Dental Association.

Susan P. Bagwell, MA, received her Masters degree in Education from The University of Alabama at Birmingham in 2009. She is an alumnus of the UAB Urban Teacher Enhancement Program. She has over six years of teaching experience and served as administrator and teacher at a summer learning program for urban school children.

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Component 5/Unit 1

Unit Title
Evolution of Health IT: The Early Years

Unit Description
This unit describes the early years of the evolution of health IT.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the enduring values that have been foci for HIT stakeholders and how the social, educational, and professional environments in healthcare influence these values.
2. Discuss the impact of key developments in the 1950s and 1960s including Sputnik, Medicare/Medicaid legislation and medical research on healthcare.
3. Describe how medical records and the use of health information technology changed from the 1950's through the 1980's.
4. Describe some of the key informatics innovations in the 1970's and 1980's including the problem-oriented medical record, Medline, the early electronic medical records and clinical decision support systems.
5. Discuss the increasing professionalization of informaticians and HIT professionals including training programs and professional organizations.

Unit Topics
1a.1 Influences, goals and values of key players in healthcare and health IT
1a.2 The healthcare environment prior to 1970
1b.1 The 1970s environment
1b.2 Key informatics innovations in the 1960s and 1970s (Medline, early EHRs, medical expert systems)
1c.1 The 1980s environment
1c.2 Information systems in healthcare
1c.3 Early clinical decision support systems
1c.4 Professionalization of informatics

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Lecture Titles
1a Introduction and Pre-1970
1b The 1970s
1c The 1980s

Unit References
(All links accessible as of 1/17/2012)

Lecture 1a

1. Weiner JP. A shortage of physicians or a surplus of assumptions? Health Aff (Millwood). 2002;21(1):160-2.

Lecture 1a Charts, Tables, and Figures
None.

Lecture 1a Images
Slide 27: Picture of Sputnik Satellite, NASA Picture of the Day Collection, Available from: ttp://www.nasaimages.org
Slide 32 -33: Johnson signing Civil Rights Act, Available from: http://commons.wikimedia.org/wiki/File:Lyndon_Johnson_signing_Civil_Rights_Act,_2_July,_1964.jpg Source:LBJ Library, University of Texas
Slide 35: NASA Great Images in Nasa Collection, IBM Electronic Data Processing Machine Available from: http://www.nasaimages.org

Lecture 1b

1. Barnett GO, Justice NS, Somand ME et al. COSTAR – A computer-based medical information system for ambulatory care. Proc IEEE. 1979;67:1226-37.
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11. Warner HR, Olmsted CM, Rutherford BD. HELP, a program for medical decision-making. Comp Biomed Res. 1972;5:65-74.
12. Weed LL. Medical records that guide and teach. N Engl J Med. 1968 Mar 14;278(11):593-600.
13. Weed LL. Medical records that guide and teach. N Engl J Med. 1968 Mar 21;278(12):652-7 concl.

Lecture 1b Charts, Tables, and Figures
None.

Lecture 1b Images
Slide 6: Mainframe computer, **http://en.wikipedia.org/wiki/File:Ibm704.gif** Photo courtesy of Lawrence Livermore National Laboratory.

Lecture 1c

1. HIMSS Legacy Workgroup. History of the Healthcare Information and Management Systems Society (formerly Hospital Management Systems Society) [Internet]. Chicago: Healthcare Information and Management Systems Society (HIMSS); 2007. Available from: http://www.himss.org/content/files/HIMSS_HISTORY.pdf
2. Miller R, Masarie FE. Quick medical reference (QMR) for diagnostic assistance. MD Comput. 1986 Sep-Oct;3(5):34-48.
3. Tapscott D. Growing up digital. New York: McGraw-Hill, 1998.
4. Wilson GA, McDonald CJ, McCabe GP Jr. The effect of immediate access to a computerized medical record on physician test ordering: a controlled clinical trial in the emergency room. Am J Public Health. 1982 Jul;72(7):698-702.

Lecture 1c Charts, Tables, and Figures
None.

Lecture 1c Images
Slide 3: Baxter, Judy , CC BY-NC-ND 2.0, Available from: http://www.flickr.com/photos/judybaxter/3555505/

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Unit Required Readings
None.

Unit Suggested Readings

1. Collen MF: Origins of medical informatics, In Medical informatics [Special Issue]. West J Med 1986; 145:778-785. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1307150/pdf/westjmed00160-0042.pdf/
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Student Application Activities
comp5_unit1_activity.doc
comp5_unit1_activity_key.doc
comp5_unit1_self_assess.doc
comp5_unit1_self_assess_key.doc

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Additional Materials

Glossary-- The glossary includes definitions of some of the terms mentioned in the Component 5 presentations.

Glossary

AHIMA
American Health Information Management Association

AMIA
American Medical Informatics Association

Capitation
A method of healthcare reimbursement in which an insurance carrier prepays a physician, hospital, or other healthcare provider a fixed amount for a given population without regard to the actual number or nature of healthcare services provided to the population.[1]

Critical Pathway
The sequences of tasks that determine the project finish date.[1] In IT management this would be part of the implementation process, but in healthcare in general, there are protocols that determine the sequence of activities or patient outcomes that must be met before a patient is ready to be discharged from the hospital.

Decentralized Data Structure
A decentralized architecture, or federated model, involves the exchange of information on an "as needed basis" rather than aggregating all databases to a centralized location. In decentralized architectures, individual organizations maintain their own health information network with no centralized repositories.

Diagnostic Related Groups (DRGs)
Groups of International Classification of Disease (ICD) coded diagnoses, procedures, and other information used to group patients for reimbursement by Medicare.[2]

Fiscal
Refers to financial issues.

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Geriatrics
A branch of medicine that deals with the problems and diseases of old age and aging people.[3]

HIMSS
Healthcare Information and Management Systems Society

HIPAA (Health Insurance Portability and Accountability Act of 1996)
The federal legislation enacted to provide continuity of health coverage, control fraud and abuse in healthcare, reduce healthcare cost, and guarantee the security and privacy of health information.[1]

Informaticians
Individuals in a field of study (informatics).[1]

Informatics
There are often slightly different definitions of this term, but all relate to management of information and most relate to technology.[1]

Information Technology (IT)
Computer technology (hardware and software) combined with telecommunications technology (data, image, and voice networks); often used interchangeably with information systems (IS) .[1]

Managed Care
A generic term for reimbursement and delivery systems that integrate the financing and provision of healthcare services by means of entering contractual agreements with selected providers to furnish comprehensive healthcare services and developing explicit criteria for the selection of healthcare providers, formal programs of ongoing quality improvement and utilization review, and significant financial incentives for members to use providers associated with the plan.[1] In the early 1990s it was expected that managed care that involved capitation would dominate health care but that has not occurred.

Outcome analysis
An evaluation that measures the actual outcomes of patient care and services against predetermined criteria or expected outcomes; also called outcome assessment.[1]

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Pediatrics
A branch of medicine dealing with the development, care, and diseases of children.[3]

Platform
The combination of hardware and operating system on which an application program can run.[1]

Protocol
A detailed plan of care for a specific medical condition based on investigative studies.[1]

Telehealth
Using communications networks to provide health services including, but not limited to, direct care, health prevention, consulting, and home visits to patients in geographical locations different than the provider of these services.[2]

Sources for definitions:

1. Blondeau C, Greenock K, Ulbricht M & Zielske K; Pocket glossary of health information management and technology. 2nd ed. Chicago: American Health Information Management Association; 2010.
2. HIMSS Dictionary of healthcare information technology terms acronyms and organizations. Chicago: Health Information and Management Systems Society; 2006.
3. Merriam-Webster. Free Merriam-Webster Dictionary. [Homepage on the Internet]. 2010 [cited 2010 Jul 16]. Available from: http://www.merriam-webster.com/

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Component 5/Unit 2

Unit Title
Evolution of Health IT: The Modern Era

Unit Description
This unit describes the evolution of health IT from 1990 - 2009.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss factors that led to increasing clinical use of computers from 1990- 2009.
2. Discuss key influences on health IT developments including the Internet, HIPAA, and the Institute of Medicine reports.
3. Discuss the focus of health IT in the late 90s up to the present.
4. Discuss the role of health IT in clinical and translational research and personalized medicine.
5. Discuss why there is more receptivity to the use of Health IT now than during the previous 50 years.

