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

Component 12: Quality Improvement

Instructor's Manual

Version 3.0/Spring 2012

Notes to Instructors

This Instructor's Manual is a resource for instructors using the Quality Improvement component. Each component is broken down into Units, each of which will 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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Component Overview

Quality Improvement introduces the concepts of health IT and practice workflow redesign as instruments of quality improvement. It addresses establishing a culture that supports increased quality and safety. It also discusses approaches to assessing patient safety issues and implementing quality management and reporting through electronic systems.

Component Objectives

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

1. Analyze clinical decision-making requirements, including who, what, when, how, and where information is needed.
2. Design and implement information technology that supports effective teamwork, fosters open communication and enables shared decision-making to achieve quality patient care
3. Analyze clinical workflows to design information technology that supports clinical decision-making and care coordination.
4. Design and apply of information technology and standardized practices that support safety and quality
5. Formulate activation planning that supports and maintains safety and quality
6. Select and apply quality measures for incorporation into information systems to enable review of outcomes of care and identification of improvement opportunities
7. Assess findings from quality reviews of reported events to design and implement clinical information system improvements.
8. Select improvement tools to assist clinical teams in improving the quality and safety of the electronic health record.
9. Monitor use of information technology for inappropriate use leading to hazards and errors
10. Design an information technology culture conducive to highly reliable processes built on human factors research.
11. Design and implement effective strategies to use information technology to decrease reliance on memory.

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Component Authors

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Ms. Dawson is the assistant director of nursing clinical quality and Magnet at The Johns Hopkins Hospital. She has experience in working with nurses at all levels to identify, develop and disseminate best-practices in clinical care and leadership that are worthy of Magnet recognition. She facilitates the implementation of safety and quality improvement projects and instructs nurses on conduct of clinical outcome measurement. Ms. Dawson has presented and published on topics the topics of evidence-based practice, quality improvement and measuring patient safety outcomes.

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Kelly J. Hugo MBA, RHIA is an assistant professor and the Program Coordinator for the Health Information Technology program at Anne Arundel Community College. She earned her Bachelor of Science degree in Health Information Management from the University of Pittsburgh and her Master's of Business Administration from Johns Hopkins University. Kelly has seventeen years experience in health information including consulting, managing data, large teams, projects and software installations. In her previous position, she had overall financial responsibility for 14 SQL and pervasive based Health Information Management software applications and product implementations, accountable for 90 staff members, and responsibility for a $30M P&L.

Stephanie Poe, DNP, RN, Johns Hopkins Hospital
Stephanie Poe is Director of Nursing, Clinical Quality and Chief Nursing Information Officer for The Johns Hopkins Hospital and holds a joint appointment with The Johns Hopkins University School of Nursing. She is responsible for planning, organizing, leading, and evaluating central nursing programs that include, but not limited to, clinical quality, documentation management, nursing regulatory readiness, Magnet standards, and clinical data systems. Dr. Poe is responsible for strategic and operational leadership in the development, deployment, re-engineering and integration of clinical information systems. She has published and presented on the topics of quality improvement, patient safety, clinical informatics, and evidence-based practice. Dr. Poe is one of the original developers of the Johns Hopkins Nursing Evidence-based Practice Model and Guidelines and is dedicated to promoting evidence-based clinical quality and informatics initiatives.

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Anna Maria Izquierdo-Porrera is the Chief Medical Officer & Quality Improvement Lead for BlueNovo, Inc, a company dedicated to the evaluation and implementation of health care delivery and support systems that improve the efficiency and efficacy of clinical care. Dr Izquierdo is responsible for the clinical and quality aspects of HIT solution deployments. She is also an improvement advisor and has worked with many health care organizations on quality improvement projects. Prior to joining BlueNovo, Dr. Izquierdo was the Medical Director at a Community Health Center and brings that additional unique perspective to the development of this curriculum.

Peter Pronovost, PhD, MD, JHU, School of Medicine
Peter J. Pronovost, MD, PhD is a practicing anesthesiologist and critical care physician, teacher, researcher, and international patient safety leader. Dr. Pronovost is a Professor in the Johns Hopkins University School of Medicine (Departments of Anesthesiology and Critical Care Medicine, and Surgery); in the Bloomberg School of Public Health (Department of Health Policy and Management) and in the School of Nursing. He is also Medical Director for the Center for Innovation in Quality Patient Care, which supports quality and safety efforts at the Johns Hopkins Hospitals. In 2003 Dr. Pronovost established the Quality and Safety Research Group to advance the science of safety. Dr. Pronovost and his research team are dedicated to improving health care through methods that are scientifically rigorous, but feasible at the bedside. Dr. Pronovost holds a doctorate in clinical investigation from the Johns Hopkins Bloomberg School of Public Health. Dr. Pronovost has been chosen by the editors of Time Magazine as one of their 100 most influential people for 2008. His work in innovating ways to improve patient safety and care are changing the way, not just the US, how the world thinks about medical care.

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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 12/Unit 1

Unit Title
Introduction to Quality Improvement and Health Information Technology

Unit Description
This unit will introduce the learned to the concept of health care quality and the importance of meaningful use of health information technology in improving health care quality. The Institute of Medicine aims of quality improvement are used to frame a discussion of the role of health information technology in leading to improvement of patient safety, efficiency, effectiveness, equity, timeliness, and patient-centeredness. The unit will also review the basic principles of quality improvement: set an aim, design a measure strategy, attempt change, and learn about your system. The learner is also provided with examples of how health IT can facilitate quality improvement and how well-crafted HIT solutions can improve safety, effectiveness, efficiency, equity, timeliness, and patient-centeredness of care and accomplish the best care for the whole population at the lowest cost.

Unit Objectives
By the end of this unit the student will be able to:
1. Identify the current challenges in health care quality.
2. Examine the components of the health care system that have an impact on quality.
3. Describe QI as a goal of meaningful use of HIT.
4. Analyze the ways that HIT can either help or hinder quality improvement.
5. Explain health care quality and quality improvement (QI).

Unit Topics/Lecture Titles
1.1 – Health Care Quality and HIT
1.2 – Relationship of QI and HIT

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

*Indicates this link is no longer functional.

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Lecture 1a

1. Berwick, D. October 30, 2009, speech, Harvard School of Public Health
2. Center for Medicaid Services. Shared Services Program. Available from: https://www.cms.gov/sharedsavingsprogram/
3. Endorsing national consensus standards for measuring and publicly reporting on performance; California Academy of Family Physicians Diabetes Initiative Care Model Change Package originally developed by Lumetra,
4. Holland, Marc. In Health Information Exchange: From Meaningful Use to Healthcare Transformation. Available from: http://www.himss.org/content/files/Carefx%20_HIE_meaningful-use2.pdf*
5. The National Coalition on Health Care (NCHC, 2007). Available from: http://nchc.org/
6. President Barack Obama. Barack Obama, speech at George Mason University, January 12, 2009
7. U.S. Department of Health and Human Services. (June 22, 2011). Up to $500 million in Affordable Care Act funding will help health providers improve care. Retrieved from: http://www.hhs.gov/news/press/2011pres/06/20110622a.html*

Lecture 1a Charts, Tables, and Figures

1.1 NCQA Scoring Tool. Produced by the National Committee for Quality Assurance. Available from: http://www.ncqa.org/LinkClick

Lecture 1a Images

Slide 5: Meaningful Use, Patient Centered Medical Home, Accountable Care Organization. Courtesy of Dr. Anna Maria Izquierdo-Porrera
Slide 9: Meaningful Use Stages. Courtesy of Dr. Anna Maria Izquierdo-Porrera

Lecture 1b

1. Agency for Healthcare Research and Quality (AHRQ). Available from: http://www.ahrq.gov/
2. Batalden, Paul M.D in The Improvement Collaborative: An Approach to Rapidly Improve Health Care and Scale Up Quality Services. June 2008. Available from: http://www.urc-chs.com/resource?ResourceID=23

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3. Beal et al. Closing the Divide: How Medical Homes Promote Equity in Health Care. Commonwealth Fund, 2007
4. Centers for Medicare and Medicaid Services. http://www.cms.gov/
5. IOM—International Institute of Medicine. Available from: http://iom.edu/
6. Institute for Healthcare Improvement (IHI) Available from: http://www.ihi.org/Pages/default.aspx
7. Joint Commission. Available from: http://www.jointcommission.org/
8. National Committee for Quality Assurance. Available from: http://www.ncqa.org/
9. National Quality Forum (NQF). Available from: http://www.qualityforum.org/Home.aspx
10. Physician Consortium for Performance Improvement (PCPI)-American Medial Association. Available from: http://www.ama-assn.org/ama/pub/physician-resources/clinical-practice-improvement/clinical-quality/physician-consortium-performance-improvement.page
11. Wasson, J. & Benjamin, R. How is your health: what you can do to make your health and healthcare better, 2009. Available from: http://www.howsyourhealth.org/html/HowsYourHealth_4thEd.pdf

Lecture 1b Images

Slide 4: Quality Health Care: Who Defines It? Courtesy of Dr. Anna Maria Izquierdo-Porrera

Slide 6: Cover of the 2009 National Quality Healthcare Report and the 2009 National Healthcare Disparities Report. Available from: http://www.ahrq.gov/qual/qrdr09.htm

Slide11: Basics of Quality Improvement. Courtesy of Dr. Anna Maria Izquierdo-Porrera

Slide 13: Process Measure, Outcome Measure, Balancing Measure. Courtesy of Dr. Anna Maria Izquierdo-Porrera

Lecture 1b Charts, Tables, and Figures

1.2 Example of a Change Care Package. California Academy of Family Physicians Diabetes Initiative Care Model Change Package. Available from: http://eo2.commpartners.com/users/acme/downloads/CAFP._Diabetes_Change_Package.pdf

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Lecture 1c

1. Institute of Medicine. Crossing the quality chasm. Washington DC: National Academy Press, p. 232. 2001.
2. Lecture 1c Images
3. Slide 3. What is Health Care Quality? Courtesy Dr.Anna Maria Izquierdo-Porrera

Lecture 1d

1. Connolly, C. (2005, March 21). Cedars-Sinai doctors cling to pen and paper. Washington Post, p. A01. Available from:
2. http://gunston.gmu.edu/.../cedars-sinai%20cpoe%20washpost%203-21-05*
3. Doyle, M. Impact of the Bar Code Medication Administration (BCMA) system on medication administration errors. Unpublished doctoral dissertation, University of Arizona, Tucson in Nursing Informatics and the Foundation of Knowledge. Jones and Bartlett Publishers Sudbury, Massachusetts. 2005.
4. Han, Y.Y., Carcillo, J.A., Venkataraman, S.T., et al. Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics*. 116;1506-1512. 2005

Lecture 1d Images

Slide 7: Work Arounds. National Institutes of Health (NIH). Coalition Against Drug Abuse. Available from: http://teens.drugabuse.com/*
Slide11: Image 1. Patient Armbands. Department of Defense. Available from:
http://www.defense.gov/HomePagePhotos/LeadPhotoImage.aspx?id=74561
Image 2. Children's Hospital, Pittsburgh, PA. Available from:
http://www.chp.edu/CHP/Community+Preview+Photo+Gallery
Image 3. Clinicians. National Institutes of Health (NIH). Coalition Against Drug Abuse. Available from: http://teens.drugabuse.com/*
Slide 12: Patient Armbands. Department of Defense. Available from:
http://www.defense.gov/HomePagePhotos/LeadPhotoImage.aspx?id=74561
Slide 13: Children's Hospital, Pittsburgh, PA. Available from:
http://www.chp.edu/CHP/Community+Preview+Photo+Gallery
Slide 14: Clinicians. National Institutes of Health (NIH). Available from:
http://www.nih.gov/