Unit Topics

2a.1	Changes in the general environment from 1990-2009
2a.2	Changes in the healthcare environment from1990-2009
2b.1	Changes in healthcare organizations from 1990-2009
2b.2	The practice of medicine in the modern era
2b.3	Academic medicine and the role of Informatics
2b.4	Impact of changes over the last 50 years

Lecture Titles
2a The Environment
2b Key Stakeholders

Unit References
(All links accessible as of 1/17/2012)

Lecture 2a

1. Age and Sex Composition: 2010. 2010 Census Briefs. Available from: http://www.census.gov/prod/cen2010/briefs/c2010br-03.pdf
2. Association of American Physicians and Surgeons, Inc. Patients' Bill of Rights. 1995. Available from: http://www.aapsonline.org/patients/billrts.htm

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3. Bush GW. State of the Union Address to Congress. 2004 Jan 20. Available from: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2004_presidential_documents&docid=pd26ja04_txt-10.pdf
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5. Kletke P, Escarce J, Polsky D, Wozniak GD. Trends in physician retirement. Abstr Book Assoc Health Serv Res Meet. 1998; 15:91.
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8. Tang PC, Ash JS, Bates DW, Overhage JM, Sands DZ. Personal health records: definitions, benefits, and strategies for overcoming barriers to adoption. J Am Med Inform Assoc. 2006 Mar-Apr;13(2):121-6.

Lecture 2a Charts, Tables, and Figures
None.

Lecture 2a Images
Slide 6: Three “W” computer keys Available from: Microsoft Clip Art. Source Name: Used with permission of Microsoft.
Slide 9: Mass Communication Specialist Seaman Brandon Myrick, Available from: http://commons.wikimedia.org/wiki/File:US_Navy_070607-N-6710M-034_Hospital_Corpsman_2nd_Class_Rolando_Samortin_dances_with_a_resident_of_Wesley_Mission%5Ersquo,s_elderly_home.jpg. Source Name: US Navy.
Slide 16: Spellman, James Jr., Military Family Available from: http://www.af.mil/photos/media_search.asp?q=AliceShepard&page=2* Source Name: US Airforce.
Slide 19: DNA double helix, http://www.genome.gov/pressDisplay.cfm?photoID=96* Source: National Human Genome Institute.
Slide 21: The Leapfrog Group, Logo of the Leapfrog Group, Used with permission from The Leapfrog Group.

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Lecture 2b

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Lecture 2b Charts, Tables, Figures and Images

None.

Unit Required Readings

None.

Unit Suggested Readings

1. Berner ES, Detmer DE, Simborg D. Will the wave finally break? A brief view of the adoption of electronic medical records in the United States. J Am Med Inform Assoc. 2005;12(1):3-7. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC543824/
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3. Committee on Quality of Health Care in America, Institute of Medicine. Crossing the Quality Chasm: A New Health System for the 21st Century, Washington, DC: National Academy Press, 2001. Free Executive Summary. Available from: http://www.nap.edu/catalog.php?record_id=10027
4. Personalized Health Care: Opportunities, Pathways, Resources. US Department of Health and Human Services. Washington, DC. September 2007. Available from: http://www.hhs.gov/myhealthcare/news/phc-report.pdf*

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Student Application Activities
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comp5_unit2_self_assess_key.doc

Additional Materials
None.

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Component 5/Unit 3

Unit Title
Evolution of Health IT: The HITECH Act

Unit Description
This unit describes the background and provisions of the HITECH Act.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the barriers to adoption of Health IT that the HITECH Act is designed to address.
2. Discuss how the following ARRA/HITECH requirements relate to previous developments in health IT:
    a. Certified electronic health records
    b. Concept of meaningful use including e-prescribing, clinical decision support, interoperability and HIE, structured documentation of quality measures
    c. Incentives to providers
    d. Education of clinicians
    e. Workforce development.
3. Give examples of how the HITECH provisions support healthcare reform efforts.
4. Discuss the overall vision for the effects of the HITECH Act.

Unit Topics
3a.1 Barriers to the use of Health IT to improve quality and reduce cost
3a.2 The HITECH vision
3a.3 Regional Extension Centers
3a.4 Workforce Development
3b1 "Meaningful Use" of Health IT
3b2 Promotion of Health Information Exchange
3b3 Strategic Health IT Advanced Research Projects

Lecture Titles
3a Regional Extension Center and Workforce Training

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3b Meaningful Use, Health Information Exchange and Research

Unit References
(All links accessible as of 1/17/2012)
None.

Lecture 3a

1. Blumenthal D. Stimulating the adoption of health information technology. N Engl J Med. 2009; 360;15:1477-9. Available from: http://content.nejm.org/cgi/reprint/360/15/1477.pdf
2. Office of the National Coordinator. Celebrating the first anniversary of the HITECH Act and looking to the future. 2010. Available from: http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_911674_0_0_18/FINAL_ONC-HITECH-Anniversary.pdf

Lecture 3a Charts, Tables, and Figures
None.

Lecture 3a Images
Slides 12, 13: Courtesy of the Office of the National Coordinator for Health Information Technology. Available from: http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_911674_0_0_18/FINAL_ONC-HITECH-Anniversaryf

Lecture 3b

1. Blumenthal D. Stimulating the adoption of health information technology. N Engl J Med. 2009; 360;15:1477-9. Available from: http://content.nejm.org/cgi/reprint/360/15/1477.pdf*
2. Blumenthal D and Tavenner M. The “Meaningful Use” Regulation for Electronic Health Records. N Engl J Med 2010; 363:501-504. Available from: http://www.nejm.org/doi/full/10.1056/NEJMp1006114*
3. Office of the National Coordinator. Celebrating the first anniversary of the HITECH Act and looking to the future. 2010. Available from: http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_911674_0_0_18/FINAL_ONC-HITECH-Anniversary.pdf*

Lecture 3b Charts, Tables, and Figures
None.

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Lecture 3b Images
Slide 4, 8, 20, 24: Courtesy of the Office of the National Coordinator for Health Information Technology. Available from: http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_911674_0_0_18/FINAL_ONC-HITECH-Anniversaryf*
Slide 6, 7: Microsoft clip art; Used with permission from Microsoft.
Slide 18: Andrew Bossi CC-By-SA-2.5, 2.0, and 1.0 Available from: http://en.wikipedia.org/wiki/File:NJ_LBI_Lighthouse_06.JPG.

Unit Required Readings
None.

Unit Suggested Readings
1. Blumenthal D. Stimulating the adoption of health information technology. N Engl J Med. 2009; 360;15:1477-9. Available from: http://content.nejm.org/cgi/reprint/360/15/1477.pdf
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Student Application Activities
comp5_unit3_activity.doc
comp5_unit3_activity_key.doc
comp5_unit3_self_assess.doc
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Additional Materials
1. HITECH Programs. This is the official website for the Office of the National Coordinator and includes information on all the HITECH programs. Available from: http://www.healthit.gov/policy-researchers-implementers/hitech-programs-advisory-committees
2. Certification Commission for Health Information Technology. Available from: www.CCHIT.org
3. Martin R. HITECH An interoperetta in three acts. This is a

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humorous musical introduction to the HITECH Act. It also includes definitions of many of the terms connected with health IT. It was made shortly after the HITECH legislation passed but before many of rules had been finalized. Available from: http://www.youtube.com/watch?v=Gv1s8fM3mMk

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Component 5/Unit 4

Unit Title
Evolution of Public Health Informatics

Unit Description
This unit describes the evolution of public health informatics.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss how the sub-discipline of public health informatics has evolved over time.
2. Describe how health IT (HIT) can be used to enhance public health practice.
3. List potential ethical, social, and political issues associated with the development of HIT applications for public health purposes.

Unit Topics
4.1 What is public health?
4.2 What is public health informatics (PHI) and how did it evolve?
4.3 What were early PHI applications?
4.4 What are emerging and future PHI uses?

Lecture Titles
4 Evolution of Public Health Informatics

Unit References
(All links accessible as of 1/17/2012)

Lecture 4

1. CDC at Work. BioSense is useful tool during California wildfires. CDC [Internet]. Available from: http://www.cdc.gov/washington/cdcatWork/pdf/wildfires2.pdf*
2. Chen H, Zeng D, Yan P. Infectious disease informatics: syndromic surveillance for public health and bio-defense. New York: Springer; 2010.
3. Friede A, et al. Public health informatics: how information-age technology can strengthen public health. Annual Review of Public Health.1995;16:239-52.
4. Geographic Information Systems. Wikipedia. [Internet]. Available

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from: http://en.wikipedia.org/wiki/Geographic_information_system
5. Public Health Functions Project [Internet]. [Updated 2000 Nov 28]. Available from: http://www.health.gov/phfunctions/public.htm
6. Stoto MA, Matthias S, Mariano LT. Syndromic surveillance: Is it worth the effort? Chance. 2004;17(1):19-24.
7. Yan P, Chen H, Zeng D. Syndromic surveillance systems. Annual Review of Information Science and Technology. 2008;42:425–95.
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Lecture 4 Charts, Tables, and Figures

1.1 Chart: www.health.gov/phfunctions/public.htm Courtesy: Public Health Functions Project.

1.2 Chart: Ginsberg M, Johnson J et al. Monitoring health effects of wildfires using the BioSense system – San Diego County, California, October 2007. MMWR 57: 741-747. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5727a2.htm#fig1 Available from: http://www.cdc.gov/mmwr/about.html Sept 22-Nov, 2007.