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Unit Suggested Readings

1. Blumenthal D, Tavenner, M. The “meaningful use” regulations for electronic health records. *New Engl J Med*. 2010 Jul 13.
2. Schoville RR. Work-arounds and artifacts during transition to a computer physician order entry: what they are and what they mean. J Nurs Care Qual. 2009 Oct-Dec; 24(4):316-324.
3. Balfour DC, Evans S, Januska J, Lee HY, Lewis SJ, Nolan SR, Noga M, Stemple C, Thapar K. Health information technology. Results from a round table discussion. *J Manag Care Pharm*. 2009 Jan-Feb;15(1SupplA):10 http://www.ihi.org/knowledge/Pages/HowtoImprove/default.aspx

Student Application Activities

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Component 12/Unit 2

Unit Title
Principles of Quality and Safety for HIT

Unit Description
This unit is designed to introduce the learner to the magnitude of the problem of medical error in the US. The health care system and the role of the learning in helping to make our system safer is explored. Emphasis is placed on how the science of safety can be applied to health care and the impact of system factors on patient safety. Three principles of safe design are introduced (eliminate steps, create independent checks. and learn from mistakes).

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

1. Investigate the fallibility of people and systems.
2. Describe the ways that every system is designed to achieve the results it gets.
3. Apply the basic principles of safe design.
4. Explain the ways that teams make wise decisions with diverse and independent input.

Unit Topics/Lecture Titles
2.1 – Improving Patient Safety

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

Lecture 2a

1. Boeing. 2001 Statistical Summary of Commercial Jet Airplane Accidents. June 2002
2. Johns Hopkins Hospital. Josie King. Available from: http://www.hopkinsmedicine.org/hmn/s04/feature1.cfm
3. Reason, J. *BMJ* 2000;320:768-770

Lecture 2a Images
Slide 3. Bilateral Cued Finger Movements . Image courtesy Dr. Peter Pronovost. Available from: http://www.ahrq.gov/about/annualmtg08/090908slides/Pronovost.htm.

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Slide 4. Sponge left in stomach. Image courtesy Dr. Peter Pronovost. Slide Presentation from the AHRQ 2008 Annual Conference: September 9, 2008 Available from: http://www.ahrq.gov/about/annualmtg08/090908slides/Pronovost.htm
Slide 5. Josie King. Image courtesy Dr. Peter Pronovost. Slide Presentation from the AHRQ 2008 Annual Conference: September 9, 2008 Available from: http://www.ahrq.gov/about/annualmtg08/090908slides/Pronovost.htm
Slide 9. The Swiss Cheese Model. Adapted by Dr. Peter Pronovost from original in Reason, J. BMJ 2000;320:768-770. Slide Presentation from the AHRQ 2008 Annual Conference: September 9, 2008
Slide 10. System Factors. Slide Presentation from the AHRQ 2008 Annual Conference: September 9, 2008 Image courtesy Dr. Peter Pronovost.
Slide 11. A Dosage Error? Creative Commons by MBBradford. Available from: http://en.wikipedia.org/wiki/File:Glucagon_vials_and_syringe.JPG
Slide 12. Adapted from : Boeing. 2001 Statistical Summary of Commercial Jet Airplane Accidents. June 2002 . http://www.fearofflying.com/Boeingaccidentstatsum59-01.pdf

Lecture 2b

1. Dayton, Elizabeth. Joint Commission Journal, Jan. 2007
2. Johns Hopkins Hospital. Josie King. Available: http://www.hopkinsmedicine.org/hmn/s04/feature1.cfm
3. Reason, J. BMJ 2000;320:768-770

Lecture 2b Images

Slide 4: A Woman Peers into a Microscope to Examine a Circuit Board. Courtesy National Science Foundation. Available from http://nsf.gov
Slide 5: A Bank of ATMs. Creative Commons: Piotrus. Available from: http://commons.wikimedia.org/wiki/File:PNC_bank_ATMs.JPG
Slide 6. A Three-Point Seat Belt in a Lincoln Town Car. Courtesy Creative Commons Gerdbrendel. Available from: http://en.wikipedia.org/wiki/File:Seatbelt.jpg
Slide 7: Basic Components of Communication. Courtesy Elizabeth Dayton, Joint Commission Journal, Jan. 2007
Slide 8. Jelly Beans. Creative Commons Brandon D
Available from: http://3.bp.blogspot.com/-oxxwjc9sQp8/TbCxyVKPtWI/AAAAAAAAAcA/NkPtINLsFjw/s1600/jelly-beans.jpg
Slide 9: Johns Hopkins lacrosse team . Courtesy Johns Hopkins University.

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Slide 11. Josie King. Courtesy Dr. Peter Pronovost. Slide Presentation from the AHRQ 2008 Annual Conference: September 9, 2008 Available from:
http://www.ahrq.gov/about/annualmtg08/090908slides/Pronovost.htm

Unit Suggested Readings

1. Winters BD, Gurses AP, Lehmann H, Sexton JB, Rampersad CJ, Pronovost PJ. Clinical review checklists – translating evidence into practice. Crit Care 2009; 13(6):210 Epub 2009 Dec 31.
2. Kuehster CR, Hall CD. Simulation. Learning from mistakes while building communication and teamwork. J Nurse Staff Dev. 2010 May-Jun;26(3):123-127.
3. Beauregard K. Patient safety, elephants, chickens, and mosquitoes. Plast Surg Nurs. 2006 Jul-Sep; 26(3):123-125; quiz 126-127.
4. Botwinick L, Bisognano M, Haraden C. *Leadership Guide to Patient Safety*. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Health care Improvement; 2006. (Available on www.IHI.org)

Student Application Activities

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Component 12/Unit 3

Unit Title
Introduction to Reliability

Unit Description
This unit introduces the learner to the notion of high reliability organizations. Reliability principles, used to design systems that compensate for the limits of human ability, can improve safety and the rate at which a system consistently produces desired outcomes.

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

1. Discuss the basic concepts of reliability.
2. Understand what makes organizations highly reliable.

Unit Topics/Lecture Titles
3.1 – Introduction to Reliability.

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

Lecture 3

1. Elgert, S. Reliability Science: Reducing the Error Rate in Your Practice. These seven principles can help ensure that your patients receive the right care at the right time every time. *Fam Pract Manag.* 2005 Oct;12(9):59-63.
2. Nolan, T., Resar, R., Haraden, C., Griffin, F.A. *Improving the Reliability of Health Care.* IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2004. Available from: www.IHI.org
3. Merriam-Webster's Dictionary. Available from: http://www.merriam-webster.com/dictionary/reliability
4. Reliability: Sepsis Management Bundle. Available from: http://www.ihi.org/knowledge/Pages/Measures/ReliabilitySepsisManagementBundle.aspx*
5. When Good Enough Isn't … Good Enough: The Case for Reliability. Institute for Healhcare Improvement.
6. Available from: http://www.ihi.org/IHI/Topics/Reliability/ReliabilityGeneral/ImprovementStories/WhenGoodEnoughIsntGoodEnoughTheCaseforReliability.htm

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Lecture 3 Charts, Tables, and Figures

3_1 Which Clinic Would You Prefer? Courtesy Dr. Anna Maria Izquierdo-Porrera

3_2 Examples of Reliability in Health Care. Courtesy Dr. Anna Maria Izquierdo-Porrera

Lecture 3 Images

Slide 7: Strategies to Improve Reliability. Adapted from Olan, T., Resar, R., Haraden, C., Griffin, F.A. *Improving the Reliability of Health Care.* IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2004. Available from: www.IHI.org

Unit Suggested Readings

1. Nolan T, Resar R, Haraden C, Griffin FA. *Improving the Reliability of Health Care.* IHI Innovation Series white paper. Boston: Institute for Health care Improvement; 2004. (Available on http://www.ihi.org/Pages/default.aspx)
2. When Good Enough Isn't…Good Enough: The Case for Reliability. Institute for Healhcare Improvement. Available from: http://www.ihi.org/IHI/Topics/Reliability/ReliabilityGeneral/ImprovementStories/WhenGoodEnoughIsntGoodEnoughTheCaseforReliability.htm
3. Reliability: Sepsis Management Bundle http://www.ihi.org/knowledge/Pages/Measures/ReliabilitySepsisManagementBundle.aspx*
4. Stephen Elgert, MD. Reliability Science: Reducing the Error Rate in Your Practice. These seven principles can help ensure that your patients receive the right care at the right time every time. Fam Pract Manag. 2005 Oct;12(9):59-63.

Student Application Activities

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Component 12/Unit 4

Unit Title
Reliability and Culture of Safety

Unit Description
This unit introduces the learner to the notion of high reliability organizations, and the importance of transparency and speaking up to a culture of safety. Characteristics of a culture of safety are outlined and the role of the HIT professional in this culture is defined. Strategies and tactics for communicating risks and advocating for resolution in a resistant culture are discussed.

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

1. Discuss reliability as a tool for ensuring safety.
2. Examine how ultra-safe organizations operate.
3. Identify how teams make wise decisions.

Unit Topics/Lecture Titles
4.1 – Reliability, Culture of Safety and HIT

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

Lecture 4

1. AHRQ Patient Safety Primers. Safety Culture. Available from: http://psnet.ahrq.gov/primer.aspx?primerID=5
2. Becoming a High Reliability Organization: Operational Advice for Hospital Leaders. Rockville, MD. AHRQ Publication No. 08-0022, 2008 April. Agency for Healthcare Research and Quality. Available from: http://www.ahrq.gov/qual/hroadvice/
3. Riley, W., Davis, S.E., Miller, K.K., & McCullough, M. A model for developing high reliability teams. *J Nurs Manag.* 2010 Jul18(5):556-563.

Lecture 4 Charts, Tables, and Figures
Table 4_1. The five specific concepts that help create the state of mindfulness that is needed for reliability, which in turn is a prerequisite for safety. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm

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Lecture 4 Images

Slide 6: Becoming a High Reliability Organization: Operational Advice for Hospital Leaders. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm)
Slide 7: Preoccupation with Failure. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm
Slide 8: Reluctance to Simplify. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm
Slide 9: Deference to Expertise. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm
Slide 10: Resilience. Available from: http://www.ahrq.gov/qual/hroadvice/hroadvicefig1-6.htm

Unit Suggested Readings

1. Watson SR, George C, Martin M, Bogan B., Goeschel C, Pronovost PJ. Preventing central line-associated bloodstream infections and improving safety culture: a statewide experience. *Jt Comm J Qual Patient Saf*. 2009 Dec; 35(12):593-597.
2. McKeon LM, Oswaks JD, Cunningham PD. Safegaurding patients: complexity science, high reliability organizations, and implications for team training in health care. *Clin Nurs Spec.* 2006 Nov-Dec; 20(6):298-304; quiz 305-306.
3. Carroll JS, Rudolph JW. Design of high reliability organizations in health care. *Qual Saf Health Care*. 2006 Dec 15 Suppl 1:i4-9
4. AHRQ Patient Safety Primers. Safety Culture. Available from: http://psnet.ahrq.gov/primer.aspx?primerID=5
5. *Becoming a High Reliability Organization: Operational Advice for Hospital Leaders.* Rockville, MD. AHRQ Publication No. 08-0022, 2008 April. Agency for Health care Research and Quality. Available from: http://www.ahrq.gov/qual/hroadvice/.
6. Riley W, Davis SE, Miller KK, & McCullough M. A model for developing high reliability teams. J Nurs Manag. 2010 Jul18(5):556-563.

Student Application Activities

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Component 12/Unit 5

Unit Title
Decision Support for Quality Improvement

Unit Description
This unit presents an in depth review of ways in which decision support can enhance quality and safety in patient care. Definitions of decision support are provided.