Lecture 4 Images

Slide 12: Gobetz, Wally, Twin Towers, CC BY-NC-ND 2.0, Available from: http://www.flickr.com/photos/wallyg/159455100/

Slide 12: Daschle letter, CC BY-NC-ND 2.0, Available from: http://en.wikipedia.org/wiki/File:Daschle_letter.jpg

Slide 16: newspaper article Available from: http://www18.georgetown.edu/data/people/stotom/publication-25897.pdf Article is freely availabvle on the web.

Slide 18: map of the US, "Real-time Biosurveillance: Strategy & Approach", Available from: http://www.cdc.gov/biosense/subtropic/background.index.html* Source Name: Presentation by Leslie, Lenert, Director, National Center for Public Health Informatics, Centers for Disease Control and Prevention.

Slide 23: Labianco, Kevin, burning fires at night, Available from: http://www.flickr.com/photos/kevinl8888/1724350154/. Source Name: Kevin Labianco.

Slide 24: Booher, Andrea, Firemen Fighting Fires. Available from: http://www.fema.gov/photodata/original/33376.jpg. Source Name: FEMA/Andrea Booher.

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Slide 25: Booher, Andrea, destroyed region, Available from: http://www.nsf.gov/discoveries/disc_images.jsp?cntn_id=111740&org=NSF. Source Name: FEMA/Andrea Booher; Flickr.com.
Slide 26: fires from sky, Available from: http://earthobservatory.nasa.gov/IOTD/view.php?id=8148, Source Name: NASA; Commons.wikimedia.org.
Slide 28: biosense webpage Available from: https://sites.google.com/site/biosenseredesign/?pli=1. Source Name: CDC.
Slide 30: Olympic rings, Available from: http://commons.wikimedia.org/wiki/File:Olympic_Rings.svg. Source Name: http://www.teamusa.org/resources/u-s-olympic-education/materials-for-teachers/guidelines-for-using-olympic-symbols-marks*
Slide 31: Soccer match, CC BY 2.0, Available from: http://www.flickr.com/photos/mjohn2101/3093906270/
Slide 32: Peters, Marek, G8 Summit, Available from: http://de.wikipedia.org/wiki/Datei:Polizei-G8-Rostock.jpg. Source Name: Photo by Marek Peters / www.marek-peters.com
Slide 33: McClosky, Colin, World series stadium, CC BY-NC-SA, Available from: http://www.flickr.com/photos/mccolin/3119313075/
Slide 34: Bone, Terry, Superbowl halftime show (Rolling Stones), CC BY-SA 2.0, Available from: http://www.flickr.com/photos/tbone2/98310749/
Slide 35: Kentucky Derby, Available from: http://commons.wikimedia.org/wiki/File:Derby.jpg. Source Name: Wikimedia Commons; Courtesy Kentuckytourism.com.
Slide 36: Vanover, Christie, H1N1, Available from: http://www.army.mil/media/60431 Source Name: Christie Vanover.
Slide 37: Serfas, Mike, deaths by state, CC BY-SA 3.0, Available from: http://en.wikipedia.org/wiki/File:Swine_flu_infections_and_deaths_by_county_June_2009.svg. Source Name: Wikimedia Commons.
Slide 40: geo info systems, Source Name: Courtesy Devon Taylor, Jefferson County, AL Dep't of Health.
Slide 41, 42: Photo by Alton, smart phone, Available from: http://en.wikipedia.org/wiki/File:Texting.jpg Source Name: Wikimedia Commons.

Unit Required Readings
None.

Unit Suggested Readings
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http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2781725/
2. Tokars JI, English R, McMurray P, Rhodes B. Summary of data reported to CDC's national automated biosurveillance system 2008. BMC Med Inform Decis Mak 2010 May 25;10:30. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2890598/
3. Yasnoff WA, Overhage JM, Humphreys BL, LaVenture M. A national agenda for public health informatics: summarized recommendations from the 2001 AMIA Spring Congress. J Am Med Inform Assoc 2001 Nov-Dec;8(6):535-45. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC130064/
4. O'Carroll PW, Yasnoff WA, Wilhoite W. Public health informatics: a CDC course for public health program managers. Proc AMIA Symp 1998:472-6. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2232102/

Student Application Activities

comp5_unit4_activity.doc
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Additional Materials

None.

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Component 5/Unit 5

Unit Title
Evolution of Nursing Informatics and HIT Tools Used By Nursing

Unit Description
This unit describes the evolution of nursing informatics and the HIT tools used by nursing.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss how health IT (HIT) tools have evolved to support the practice of nursing.
2. List common nursing HIT applications and describe how they have evolved over time.
3. Describe the evolving role of nurse informaticists in healthcare organizations.

Unit Topics
5.1 How nurses spend their time
5.1 The changing definitions of nursing informatics over time
5.1 Early nursing informatics tools, and how they evolved over time
5.1 Evolving Role of the Nurse Informaticist

Lecture Titles
5 Evolution of Nursing Informatics and HIT Tools Used By Nursing

Unit References
(All links accessible as of 1/17/2012)

Lecture 5

1. Collen MF. A history of medical informatics in the United States 1950-1990. Bethesda (MD): AMIA;1995.
2. Hendrich A. A 36-hospital time and motion study: how do medical-surgical nurses spend their time? The Permanente Journal [Internet]. 2008 Summer.
   Available from: http://xnet.kp.org/permanentejournal/sum08/time-study.pdf*
3. HIMSS 2009 informatics nurse impact survey. Available from: http://www.himss.org/content/files/HIMSS2009NursingInformaticsImpactSurveyFullResults.pdf*

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5. Ozbolt JG, Saba VK. A brief history of nursing informatics in the United States of America. Nursing Outlook. 2008 Sep-Oct;56(5):199-205.
6. The nursing process: a common thread amongst all nurses [Internet]. Silver Springs (MD): American Nurses Association; 2011. Available from: http://www.nursingworld.org/EspeciallyForYou/StudentNurses/Thenursingprocess.aspx*
7. Thompson BW. The transforming effect of handheld computers on nursing practice. Nurs Admin Q. 2005 Oct-Dec; 29(4): 308-14.

Lecture 5 Charts, Tables, and Figures
None.

Lecture 5 Images
Slide 4: Niramon, Poramaporn, nurse with IV bag, CC BY-NC-ND 2.0, Available from: http://www.flickr.com/photos/poramapon/152352834/in/set-72157600230431461
Slide 6: Nurse typing on a computer, Source Name: UAB School of Nursing.
Slide 10: Photo by Gwern, punch card, Available from: http://commons.wikimedia.org/wiki/File:Blue-punch-card-back.png. Source Name: Wikimedia Commons.
Slide 16: Mainframe computer, CC BY-SA 2.0, Available from: http://en.wikipedia.org/wiki/File:Ibm704.gif. Source Name: Courtesy of Lawrence Livermore National Laboratory: Wikimedia Commons.
Slide 16: Liew, Cheon Fong, smart phone, Available from: http://www.flickr.com/photos/liewcf/3547134847/
Slide 17: nurse looking at files, Available from: http://en.wikipedia.org/wiki/File:US_Navy_041019-N-5821P019_Airman_Lauren_Thurgood_of_Las_Vegas,_Nev.,_pulls_patient_medical_records_in_the_inpatient_ward_aboard_the_conventionally_powered_aircraft_carrier_USS_Kitty_Hawk.jpg Source Name: Wikimedia Commons/* U.S. Navy photo by Photographer's Mate 3rd Class Jason T. Poplin.
Slide 17: tablet computer, CC BY-NC-ND 2.0. Available from: http://www.flickr.com/photos/jiscimages/435110462/. Source Name: Photo by JISC.

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Slide 18: Brown, Vincent J & Neils van Eck, Simon Says, Available from: http://en.wikipedia.org/wiki/File:OriginalSimon.jpg. Source Name: Wikimedia Commons.
Slide 18: Van Eck, Neils, iPhone screen, CC BY-NC-SA 2.0, Available from: http://www.flickr.com/photos/nielsvaneck/1490570992/
Slide 22: Nurse documenting care on computer. Available from: http://www.army.mil/media/113513. Source Name: U.S. Army.
Slide 23: wrist and bracelet Available from: http://commons.wikimedia.org/wiki/File:USID_P-Tag_On_Wrist_With_Barcode.jpg. Source Name: Wikimedia Commons CC BY 3.0.
Slide 24: Thorne, Angie, nurse bandaging an army patient. Available from: http://www.army.mil/media/166093. Source Name: U.S. Army.
Slide 25: Ms. Chrystal Smith (IMCOM), telemedicine. Available from: http://www.army.mil/media/170544. Source Name: U.S. Army.

Unit Required Readings
None.