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

1. Define decision support, its importance and why it is difficult to implement.
2. Compare decision support tools that help improve quality.
3. Analyze the benefits and shortfalls of alerts and clinical reminders.

Unit Topics/Lecture Titles
5.1 – Clinical Decision Support System (CDSS) Basics
5.2 – Alerts and Clinical Reminders.

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

Lecture 5a

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Lecture 5a Images

Slide 10: Decision Support. Adapted from Perreault & Metzer 1999 by Dr. Anna Maria Izquierdo-Porrera

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Lecture 5b

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Lecture 5b Images

Slide 5: Responses to Clinical Reminders. Adapted by Dr. Anna Maria Izquierdo-Porrera from Vashitz, G., Meyer J, Parmet, Y, et al. (2009). Defining and measuring physicians' responses to clinical reminders. *Journal of Biomedical Informatics* 42(2):317-26. Epub 2008 Oct 26
Slide 6: Responses to Clinical Reminders. Adapted by Dr. Anna Maria Izquierdo-Porrera from Vashitz, G., Meyer J, Parmet, Y, et al. (2009). Defining and measuring physicians' responses to clinical reminders. *Journal of Biomedical Informatics* 42(2):317-26. Epub 2008 Oct 26
Slide 12: Basic laboratory Alerts. Dr. Anna Maria Izquierdo-Porrera
Slide 14: Practice Reminder Challenges. Adapted by Dr. Anna Maria Izquierdo-Porrera from Lami, J.B., Ebrahiminia, V., Riou, C., et al. (2010). How to translate therapeutic recommendations in clinical practice guidelines into rules for critiquing physician prescriptions. Methods and application to five guidelines. BMC Medical Informatics and Decision Making. 2010 May 28;10:31.
Slide 15: Practice Reminders. Dr. Anna Maria Izquierdo-Porrera
Slide 16: Administrative Reminders. Dr. Anna Maria Izquierdo-Porrera

Student Application Activities

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Component 12/Unit 6

Unit Title
Workflow Design

Unit Description
This unit introduces the learner to good practices for determining current workflow design and whether this design can be supported by HIT. It also presents ways of assisting users to redesign clinical work-flow as needed without loss of quality and safety in the clinical environment. Discussion of questions to ask when determining hard-wired and mobile technology placement is included.

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

1. Assess decision-making requirements in health or health care.
2. Construct a work process flow chart.
3. Appraise ways of incorporating decision-making requirements into HIT design.

Unit Topics/Lecture Titles
6.1 – Workflow Assessment
6.2 – Work Process Flow Charts

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

Lecture 6a

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Lecture 6a Images

Slide 8: An Alarm Clock. Creative Commons. Alan Cleaver_2000. Available from: http://www.flickr.com/photos/11121568@N06/4293345633
Slide 9: Work Process Flowchart. Courtesy Dr. Stephanie Poe
Slide 11: Work Process Flowchart. Courtesy Dr. Stephanie Poe
Slide 12: Work Process Flowchart Symbols. Courtesy Dr. Stephanie Poe
Slide 17: PPD Workflow Courtesy Dr. Stephanie Poe

Lecture 6b

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Student Application Activities

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Component 12/Unit 7

Unit Title
HIT Design to Support Teamwork and Communication

Unit Description
The unit focuses on ways in which HIT can be designed to support care coordination. The focus is on electronic tools to support communication and teamwork during hand-off, care planning, and care transitions. Incorporation of automatic referral requests, data transfer to longitudinal records, and shared problem lists and daily goal forms into the EHR is discussed as well as the utility of electronic whiteboards and clipboard tools.

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

1. Assess the impact of teamwork and communication on patient safety and care coordination.
2. Investigate ways in which HIT design can serve as a barrier to effective communication.
3. Describe ways in which HIT design can enhance communication and care coordination.

Unit Topics/Lecture Titles
7.1 – Communication and care coordination and barriers of HIT
7.2 – Tools to enhance communication and care coordination

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

Lecture 7a

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Lecture 7a Images

Slide 4: A Man's Silhouette. Creative Commons Credits to all-silhouettes.com*

Slide 11: Hospital Discharges. Image courtesy Dr. Stephanie Poe.

Slide 15: Coordination of Care. Image courtesy Dr. Stephanie Poe.

Lecture 7b

1. Anderson, J. Evaluation in health informatics: social network analysis. *Computers in Biology and Medicine*. 2002;32:179-193.
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Lecture 7b Images

Slide 3: IT, Communication, & Workflow. Courtesy Dr. Stephanie Poe

Slide 4: Barriers to Communication. Courtesy Dr. Stephanie Poe

Slide 6: Female Silhouette. Creative Commons Credits to all-silhouettes.com*

Slide 9: Social Network Analysis. Adapted from Anderson et al, 2002 by Dr. Stephanie Poe

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Slide 10: Communication Workflow Support and System Design. Adapted from Anderson et al, 2002 by Dr. Stephanie Poe

Lecture 7c

1. Gurses, A.P. A systematic review of the literature on multidisciplinary rounds to design information technology. *Journal of the American Medical Informatics Association*. 2006; 13(3): 267-276.
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Lecture 7c Images

Slide 3: Female Silhouette. Creative Commons all-silhouettes.com
Slide 4: Communication Tools. Courtesy Dr. Stephanie Poe.
Slide 5: Courtesy Dr. Anna Maria Izquierdo-Porrera. Adapted from: Sehgal, N.L., Green, A., Vidyarthi, AR, et al. Patient whiteboards as a communication tool in the hospital setting: a survey of practices and recommendations. Journal of Hospital Medicine. 2010;5(4): 234-239.
Slide 12: Multidisciplinary Rounds Tools. Courtesy Dr. Anna Maria Izquierdo-Porrera

Unit Suggested Readings

1. Woods, D.M., Holl, J.L., Angst, D., et al. Improving clinical communication and patient safety: clinician-recommended solutions. 2009. Available from: http://www.ahrq.gov/downloads/pub/advances2/vol3/Advances-Woods_78.pdf
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Student Application Activities

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Component 12/Unit 8

Unit Title
HIT and Infecting a Patient Safety Culture

Unit Description
This unit dives into the specifics of how poor design and misuse of technology can place patients and organizations at risk. A strong case is made for the responsibility of users to monitor information systems for risks and to ensure that they use these systems appropriately. Examples of poor design are provided, as well as their impact on patient care. The HIT professional's role in ensuring attention to usability and compatibility with workflow during the design and testing phase of implementation is discussed.

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

1. Apply QI tools to the analysis of HIT errors.
2. Identify strategies for adaptive work that can be useful to HIT initiatives.

Unit Topics/Lecture Titles
8.1 – The BSI Story and CUSP
8.2 – Strategies for Adaptive Work

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

Lecture 8a
1. Quality Matters. A Conversation with Peter Pronovost About Patient Safety Available from: http://www.commonwealthfund.org/Newsletters/Quality-Matters/2010/April-May-2010/Q--A.aspx

Lecture 8a Images
Slide 3: Dr. Peter Pronovost Listens to a Patient's Heart. The photo was taken during filming for Program One - "Silent Killer" at Johns Hopkins University's Hospital and Children's Center for the RAM Campaign. Available from: http://www.ramcampaign.org/pages/campaign_photos.htm
Slide 4: Dr. Peter Pronovost. The photo was taken during filming for Program One - "Silent Killer" at Johns Hopkins University's Hospital and

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Children's Center for the RAM Campaign. Available from: http://www.ramcampaign.org/pages/campaign_photos.htm
Slide 5: Key Topics. Courtesy Dr. Anna Maria Izquierdo-Porrera
Slide 6: Earthrise Over the Lunar horizon.(NASA photo ID AS11-44-6552). Available from: http://nssdc.gsfc.nasa.gov/planetary/lunar/apollo11.html
Slide 7: Planet Earth from the Moon. (NASA photo ID AS11-36-5355). Available from: http://nssdc.gsfc.nasa.gov/planetary/lunar/apollo11.html
Slide 8: A Collage of Association Logos for Agencies Involved in HIT. Image Sources: AHRQ. http://www.ahrq.gov/; Patient Safety. http://www.patientsafety.gov/; World Health Organization. http://www.who.int/en/; Joint Commission. http://www.jointcommission.org/;Institute for Safe Medication Practice. http://www.ismp.org/; Patient Safety. http://www.patientsafety.org/;Nursing World. http://www.nursingworld.org/; ECRI. https://www.ecri.org; AMA. http://www.ama-assn.org/
Slide 9: National Healthcare Disparities Reports and National Healthcare Quality Report. Available from: http://www.ahrq.gov/qual/qrdr09.htm
Slide 11: A Clinician Prepares a Syringe While a Patient Looks On. American Health Information Management Association (AHIMA). Available from: http://informaticsnursing.net/?page_id=119
Slide 12: Automotive Seatbelt. Wikimedia Commons Gerdbrendel. Available from: http://en.wikipedia.org/wiki/User:Gerdbrendel
Slide 13: David H. Berger, M.D. Houston VA. Available from: http://www.houston.va.gov/pressreleases/news_20050207.asp
Slide 14: Nurse. CDC. Available from: http://www.cdc.gov/ncbddd/fasd/training.html
Slide 15: Surgery Dept. of Defense. Available from: http://www.defense.gov/photos/newsphoto.aspx?newsphotoid=6052
Slide 16: Blood Infection Checklist at Johns Hopkins. Available from: http://www.hopkinsmedicine.org
Slide 17: Swan-Ganz- Heparin Coated Catheter. FDA. Available from http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/medsun/news/newsletter.cfm?news=48
Slide 18: Safety Score Card. The BSI Report Card – Dr. Peter Pronovost. Available from: http://www.mhaonline.org/File%20Library/Quality/CLABSI/1-Leading-Change-Who-Are-We-Where-Are-We-Going.pdf
Slide 19: Overview of STOP-BSI Program. Peter Pronovost, MD, PhD Available from: http://www.mhaonline.org/File%20Library/Quality/CLABSI/1-Leading-Change-Who-Are-We-Where-Are-We-Going.pdf

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Slide 20: The Model. Available from: http://www.hopkinsmedicine.org
Slide 21: Dr. Peter Pronovost. Available from: http://www.ramcampaign.org/pages/images/Dr_Pronovost_large.jpg

Lecture 8c

1. Peter Pronovost speech on October 27 2010 at the Legg Mason Capital Management. Full transcript is available from: http://www.leggmason.com/thoughtleaderforum/2010/conference/speakers/pronovost-transcript.asp

Lecture 8c Images

Slide 3: Last Phase of Talk. Courtesy National Institutes of Health. Available from: http://www.ncrr.nih.gov/clinical_research_resources/clinical_and_translational_science_awards/funded_institutions/*
Slide 4: Bathroom Drain. Decafinata. Attribution-ShareAlike 2.0 Generic (CC BY-SA 2.0). Available from: http://www.flickr.com/photos/47799429@N00/290724680/
Slide 5. Dr. Peter Pronovost. The photo was taken during filming for Program One - "Silent Killer" at Johns Hopkins University's Hospital and Children's Center for the RAM Campaign. Available from: http://www.ramcampaign.org/pages/campaign_photos.htm
Slide 6. Change. Flickr Creative Commons Commercial: Time for Change. Available from: http://www.sharedvisions.ca/wp-content/uploads/2010/12/Change.jpg
Slide 7. Bethlem Royal Hospital Author: Philip Talmage (Creative Commons Attribution 2.0 Generic). Available from: http://www.london-traveltips.com/bethlem-royal-hospital-archives-and-museum.htm

Unit Suggested Readings

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Student Application Activities

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Component 12/Unit 9

Unit Title
HIT Implementation Planning for Quality and Safety

Unit Description
This unit focuses the attention of the learner on ways in which HIT implementation can be managed to ensure the quality and safety are maintained during the transition period. Use of internal support pools, super-users, and front-line clinical experts to provide at-the-elbow support during the transition period is discussed. Emphasis is placed on the need for local adaptation and ongoing development of skills so that users can gain expertise in safe use of electronic health records and other information technology.