Unit Suggested Readings

1. Masys DR, Brennan PF, Ozbolt JG, Corn M, Shortliffe EH. Are medical informatics and nursing informatics distinct disciplines? The 1999 ACMI debate. J Am Med Inform Assoc 2000; May-Jun;7(3):304-12. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC61434/
2. Bakken S, Stone PW, Larson EL. A nursing informatics research agenda for 2008-18: contextual influences and key components. Nurs Outlook 2008 Sep-Oct;56(5):206-214.e3. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2613178/
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Student Application Activities
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comp5_unit5_activity_key.doc
comp5_unit5_self_assess.doc
comp5_unit5_self_assess_key.doc

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Additional Materials

Videotaped Stories from Nursing Informatics Pioneers. Available from: (http://www.amia.org/programs/working-groups/nursing-informatics/history-project/video-library-1)

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Component 5/Unit 6

Unit Title
History of Electronic Health Records (EHRs)

Unit Description
This unit describes the history of electronic health records.

Unit Objectives
By the end of this unit the student will be able to:

1. Describe some early examples of electronic medical records.
2. Discuss lessons learned from the early EHR implementations.
3. Discuss how the attributes that were identified for a computer-based patient record in the 1991 Institute of Medicine Report relate to the concept of meaningful use.
4. Discuss differences between the terms electronic health record (EHR) and personal health record (PHR).

Unit Topics
6a.1 EHR terminology changes over time
6a.2 Example of an early EHR--COSTAR
6a.3 Example of an early EHR—TMR
6a.4 Example of an early EHR—RMRS
6a.5 Lessons learned from the early systems
6a.6 Barriers to widespread use
6a.7 The Computer-Based Patient Record (1991)
6a.8 Electronic Health Record System Capabilities (2003)
6a.9 Meaningful Use (2010)

Lecture Titles
6a Early EHR Prototypes
6b Evolution of Functional Requirements for EHRs

Unit References
(All links accessible as of 1/17/2012)
None.

Lecture 6a
1. Barnett GO, Zielstorff RD, Piggins J, et al. COSTAR: a comprehensive medical information system for ambulatory care.

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Proc Annu Symp Comput Appl Med Care. 1982 Nov 2; 8–18.
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5. Dick RS, Steen EB, Detmer DE. The computer-based patient record: an essential technology for healthcare. Washington, DC: National Academy Press; 1991.
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Lecture 6a Charts, Tables, Figures and Images
None.

Lecture 6b

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2. Institute of Medicine. Committee on Data Standards for Patient Safety, Board of Health Care Services. Key capabilities of an electronic health record system. Letter report. Washington (DC): The National Academies Press; 2003 Jul.
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empirical observations from a decade of CPOE experience at Vanderbilt. J Biomed Inform. 2005 Dec;38(6):469-85.
4. Smaltz DH, Berner ES. The executive's guide to electronic health records. Chicago (IL): Health Administration Press; 2007.

Lecture 6b Charts, Tables, and Figures
None.

Lecture 6b Images
Slide 17: US Dept. of Veterans Affairs. Available from: http://www.va.gov/VISTA_MONOGRAPH/docs/2008_2009_VistAHealtheVet_Monograph_FC_0309*.

Unit Required Readings
None.

Unit Suggested Readings
1. Barnett GO, Zielstorff RD, Piggins J, et al. COSTAR: A Comprehensive Medical Information System for Ambulatory Care. Proc Annu Symp Comput Appl Med Care. 1982 November 2: 8–18. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2580195/pdf/procascamc00008-0032.pdf
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Student Application Activities
comp5_unit6_activity.doc
comp5_unit6_activity_key.doc
comp5_unit6_self_assess.doc
comp5_unit6_self_assess_key.doc

Additional Materials
None.

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Component 5/Unit 7

Unit Title
History of Clinical Decision Support Systems

Unit Description
This unit describes the history of clinical decision support systems.

Unit Objectives
By the end of this unit the student will be able to:

1. Describe various types and structures of clinical decision support (CDS) systems.
2. Discuss the evolution of clinical decision support from expert system research.
3. Discuss the changes in focus of clinical decision support from the 1980s to the present.
4. Discuss the change in architecture and mode of access of clinical decision support systems from the 1980s to the present.
5. Describe some of the early clinical decision support systems.
6. Discuss the historical challenges in implementing CDS.

Unit Topics
7a.1 Definition of clinical decision support (CDS)
7a.2 Types of CDS
7a.3 “Classic” clinical decision support systems
7b.1 Examples of CDS and how they evolved
7b.2 Evolution of CDS architecture
7b.3 Challenges to be overcome

Lecture Titles
7a What is CDS?
7b Examples of Early CDS Systems
7c Evolution of CDS

Unit References
(All links accessible as of 1/17/2012)
None.

Lecture 7a
1. Berner ES, La Lande TJ. Overview of CDSS. In: Berner ES, editor.

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Lecture 7a Charts, Tables, Figures and Images
None.

Lecture 7b

1. Barnett GO, Cimino JJ, Hupp JA, Hoffer EP. DXplain. An evolving diagnostic decision-support system. JAMA. 1987 Jul 3;258(1):67-74.
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Springer; 2007. p. 159-89.
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Lecture 7b Charts, Tables, Figures and Images
None.

Lecture 7c

1. Berner ES, La Lande TJ. Overview of CDSS. In: Berner ES, editor. Clinical decision support systems: theory and practice. 2nd ed. New York: Springer; 2007. p. 3-22.
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Lecture 7c Charts, Tables, and Figures
None.

Lecture 7c Images
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month=12&to_day=31&to_year=1996&datesearch=Go&pageno=2&captionpage=true&photoId=S61-02749&hitsperpage=100. Source: NASA/ Courtesy of nasaimages.org.
Slide 13: David Weiss, Personal Collection.
Slide 14: George L. Smyth CC BY-NC-SA 2.0. Available from: http://www.flickr.com/photos/glsmyth/3097186351/.

Unit Required Readings
None.

Unit Suggested Readings
1. Osheroff JA, Teich JM, Middleton B, Steen EB, Wright A, Detmer DE. A roadmap for national action on clinical decision support, J Am Med Inform Assoc 2007; 14:141-145. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2213467/
2. Berner ES. Clinical decision support systems: State of the art. AHRQ publication No. 09-0069-EF. Rockville, Maryland: Agency for Healthcare Research and Quality. June 2009. Available from: http://healthit.ahrq.gov/portal/server.pt/gateway/PTARGS_0_1248_874024_0_0_18/09-0069-EF.pdf*
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Student Application Activities
comp5_unit7_activity.doc
comp5_unit7_activity_key.doc
comp5_unit7_self_assess.doc
comp5_unit7_self_assess_key.doc

Additional Materials
1. Demonstration of DXplain CDS: Massachusetts General Hospital. DXplain. [Homepage on the Internet]. 2008 [cited 2010 Jul 12]. Available from: http://dxplain.mgh.harvard.edu/dxp/dxp.sdemo.pl

Additional historical CDS resources:

2. Buchanan BG, Shortliffe EH. Rule-based expert systems [. Boston,

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MA:Addison-Wesley,1984 Available from: http://www.aaai.org/AITopics/pmwiki/pmwiki.php/AITopics/RuleBasedExpertSystems

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Component 5/Unit 8

Unit Title
History of CPOE and E-Prescribing

Unit Description
This unit describes the history of CPOE and e-prescribing.

Unit Objectives
By the end of this unit the student will be able to:

1. Explain how the evolving capabilities of CPOE systems impact quality and patient safety in the hospital setting.
2. Explain how the evolving capabilities of e-prescribing systems impact quality and patient safety in the ambulatory setting.

Unit Topics

8a.1 The unreliability of physician handwriting
8a.2 Automation of the ordering process
8a.3 Early CPOE systems
8a.4 Early e-prescribing systems

Lecture Titles
8a History of CPOE
8b History of E-Prescribing

Unit References
(All links accessible as of 1/17/2012)

Lecture 8a

1. Ash J S, Gorman PN, Seshadri V, Hersh WR. 2004. Computerized physician order entry in U.S. hospitals: results of a 2002 survey. J Am Med Inform Assoc. 11(2):95-9.
2. Bates DW, Leape LL, Cullen DJ. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. JAMA. 1998 Oct 21;280(15):1311-6.
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Lecture 8a Charts, Tables, and Figures
None.

Lecture 8a Images
Slide 3: Govard Bidloo Available from: http://commons.wikimedia.org/wiki/File:Ontleding_titlepg_fc.png
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Slide 6: Available from: http://en.wikipedia.org/wiki/File:Apothicaire.jpg.
Slide 8: Handwriting on the wall? Institute for Safe Medication Practices. Horsham (PA). Image used with permission. Available from: http://www.ismp.org/Newsletters/acutecare/articles/19970716.asp
Slide11: Derrick Wheeler, Personal Collection.
Slide 17: Nir Menachemi based on Sittig and Stead, 1994, Personal Collection.
Slide 20: Nir Menachemi, Personal Collection.