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

1. Critique an implementation team and the roles they play in ensuring quality
2. Analyze effective implementation planning
3. Assess the quality implications of “big bang” versus staggered approaches
4. Discuss “go live” support strategies that minimize risk

Unit Topics/Lecture Titles/Lecture Titles
9.1 – The Implementation Team and Effective Implementation Planning
9.2 – Go-Live Support Strategies

Unit References

Lecture 9a

1. Bridges, W., Bridges, S. *Managing Transitions. Making the Most of Change.* 3rd edition. Philadelphia, PA: DaCapo Press. 2009
2. Chin, H.L. The reality of EMR implementation: lessons from the field. *The Permanente J*, 2004 Fall;8(4):1:7 Available from: http://xnet.kp.org/permanentejournal/fall04/reality.html*
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Lecture 9a Images

Slide 4: Effective Implementation Teams – Team Characteristics..Adapted from Mickan and Rodger by Dr. Anna Maria Izquierdo-Porrera
Slide 13: HIT Implementation Strategies. Dr. Anna Maria Izquierdo-Porrera

Lecture 9b

1. Gruber, D., Cummings, G.G., Leblanc, L., Smith, D.L. Factors influencing outcomes of clinical information systems implementation: A systematic review. Comput Inform Nurs. 2009 May-Jun;27(3):151-163
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Lecture 9b Images
Slide 3: The Universe's "Baby Picture." Courtesy NASA. Available from: http://science.nasa.gov/astrophysics/focus-areas/what-powered-the-big-bang

Student Application Activities
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Component 12/Unit 10

Unit Title
Measuring Quality

Unit Description
This unit we will discuss the basics of measurement for quality. We will introduce the concepts of understanding variation. We will also discuss the fact that the design of electronic documents and flow sheets have a significant impact on the ability to extract quality measures from the resulting database. The importance of rigorous design and testing of system reports used for quality purposes is emphasized. Sample quality measures that are frequently requested of HIT systems are identified, and questions that guide data extraction are suggested.

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

1. Understand the basic concepts of variation.
2. Explain the attributes of an effective reporting system.
3. Examine the importance of having standardized and structured health information so that you can use those data to make valid reports.
4. Discuss how HIT can facilitate data collection and reporting for improving quality of care and patient safety.

Unit Topics/Lecture Titles
10.1 Measuring Patient Safety

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

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Lecture 10 Images

Slide 5. Different interpretations of variation. Adapted From Nolan TW, Pronovost LP. Understanding variation. Quality Press. 1990 (May)
Slide8. Graphical Representation of Data. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 9. Run Charts. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 12 Statistical Rules to identify non-random signals in run charts. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 13. Statistical Rules to identify non-random signals in run charts. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 14. Statistical Rules to identify non-random signals in run charts. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 15. Statistical Rules to identify non-random signals in run charts. Adapted from Perla, Provost & Murray (2011) by Dr. Anna Maria Izquierdo-Porrera
Slide 16. P.O.B. Dr. Anna Maria Izquierdo-Porrera

Student Application Activities

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Unit Suggested Readings

1. Behn, R.D. Why Measure Performance? Different Purposes Require Different *Measures Public Administration Review*. September/October 2003, Vol. 63, No. 5

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Component 12/Unit 11

Unit Title
Data Quality Improvement

Unit Description
This unit will introduce the learner to the importance of data quality and the role of the HIT professional in monitoring and ensuring the quality of data in clinical information systems. The theme of this unit is “beginning with the end in mind” and a review of both measurable and intangible dimensions of data quality is provided. Examples of each dimension are reviewed and a business case for quality is presented.

Unit Objectives

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

1. Understand the different purposes of data.
2. Discuss the impact of poor data quality on quality measurement.
3. Identify ten attributes of data quality and key process recommendations.
4. Explore the attributes of data quality and key process recommendations for maintaining data integrity.
5. Discuss common causes of data insufficiency.
6. Describe how health information technology design can enhance data quality.

Unit Topics / Lecture Titles

11.1 Characteristics and use of data.
11.2 Common causes of Insufficient Data Quality and Design Recommendations.

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

Lecture 11a

1. American Health Information Management Association (AHIMA).Available from: http://Ahima.org
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4. OLR Backgrounder: Electronic Health Records and "Meaningful Use" October 12 2010. Available from: http://www.cga.ct.gov/2010/rpt/2010-R-0402.htm
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Lecture 11a Images

Slide 3.Data and Healthcare. Dr. Anna Maria Izquierdo-Porrera. AHIMA
Slide 5. Health Quality Measure Format (HQMF). Dr. Anna Maria Izquierdo-Porrera
Slide 7. Data Quality Management Model. Dr. Anna Maria Izquierdo-Porrera

Lecture 11a Charts, Tables, and Figures

Table 11_1. QI. Vs Research. Adapted by Dr. Anna Maria Izquierdo-Porrera from Solberg et al (1997)

Lecture 11b References

1. American Health Information Management Association (AHIMA).Available from: http://Ahima.org
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Lecture 11c References

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Lecture 11c images

Slide 5. Data Quality Enhancement Opportunities. Adapted by Dr. Anna Maria Izquierdo-Porrera from Arts at al (2002).
Slide 6. Best Practices: Prevention. Dr. Anna Maria Izquierdo-Porrera
Slide 7. More Best Practices: Prevention. Dr. Anna Maria Izquierdo-Porrera
Slide 8. Best Practices: Detection. . Dr. Anna Maria Izquierdo-Porrera
Slide 9. Best Practices: Improvement Actions. Dr. Anna Maria Izquierdo-Porrera

Student Application Activities

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Additional Resources

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Component 12/Unit 12

Unit Title
Learning from Mistakes: Error Reporting and Analysis and HIT

Unit Description
This unit is designed to assist the learner in understanding the role of HIT in error detection and reporting and analysis of errors. The unit pulls together the links between learning from mistakes and the science of safety and safe culture. It includes a review of three tools for error detection and reporting: automated surveillance systems, error reporting systems, and predictive analytics and modeling. Examples of two powerful quality improvement tolls (root cause analysis and failure mode effects analysis) are provided and the role of HIT professional in contributing to these efforts is discussed.

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

1. Explain how reporting errors can help to identify HIT system issues.
2. Describe ways in which HIT can facilitate error reporting and detection.
3. Assess HIT for unintended negative consequences.
4. Examine common themes in HIT design deficiencies.
5. Apply QI tools to examine HIT errors.

Unit Topics/Lecture Titles
12.1 HIT, Error Detection, and Reporting
12.2 Quality Improvement Tools and HIT

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

Lecture 12a

1. AHRQ Patient Safety Network. Glossary. Available from: http://psnet.ahrq.gov/glossary.aspx
2. AHRQ. Glossary: Failure Mode Effects Analysis. Available from: http://webmm.ahrq.gov/popup_glossary.aspx?name=failuremodeandeffectanalysis

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3. Kilbridge PM, Classen DC. The informatics opportunities at the intersection of patient safety and clinical informatics. *J Am Med Inform Assoc*. 2008 Jul-Aug;15(4):397-407. Epub 2008 Apr 24.
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Lecture 12a Images

Slide 4. Adapted from Reason J. Human Error: Models and Management. BMJ 320:768 2000. by Dr. Peter Pronovost. Available from: http://www.bmj.com/content/320/7237/768.long
Slide 5. Adapted from Reason J. Human Error: Models and Management. BMJ 320:768 2000. by Dr. Peter Pronovost. Available from: http://www.bmj.com/content/320/7237/768.long
Slide 9. Automated Surveillance Systems. Dr. Anna Maria Izquierdo-Porrera .
Slide 10. On-line Event Reporting Systems. Dr. Anna Maria Izquierdo-Porrera .
Slide 12. On-line Event Reporting Systems - Hierarchical. Dr. Anna Maria Izquierdo-Porrera .
Slide 13. Health care data repositories . Dr. Anna Maria Izquierdo-Porrera .
Slide 14. Types of Outcomes. Dr. Anna Maria Izquierdo-Porrera

Lecture 12b

1. AHRQ Patient Safety Network. Glossary. Available from: http://psnet.ahrq.gov/glossary.aspx
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Lecture 12b Images

Slide 4. Types of Error. Dr. Anna Maria Izquierdo-Porrera
Slide 5. Types of Error II. Dr. Anna Maria Izquierdo-Porrera

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Lecture 12c

1. AHRQ Patient Safety Network. Glossary. Available from: http://psnet.ahrq.gov/glossary.aspx
2. AHRQ. Glossary: Failure Mode Effects Analysis. Available from: http://webmm.ahrq.gov/popup_glossary.aspx?name=failuremodeandeffectanalysis

Lecture 12c Images

Slide 3.Quality Improvement Tools. Dr. Stephanie Poe
Slide 5. Root Cause Analysis. Dr. Stephanie Poe
Slide 6. Daughter. Dr. Stephanie Poe
Slide 15.Failure Mode Effects Analysis. Dr. Stephanie Poe
Slide 18. FMEA: Steps. Dr. Stephanie Poe
Slide 22.FMEA Diagram. Dr. Stephanie Poe
Slide 24.Quality Improvement Tools. Dr. Stephanie Poe

Lecture 12c Charts, Tables, and Figures

Table12.1 Conduct a Hazard Analysis. Dr. Stephanie Poe
Table12.2 Conduct a Hazard Analysis II. Dr. Stephanie Poe

Student Application Activities

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Component Acronym Glossary

ACO—Accountable Care Organization
AAP—American Academy of Pediatrics
AAFP—American Academy of Practitioners
ACP—American College of Physicians
AOA—American Osteopathic Association
ASPs—application service providers
AHIMA —American Health Information Management Association
AHRQ—Agency for Healthcare Research and Quality
AMA—American Medical Association
BSI—bloodstream infections
CAH—Critical access hospitals
CAT (scan)—computerized axial tomography
CAPS—Consumers Advancing Patient Safety
CDS—clinical decision support
CDSS—clinical decision support systems
CICU—cardiac intensive care unit
CIM—Contextual Implementation Model
CIS—client information system
CLAS— culturally and linguistically appropriate services
CMS—Centers for Medicare & Medicaid Services
COWS—Computers on Wheels
CPOE—Computerized Provider Order Entry
ED—Emergency Departments
EHR—Electronic Health Record
eMAR—electronic medication record
FMEA—Failure Mode Effects Analysis
HIE—Health information exchange
HIMS— Healthcare Information and Management Systems Society
HIT—Health Information Technology
HITECH—Health Information Technology for Economic and Clinical Health
ICU—Intensive care unit
IHI—Institute for Healthcare Improvement
IJ—Internal Jugular
IOM—Institute of Medicine
IT—Information Technology
ISMP—Institute for Safe Medication Practices
MLM—Medical logic module
mmHg—Millimeters of Mercury

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MRI—Magnetic resonance imaging
NCNQ—National Center for Nursing Quality
NCPS—National Center for Patient Safety
NPSF—National Patient Safety Foundation
OR—Operation room
POE—Provider Order Entry
PSO—Patient Safety Organization
RCA—Root Cause Analysis
SEIPS—Systems Engineering Initiative for Patient Safety
SICU—Surgical Intensive Care Unit
WICU—Weinburg Intensive Care Unit
WHO—World Health Organization
WNL—within normal limits

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