Lecture 8b

1. Au DW, Menachemi N, Panjamapirom A, Brooks RG. The influence of payer mix on electronic prescribing by physicians. Health Care Manage Rev. 2011 Jan-Mar;36(1):95-101.
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Lecture 8b Charts, Tables, and Figures
None.

Lecture 8b Images
Slide 3: Nir Menachemi, Personal Collection.

Unit Required Readings
None.

Unit Suggested Readings

1. Sittig DF, Stead WW. Computer-based physician order entry: the state of the art. J Am Med Inform Assoc 1994 Mar–Apr;1(2):108–123. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC116190/
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Student Application Activities
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Additional Materials
None.

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Component 5/Unit 9

Unit Title
History of Health Information Exchange

Unit Description
This unit describes the history of health information exchange.

Unit Objectives
By the end of this unit the student will be able to:

1. Describe historical U.S. efforts at realizing health information exchange.
2. Define community health information networks or CHINs and regional health information organizations known as RHIOs.
3. Describe why CHINs failed in the 1990s.
4. Describe the concept of RHIOs and articulate how they relate to Nationwide Health Information Network now called the NwHIN.

Unit Topics

9.1 What is health information exchange (HIE)?
9.2 How is health information currently exchanged?
9.3 What were early HIE systems, and why did they fail?
9.4 The goals of the Nationwide Health Information Network

Lecture Titles
9 History of Health Information Exchange

Unit References
(All links accessible as of 1/17/2012)

Lecture 9

1. Miller RH, Miller BS. The Santa Barbara County Care Data Exchange: what happened? Health Affairs. 2007;26(5):568-80.
2. Vest JR, Gamm LD. Health information exchange: persistent challenges and new strategies. JAMIA. 2010;17(3):288-294.

Lecture 9 Charts, Tables, and Figures
None.

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Lecture 9 Images
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Slide 6: Available from: maps.google.com
Slide 8: Wall of Files, Alex Gorzen. CC BY-SA 2.0. Available from: http://commons.wikimedia.org/wiki/File:Shelves-of-file-folders.jpg.
Slide 8: Post Office Van, Joseph Barillari. CC BY-SA 3.0. Available from: http://en.wikipedia.org/wiki/File:Usps-van.jpg.
Slide 8: Old Fashioned Telephone, Kornelia und Hartmut Häfele. CC BY-SA 3.0. Available from: http://en.wikipedia.org/wiki/File:Alt_Telefon.jpg.
Slide 8: Fax Machine, Jonnyt, Available from: http://en.wikipedia.org/wiki/File:Samfax.jpg.
Slide 9: Available from: http://healthit.gov.

Unit Required Readings
None.

Unit Suggested Readings
1. Adler-Milstein J, Landefeld J, Jha AK. Characteristics associated with regional health information organization viability. JAMIA 2010;17:61-65. doi:10.1197/jamia.M3284. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2995627
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Student Application Activities
comp5_unit9_activity.doc
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Additional Materials
1. Nationwide Health Information Network website.

Additional Materials
1. Nationwide Health Information Network website. http://www.healthit.gov/policy-researchers-implementers/nationwide-health-information-network-nwhin

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Component 5/Unit 10

Unit Title
History of Privacy and Security Legislation

Unit Description
This unit describes the history of privacy and security legislation in the US.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the reasons why the administrative simplification provisions were attached to the original HIPAA legislation.
2. Explain the five principles underlying the HIPAA privacy rule.
3. Discuss the reasons why the privacy rule was an action of the executive, not the legislative branch of Congress.
4. Describe security recommendations in the 1997 report “For the Record.”
5. Describe the major changes in privacy and security requirements as a result of HITECH and the reasons why the changes were needed.

Unit Topics
10a.1 Definitions of privacy, confidentiality and security
10a.2 HIPAA legislation-1996
10a.3 Privacy and confidentiality prior to HIPAA
10a.4 Principles underlying the HIPAA Privacy Rule
10a.5 HIPAA-1998-2009
10b.1 Practices recommended by National Research Council (NRC) to ensure confidentiality
10b.2 NRC Recommended Security Practices
10b.3 Background to HITECH changes to HIPAA
10b.4 HITECH changes to HIPAA
10b.5 Challenges in implementing HITECH privacy and security requirements

Lecture Titles
10a Background of HIPAA
10b Best Practices for Information Security
10c HITECH Privacy and Security Regulations

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Unit References
(All links accessible as of 1/17/2012)

Lecture 10a Charts, Tables, and Figures
None.

Lecture 10a Images
Slide 11: Omaopio. Available from: http://commons.wikimedia.org/wiki/File:Vintage_aloha-shirt-quilt.JPG.
Slide 13: Airunp. Available from: http://commons.wikimedia.org/wiki/File:Gran_muralla_badalig_agosto_2004JPG.jpg.
Slide 14: Available from: http://commons.wikimedia.org/wiki/File:US_Secret_Service_officers.jpg.
Slide 15: Win Henderson/FEMA. Available from: http://commons.wikimedia.org/wiki/File:FEMA_-_16868_-_Photograph_by_Win_Henderson_taken_on_10-06-2005_in_Louisiana.jpg.
Slide 16: Dadero Available from: http://commons.wikimedia.org/wiki/File:Oblique_facade_1,_US_Supreme_Court.jpg.
Slide 17: Available from: http://commons.wikimedia.org/wiki/File:Scale_of_justice_gold.png.
Slide 18: Jess Loughborough CC BY-NC-ND 2.0. Available from: http://www.flickr.com/photos/sunface13/3650126198.

Lecture 10b Charts, Tables, Figures and Images
None.

Lecture 10c Charts, Tables, and Figures
None.

Lecture 10c Images
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Slide 8: David Weiss, Personal Collection.
Slide 9: Courtesy of the Office of the National Coordinator for Health Information Technology. Available from: http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_911674_0_0_18/FINAL_ONC-HITECH-Anniversaryf

Unit Required Readings
None.

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Unit Suggested Readings

1. Shalala, DE. Testimony before the Senate Committee on Labor and Human Relations, Thursday, September 11, 1997. Available from: http://aspe.hhs.gov/admnsimp/pvctest.htm
2. Committee on Maintaining Privacy and Security in Health Care Applications of the National Information Infrastructure, Commission on Physical Sciences, Mathematics, and Applications, National Research Council. For the Record: Protecting Electronic Health Information. Washington DC: National Academy Press, 1997 (Free Executive Summary). Available from: http://www.nap.edu/catalog/5595.html

Student Application Activities

comp5_unit10_activity.doc
comp5_unit10_activity_key.doc
comp5_unit10_self_assess.doc
comp5_unit10_self_assess_key.doc

Additional Materials

1. Department of Health and Human Services, Office of Civil Rights, Health Information Privacy. This website provides information on HIPAA Privacy and Security requirements. Available from: http://www.hhs.gov/ocr/privacy/
2. Video: Press conference of Kathleen Sebelius, Secretary, U.S. Department of Health and Human Services on strengthening the privacy rule as a result of HITECH. This video is closed caption and features Kathleen Sebelius speaking on the changes in HIPAA as a result of the HITECH Act. Available from: http://www.hhs.gov/news/imagelibrary/video/2010-07-08_press.html*

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Component 5/Unit 11

Unit Title
Software Certification and Regulation

Unit Description
This unit describes the history of software certification and regulation.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the history of FDA involvement in the regulation of clinical software.
2. Describe the origins, focus and activities of CCHIT.
3. Discuss the changes in the EHR certification process as a result of the HITECH Act.
4. Discuss the recent efforts to improve the safety of EHRs.

Unit Topics
11.1 Explanation of EHR certification and FDA regulation processes
11.2 Challenges in regulation of EHRs
11.3 1989 FDA policy on 'competent human intervention'
11.4 Recommendations on software regulation from 1996 FDA workshop
11.5 Rise of interest in HIT-1999-2004
11.6 2004-2009 Certification of EHRs-origins and role of CCHIT
11.7 Patient safety and HIT regulation
11.8 HITECH requirements for certification of HIT
11.9 Unintended consequences of HIT
11.10 Improving the Safety of HIT

Lecture Titles
11 Software Certification and Regulation

Unit References
(All links accessible as of 1/17/2012)

Lecture 11
1. Ash JS, Sittig DF, Dykstra R, Campbell E, Guappone K. The unintended consequences of computerized provider order entry: findings from a mixed methods exploration. Int J Med Inform. 2009 Apr;78 Suppl 1:S69-76.

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2. Institute of Medicine. Health IT and Patient Safety: Building Safer Systems for Better Care. Washington (DC): The National Academies Press, 2011.
3. Koppel R, Metlay JP, Cohen A, Abaluck B, Localio AR, Kimmel SE, Strom BL. Role of computerized physician order entry systems in facilitating medication errors. JAMA. 2005 Mar 9;293(10):1197-203.
4. Manning W. Summary of Food and Drug Administration & National Library of Medicine Software Policy Workshop, Sept. 3-4, 1996. The Health Law Resource. Available from: http://www.netreach.net/~wmanning/fdaswsem.htm*
5. Miller RA, Gardner RM. Recommendations for responsible monitoring and regulation of clinical software systems. American Medical Informatics Association, Computer-based Patient Record Institute, Medical Library Association, Association of Academic Health Science Libraries, American Health Information Management Association, American Nurses Association. J Am Med Inform Assoc. 1997;4(6):442-57.
6. Miller RA, Gardner RM. Summary recommendations for responsible monitoring and regulation of clinical software systems. American Medical Informatics Association, The Computer-based Patient Record Institute, The Medical Library Association, The Association of Academic Health Science Libraries, The American Health Information Management Association, and The American Nurses Association. Ann Intern Med. 1997;127(9):842-5.
7. Quality Chasm Series: Health Care Quality Reports from the Institute of Medicine. Washington DC: The National Academies Press. 2001. Available from: http://www.nap.edu/catalog.php?record_id=12610

Lecture 11 Charts, Tables, and Figures
None.

Lecture 11 Images
Slide 9: Clip Art, Available from: Microsoft clips online; Used with permission from Microsoft.
Slide 13: Photo by: Nir Menachemi; Kohn LT, Corrigan JM and Donaldson MS, (eds). To Err Is Human: Building a Safer Health System Committee on Quality of Health Care in America, Institute of Medicine, Washington DC: National Academies Press, 1999. Image used with permission from National Academies Press.

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Slide 25: Available from: Committee on Patient Safety and Health Information Technology. Board on Health Care Services. Health IT and Patient Safety: Building Safer Systems for Better Care, Washington, DC: National Academies Press, 2011. Image used with permission from National Academies Press.
Slide 27: Sgt. Jon Soles, MND-B PAO. Available from: http://www.army.mil/media/73855. Photo courtesy of U.S. Army.

Unit Required Readings
None.

Unit Suggested Readings
Note: This reading addresses the history of FDA regulation. Additional materials for the topic of certification are in the section below on **Additional Materials.**

1. Miller RA, Gardner RM. Recommendations for responsible monitoring and regulation of clinical software systems. American Medical Informatics Association, Computer-based Patient Record Institute, Medical Library Association, Association of Academic Health Science Libraries, American Health Information Management Association, American Nurses Association. J Am Med Inform Assoc. 1997 Nov-Dec;4(6):442-57. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC61262/
2. Committee on Patient Safety and Health Information Technology. Board on Health Care Services.Health IT and Patient Safety:Building Safer Systems for Better Care, Washington, DC: National AcademiesPress, 2011. Free Executive Summary. Available from: http://books.nap.edu/openbook.php?record_id=13269

Student Application Activities
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Additional Materials

1. ONC Standards and Certification—This website is useful to monitor the changes in the certification process. It is available from: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__

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standards_and_certification/1153*

2. ONC –Authorized Testing and Certification Bodies—This website describes the current EHR certification bodies under HITECH and includes links to other relevant sites, including other certification groups in addition to CCHIT. This website is available from: http://healthit.hhs.gov/portal/server.pt?open=512&mode=2&objID=3120*

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Component 5/Unit 12

Unit Title
History of Mobile Computing

Unit Description
This unit describes the history of mobile computing in healthcare.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the developments in mobile computing that have enabled portable computers to be used in health care settings.
2. List the benefits of using mobile computers in the clinical setting, and discuss how these benefits have developed over time.
3. Give examples of three applications for mobile computers in healthcare.

Unit Topics
12.1 History and examples of mobile devices
12.2 Medical uses for mobile devices
12.3 History of use of mobile devices in medicine
12.4 Benefits of mobile devices in healthcare
12.5 Characteristics of users of mobile devices in healthcare

Lecture Titles
12 History of Mobile Computing

Unit References
(All links accessible as of 1/17/2012)

Lecture 12

1. ACP-ASIM survey finds nearly half of US members use handheld computers [Internet]. ACP-ASIM Press Release. 2001 Oct. Available from: http://www.acponline.org/college/pressroom/handheld_survey.htm
2. Barrett JR, Strayer SM, Schubart JR. Assessing medical residents' usage and perceived needs for personal digital assistants. Int J Med Inform. 2004;73(1):25-34.
3. Carroll AE, Christakis DA. Pediatricians' use of and attitudes about

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personal digital assistants. Pediatrics. Feb 2004;113(2):238-242.
4. Ebell MH, Gaspar DL, Khurana S. Family physicians' preferences for computerized decision-support hardware and software. J Fam Pract. 1997;45(2)137-41.
5. Garritty C, El Emam K. Who's using PDAs? Estimates of PDA use by health care providers: a systematic review of surveys. J Med Internet Res. 2006;8(2):e7.
6. Lu YC, Lee JK, Xiao Y, Sears A, Jacko JA, Charters K. Why don't physicians use their personal digital assistants? AMIA Annu Symp Proc. 2003:405-404.
7. Menachemi N, Brooks RG. EHR and other IT adoption among physicians: results of a large-scale statewide analysis. Journal of Healthcare Information Management. 2006;20(3):79-87.
8. Menachemi N, Perkins R, Van Durme D, Brooks R. Examining the adoption of EHR and PDA use by family physicians in Florida. Informatics in Primary Care. 2006;14(1):1-9.
9. Taylor H, Leitman R. Physicians' use of handheld personal computing devices increases from 15% in 1999 to 26% in 2001. Harris Interactive. 2001 Aug 15;1(25):1-4.
10. Worldwide PDA & Smartphone Forecasts Report: 1998-2008. eTForecasts [Internet]. Arlington Heights, IL. Available from: www.etforecasts.com

Lecture 12 Charts, Tables, and Figures
None.

Lecture 12 Images
Slide 6: Staecker, P. Christopher. Newton message pad, Available from: http://commons.wikimedia.org/wiki/File:Apple_Newton_MP100.jpg. Source Name: Wikimedia Commons/Photo by P. Christopher Staecker.
Slide 20: Photo by Indiemon, cell phone, Available from: http://commons.wikimedia.org/wiki/File:LGAlly.JPG. Source Name: Wikimedia Commons.
Slides 4, 5, 21, 22, 23, 24, 25: Clip Art, Available from: Microsoft clips online Source Name: Used with permission from Microsoft.

Unit Required Readings
None.

Unit Suggested Readings
1. Andersen P, Lindgaard A-M, Prgomet M, Creswick N, Westbrook JI. Mobile and fixed computer use by doctors and nurses on hospital

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wards: Multi-method study on the relationships between clinician role, clinical task, and device choice.
J Med Internet Res.2009 July-Sep;11(3):e32. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2762853/
2. Lindquist AM, Johansson PE, Petersson GI, Saveman BI, Nilsson GC. The use of the Personal Digital Assistant (PDA) among personnel and students in health care: a review. J Med Internet Res. 2008 Oct 28;10(4):e31. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2629360/
3. Lane SJ, Heddle NM, Arnold E, Walker I. A review of randomized controlled trials comparing the effectiveness of hand held computers with paper methods for data collection. BMC Med Inform Decis Mak. 2006 May 31;6:23. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1513201/

Student Application Activities
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comp5_unit12_activity_key.doc
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Additional Materials
None.

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Component 5/Unit 13

Unit Title
History of Telemedicine

Unit Description
This unit describes the history of telemedicine.

Unit Objectives
By the end of this unit the student will be able to:

1. Define telemedicine.
2. Describe the differences between telemedicine and telehealth.
3. Discuss key developments in the history of telemedicine.
4. Identify and describe at least two current applications of telemedicine.

Unit Topics
13.1 Telemedicine definitions
13.2 Differences between telemedicine and telehealth
13.3 History of telemedicine in the early and late 20th century
13.4 Telemedicine reports to Congress
13.5 Current and future developments in telemedicine

Lecture Titles
13 History of Telemedicine

Unit References
(All links accessible as of 1/17/2012)

Lecture 13

1. Kvedar J. Emotional automation: bonding with technology to improve health. The cHealth Blog [Internet]. Boston: Center for Connected Health. 2010 Oct 26. Available from: http://chealthblog.connected-health.org/2010/10/26/emotional-automation-bonding-with-technology-to-improve-health/
2. Telehealth [Internet]. US Health Resources and Services Administration, Rural Health. US Department of Health and Human Services [accessed 2010 March 15]. Available from: http://www.hrsa.gov/ruralhealth/about/telehealth/)
3. US Department of Commerce; US Department of Health and Human Services. Telemedicine report to Congress. 1997 Jan 31; Available from: http://www.ntia.doc.gov/legacy/reports/telemed/cover.htm

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4. 2001 Telemedicine Report to Congress. US Department of Health and Human Services. Health Resources and Services Administration. Office for the Advancement of Telehealth. 2001. Available from: ftp://ftp.hrsa.gov/telehealth/report2001.pdf*
5. UnitedHealth Group, Cisco and Project HOPE Joint Briefing Event -- Washington, DC. 2009 July 15. [cited 2010 May 10]. Available from: http://www.connectedcareamerica.com/news-and-resources.php)
6. US Centers for Medicare and Medicaid Services – CMS (2009) [cited 2010]. Available from: http://www.cms.gov

Lecture 13 Charts, Tables, Figures and Images
None.

Unit Required Readings
None.

Unit Suggested Readings
1. The 2001 Telemedicine Report to Congress – This review of telemedicine issues and policy direction emerged as the Internet grew in importance and most of the content is equally relevant today. The whole report is almost 100 pages. If a shorter assignment is desirable, the Executive Summary is only 10 pages.
2. Evolution & Summative Evaluation of the Alaska Federal Health Care Access Network Telemedicine Project – This summary and evaluation of the Alaska telehealth initiative is an excellent model for building and evaluating a telemedicine program.
3. Telemedicine Reimbursement Report – This review of telemedicine licensing and reimbursement, while dated in 2003, contains an excellent review of the status at that time, and the framework by which it is constructed is valid today for structuring an updated understanding.

Student Application Activities
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Additional Materials
None.

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Component 5/Unit 14

Unit Title
History of Quality Improvement and Patient Safety

Unit Description
This unit describes the history of the use of information technology as a part of quality improvement and patient safety.

Unit Objectives
By the end of this unit the student will be able to:

1. Describe conditions and notable publications concerning patient safety and quality improvement from 1959 to the present.
2. Describe the background to the Institute of Medicine reports on Patient Safety
3. Summarize the main findings from several Institute of Medicine reports on quality, patient safety, and health information technology (HIT).
4. Describe various ways in which HIT has evolved to improve quality or enhance patient safety**.**

Unit Topics
14.1 The Institute of Medicine Reports
14.2 History of patient safety and role of HIT
14.3 History of patient safety and quality
14.4 HITECH and patient safety and quality

Lecture Titles
14 History of Quality Improvement and Patient Safety

Unit References
(All links accessible as of 1/17/2012)

Lecture 14

1. Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients. Results of the Harvard Medical Practice Studies I.N Eng J Med. 1991; 324(6):370-6.
2. Institute of Medicine. Crossing the quality chasm: a new health system for the 21st century. 2001.
3. Institute of Medicine. Health IT and patient safety: building safer

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systems for better care. 2011.
4. Institute of Medicine. To err is human: building a safer health system. 1999.
5. Leape LL, Brennan TA, Laird NM et al. The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Studies I.N Eng J Med. 1991; 324(6):377-84.
6. Leape LL. Error in medicine. JAMA. 1994;272(23):1851-7.
7. Moser R. Diseases of medical progress: a study of iatrogenic disease. Springfield: C.C. Thomas; 1959.
8. Reason J. Human error. Cambridge: Cambridge University Press;1990.

Lecture 14 Charts, Tables, and Figures
None.

Lecture 14 Images
Slides 3, 4: "To Err is Human" book cover, Kohn LT, Corrigan JM and Donaldson MS, (eds). "To Err Is Human: Building a Safer Health System" Committee on Quality of Health Care in America, Institute of Medicine, Washington DC: National Academies Press, 1999. Source Name: Image used with permission from National Academies Press.
Slides 5, 6: "Crossing Quality Chasm" book cover, Committee on Quality of Health Care in America, Institute of Medicine. Crossing the Quality Chasm: A New Health System for the 21st Century, Washington, DC: National Academy Press, 2001. Source Name: Image used with permission from National Academies Press.
Slide 7: Bust of Hippocrates, Available from: http://en.wikipedia.org/wiki/File:Hippocrates_rubens.jpg. Source Name: Wikipedia Commons/ Courtesy National Library of Medicine.
Slides 8, 11, 18: Clip Art, Available from: Microsoft clips online Source Name: Used with permission from Microsoft.

Unit Required Readings
None.

Unit Suggested Readings
1. Amalberti R, Auroy Y, Berwick D, Barach P. Five system barriers to achieving ultrasafe health care. Ann Intern Med. 2005 May 3;142(9):756-64. Available from: http://www.annals.org/content/142/9/756.long

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2. Kohn LT, Corrigan JM and Donaldson MS, (eds). To Err Is Human: Building a Safer Health System. Committee on Quality of Health Care in America, Institute of Medicine, Washington DC: National Academies Press, 1999. Free Executive Summary and Free Brief. Available from: http://www.nap.edu/catalog/9728.html
3. Leape LL, Berwick DM. Five years after *To Err is Human*: What have we learned? JAMA. 2005;293(19):2384-90. Available from: http://www.commonwealthfund.org/~/media/files/publications/in-the-literature/2005/may/five-years-after--to-err-is-human---what-have-we-learned/leape_five_years_after_to_err_is_human_jama-pdf.pdf.
4. Committee on Patient Safety and Health Information Technology. Board on Health Care Services.Health IT and Patient Safety:Building Safer Systems for Better Care, Washington, DC: National AcademiesPress, 2011. Free Executive Summary. Available from: http://books.nap.edu/openbook.php?record_id=13269

Student Application Activities
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Additional Materials
None.

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Component 5/Unit 15

Unit Title
Payment-Related Issues and the Role of HIT

Unit Description
This unit describes payment-related issues and the role of HIT.

Unit Objectives
By the end of this unit the student will be able to:

1. Discuss the evolution of incentives for adoption of HIT.
2. Discuss direct and indirect ways in which health care payors can influence the adoption of HIT.
3. Describe past and current strategies employed by payors to influence HIT adoption.

Unit Topics
15.1 Third party payors and misalignment of incentives
15.2 Payor's influence on HIT
15.3 Incentivizing the use of HIT
15.4 Payor generosity and HIT
15.5 Other roles for payors and HIT
15.6 Payors and health information exchange
15.7 Incentives under the HITECH Act

Lecture Titles
15 Payment-Related Issues and the Role of HIT

Unit References
(All links accessible as of 1/17/2012)
None.

Lecture 15

1. Menachemi N, Hikmet N, Bhattacherjee A, Chukmaitov A, Brooks RG. The effect of payer mix on the adoption of information technologies by hospitals. Health Care Manage Rev. 2007; 32(2):102-10.
2. Menachemi N, Matthews MC, Ford EW, Brooks RG. The influence of payer mix on electronic health record adoption by physicians. Health Care Manage Rev. 2007;32(2):111-118.

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Lecture 15 Charts, Tables, and Figures
None.

Lecture 15 Images
Slide 4, 9, 14, 15, 16, 18: Microsoft clip art; Used with permission from Microsoft.

Unit Required Readings
None.

Unit Suggested Readings

1. Berner ES, Detmer DE, Simborg D. Will the wave finally break? A brief view of the adoption of electronic medical records in the United States. J Am Med Inform Assoc. 2005;12(1):3-7. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC543824/
2. Ash JS, Bates DW. Factors and forces affecting EHR system adoption: report of a 2004 ACMI discussion. J Am Med Inform Assoc. 2005;12(1):8-12. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC543830/
3. Robinson JC, Casalino LP, Gillies RR, Rittenhouse DR, Shortell SS, Fernandes-Taylor S. Financial incentives, quality improvement programs, and the adoption of clinical information technology. Med Care. 2009;47(4):411-7. Available from: http://www.chcf.org/~/media/MEDIA%20LIBRARY%20Files/PDF/F/PDF%20FinancialIncentivesClinicalIT.pdf
4. Blumenthal D and Tavenner M. The "Meaningful Use" Regulation for Electronic Health Records. N Engl J Med 2010; 363:501-504. Available from: http://www.nejm.org/doi/full/10.1056/NEJMp1006114
5. Menachemi N, Struchen-Shellhorn W, Brooks RG, Simpson L. Influence of pay-for-performance programs on information technology use among child health providers: the devil is in the details. Pediatrics. 2009 Jan;123 Suppl 2:S92-6. Available from: http://pediatrics.aappublications.org/cgi/content/full/123/Supplement_2/S92

Student Application Activities
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Additional Materials

1. Incentive Programs for EHRs. The website of the Centers for Medicare and Medicaid Services (CMS) contains a description of the incentives for meaningful use of EHRs. Available from: https://www.cms.gov/ehrincentiveprograms/

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Component 5/Unit 16

Unit Title
History of Health IT Organizations

Unit Description
This unit describes the history of health IT organizations.

Unit Objectives
By the end of this unit the student will be able to:

1. Describe the background and original constituencies of AMIA, HIMSS, and AHIMA.
2. Describe the changes in major interests that have occurred at AMIA, HIMSS, and AHIMA over time.
3. Describe the origins, current focus, and relationships among the following standards development organizations: HL-7, HITSP, ONC Health IT Standards Committee.

Unit Topics
16a.1 American Medical Informatics Association (AMIA)
16a.2 Healthcare Information and Management Systems Society (HIMSS)
16a.3 American Health Information Management Association (AHIMA)
16a.4 Collaborations among organizations
16a.5 16b.1 Standards Development Organizations

Lecture Titles
16a Professional Organizations
16b Standards Development Organizations

Unit References
(All links accessible as of 1/17/2012)

Lecture 16a

1. AHIMA, AMIA, Building the Work Force for Health Information Transformation [Internet]. Chicago: American Health Information Management Association. 2006 Feb. Available from: http://www.amia.org/sites/amia.org/files/Workforce_2006.pdf
2. AHIMA, AMIA. Health Information Management and Informatics Core Competencies for Individuals Working with Electronic Health Records [Internet]. Chicago: American Health Information

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Management Association. 2008 Oct. Available from: http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_040723.pdf
3. AHIMA History [Internet]. Chicago: American Health Information Management Association. Available from: http://www.ahima.org/about/history.aspx
4. HIMSS Legacy Workgroup. History of the Healthcare Information and Management Systems Society (formerly Hospital Management Systems Society) [Internet]. Chicago: Healthcare Information and Management Systems Society (HIMSS); 2007. Available from: http://www.himss.org/content/files/HIMSS_HISTORY.pdf*

Lecture 16a Charts, Tables, Figures and Images
None.

Lecture 16b
1. Schumacher RM, Patterson ES, North R, Zhang J, Lowry SZ, Quinn MT, Ramaiah M. Technical evaluation, testing and validation of the usability of electronic health records. Draft. NIST. US Dept of Commerce. 2011 Sep 28 [cited 2011 Nov 26]. Available from: http://www.nist.gov/healthcare/usability/upload/Draft_EUP_09_28_11.pdf

Lecture 16b Charts, Tables, and Figures
None.

Lecture 16b Images
Slides 2, 9: Cudzilo, Andrew, Electrical Socket, CC BY-SA 3.0, Available from: http://commons.wikimedia.org/wiki/File:3_Outlet_Extension.JPG. Source Name: Wikimedia Commons/Photo by Andrew Cudzilo.

Unit Required Readings
None.

Unit Suggested Readings
1. There are no readings for this unit. To learn about the organizations students will explore the websites of the organizations. These are included in the section on **Additional Materials**.

Student Application Activities
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Additional Materials

1. **Professional Associations related to health information technology**
   - American Medical Informatics Association (AMIA) http://www.amia.org/
     - About AMIA http://www.amia.org/about-amia
       - History of the American College of Medical Informatics (ACMI) http://www.amia.org/programs/acmi-fellowship
   - Health Information and Management Systems Society (HIMSS) http://www.himss.org/
     - History of HIMSS http://www.himss.org/content/files/HIMSS_HISTORY.pdf*
   - American Health Information Management Association (AHIMA) http://www.ahima.org/
     - Background and History http://www.ahima.org/about/history.aspx

2. **Standards Development Organizations**
   - International Organization for Standardization (ISO) http://www.iso.org
     - Background and History http://www.iso.org/iso/about/the_iso_story.htm
   - American National Standards Institute (ANSI) http://www.ansi.org
     - Background and History http://www.ansi.org/about_ansi/introduction/history.aspx?menuid=1

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- Health Level 7 (HL 7) http://www.hl7.org
  - Background and History http://www.hl7.org/about/index.cfm?ref=nav
- Health Information Technology Standards Panel (HITSP) http://www.hitsp.org
  - Background and History http://www.hitsp.org/faq.aspx#formed
  - Health IT Standards Committee http://www.healthit.gov/facas/health-it-standards-committee
- National Institute of Standards and Technology (NIST) http://www.nist.gov
  - Background and History http://www.nist.gov/public_affairs/general_information.cfm

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Component Acronym Glossary

AAMSI – American Association of Medical Systems and Informatics
ABD – Abdomen
ABS – Arterial Blood Sample
ACMI – American College of Medical Informatics
AHA – American Hospital Association
AHIMA – American Health Information Management Association
AHRQ – Agency for Healthcare Research and Quality
AMA – American Medical Association
AMIA – American Medical Informatics Association
AMRA – American Medical Record Association
ANA – American Nursing Association
ANSI – American National Standards Institute
ARRA – American Recovery and Reinvestment Act
ATCB – Authorized Testing and Certification Body
BCMA – Barcode Medication Administration
BM – Bowel Movement
BP –Blood Pressure
BS – Bowel Sounds
CAT – Computed Axial Tomography
CCHIT – Certification Commission for Healthcare Information
CD – Compact Disc
CDC – Centers for Disease Control and Prevention
CDRH – Center for Devices and Radiological Health
CDS – Clinical Decision Support
CEO – Chief Executive Officer
CFO – Chief Financial Officer
CHIN – Community Health Information Network
CIA – Central Intelligence Agency
CIO – Chief Information Officer
CMS – Centers for Medicare and Medicaid Services
COSTAR – Computer Stored Ambulatory Record
CPOE – Computerized Provider [or Physician] Order Entry; Computer-based [or Care Provider] Order Entry
CPR – Computer-based Patient Record
CPRS – Computerized Patient Record System
CTA – Clear to Auscultation
CV – Cardiovascular
d/c – Discontinue

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DHHS – [US] Department of Health and Human Services
DoD – Department of Defense
DRG – Diagnosis Related Groups
DSS – Decision Support Systems
DVD – Digital Video Disc (now Digital Versatile Disc)
EHR – Electronic Health Record
EKG – Electrocardiogram
EMR – Electronic Medical Record
E-Prescribing – Electronic Prescribing
FCC – Federal Communications Commission
FD A – Food and Drug Administration
GIS – Geographic Information Systems
GPS – Global Positioning System
GYN – Gynecological
HC – Healthcare
HCFA – Health Care Financing Administration
HELP – Help Evaluation through Legal Processing
HELP – Health Evaluation through Logical Processing
HEW – [US] Department of Health, Education, and Welfare
HHS – [US] Health and Human Services
HIE – Health Information Exchange
HMSS – Hospital Management Systems Society
HIMSS – Health Information and Management Systems Society
HIPAA – Health Insurance Portability and Accountability Act
HIT – Health Information Technology
HITECH – Health Information Technology for Economic and Clinical Health
HITSP – Healthcare Information Technology Standards Panel
HL7 – Health Level 7
HMO – Health Maintenance Organization
HR – Heart Rate
HRSA – [US] Health Resources and Services Administration
I/O – Input /Output
ICU – Intensive Care Unit
IHC – Intermountain Health Care
IOM – Institute of Medicine
ISO – International Organization for Standardization
IT – Information Technology
IV – Intravenous
JAMA – Journal of the American Medical Association

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JAMIA – Journal of the American Medical Informatics Association
K2 – Kennedy Kassebaum Act
LDS – Latter Day Saints
LDS – Latter Day Saints
MAUDE – Manufacturer and User Facility Device Experience
MD – Medical Doctor
MI – Myocardial Infarction
MIS – Medical Information System
MMA – Medicare Modernization Act
MRSA – Methicillin Resistant Staphylococcus Aureus
MUMPS – Massachusetts General Hospital Utility Mutiprogramming System
NAHIT – National Alliance for Health Information Technology
NHII – National Health Information Infrastructure
NHIN – Nationwide Health Information Network
NI – Nursing Informatics
NIH – National Institutes of Health
NIST – National Organization of Standards and Technology
NLM--National Library of Medicine
ONC – Office of the National Coordinator
ONCHIT – Office of the National Coordinator for Health Information Technology
OP – Operation
P4P – Pay for Performance
PACS – Picture Archiving and Communication System
PCA – Patient Controlled Analgesia
PCV – Packed Cell Volume
PDA – Personal Digital Assistant
PHI – Public Health Informatics
PHI – Protected Health Information
PHR – Personal Health Record
PKI – Public Key Infrastructure
PM – Afternoon, Evening
POD – Post Operative Day
PVC – Predicted Vital Capacity
QMR – Quick Medical Reference
R – Respiration
REC – Regional Extension Center
RHIO – Regional Health Information Organizations
RMRS – Regenstrief Medical Record System

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RRR – Relative Risk Reduction
RRR – Regular Rhythm Rate
Rx – Prescription
S/P – Status Post
SAMS – Society for Advanced Medical Systems
SCAMC – Symposium on Computer Applications in Medical Care
SCM – Society for Computer Medicine
SHARP – Strategic Health IT Advanced Research Projects
SOAP – Subjective, Objective, Assessment and Plan
SPEP – Serum Protein Electrophoresis
STD – Sexually Transmitted Disease
T – Temperature
TMR – The Medical Record
TPO – Treatment Payment [Hospital] Operations
UOP – Urine Output
VA – Veterans Affairs

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